

looking at the numbers displayed on the infusion pump. I have been using a nomogram (table 1) for a long time to make a dilution of any drug, which converts the pump setting directly to the drug infusion rate numerically. For example, if you have a 70-kg patient and dilute 100 mg of any drug to 23.8 ml, the pump set number in ml/h will be equal to the rate of drug infusion in $\mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$. If you are dealing with 10 mg of a drug and dilute it to the same volume, you can simply move the decimal point one place to the left in order to think in terms of $\mu\text{g} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$.

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Medical Protocol by Habit—The Avoidance of Amide Local Anesthetics in Malignant Hyperthermia Susceptible Patients

To the Editor:—Those of us who have a special interest in caring for malignant hyperthermia susceptible (MHS) patients often are questioned by other physicians asking if a certain procedure could be done safely under local or regional anesthesia. Many of us have responded that, among many other things, the amide type local anesthetics are contraindicated,¹ whereas the ester type are acceptable.²

Where did we get this idea? In my case, I learned it from my mentors and from many articles that cautioned me to avoid the amides, since the amides might cause an MH reaction by releasing calcium from the sarcoplasmic reticulum, and use only the ester anesthetics in my MHS patients. Questioning other physicians involved in MHS patient care yielded the same caveat but no specific case reports or references. After an extensive search of the literature, I have been unable to find any reports of any malignant hyperthermic crisis caused solely by the use of amide local anesthetics without epinephrine. On the contrary, there is a report³ of a spinal anesthetic with tetracaine followed by procaine infiltration resulting in an acute febrile reaction in an MH survivor. There is also a report that high blood levels of two different amide local anesthetics given experimentally to MHS pigs did not induce malignant hyperthermia⁴ and another study showing that lidocaine administered to MHS pigs beyond the level of systemic toxicity did not stimulate any signs of MH.⁵ Since these pigs have been inbred to be highly susceptible to MH and are probably more susceptible than almost every affected human, their failure to demonstrate signs of MH would lend credence to the thought that amide local anesthetics may be safe in human MHS patients. Furthermore, lidocaine has been used suc-

cessfully to treat the arrhythmias of a severe MH reaction⁶ and, in fact, lidocaine has been used routinely as a local anesthetic without problems on MHS patients in at least one institution.*

The amide local anesthetics often are desirable, since they are able to provide better penetration of tissue and, except for tetracaine, greater duration of action⁷ than the esters. These characteristics, along with decreased allergenicity,^{8,9} combine to help protect our MHS patients from several other potential stresses during a procedure, and stress itself has been implicated in causing episodes of MH.¹⁰

The question I am posing is clear. Is there any evidence that amide local anesthetics are contraindicated in MHS patients, or is our habit of avoiding them just a habit?

MICHAEL G. ADRAGNA, M.D.
Assistant Professor
Department of Anesthesiology
State University of New York at Buffalo
462 Grider Street
Buffalo, New York 14215

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Computerized Anesthesia Record

To the Editor:—The past few years have produced a growing number of articles on how computers have been adapted for use in clinical practice. We want to report on a system that uses proprietary software to generate an anesthesia record.

The computer used is the Radio Shack® Model 100, which is lightweight and portable. It offers several advantages over its larger relatives, most notably, that it has batteries, which allow it to be operated without a power cord and to retain data in its memory while shut off. It rests on the anesthesia machine without obscuring gas gauges or monitors and is easily transportable to recovery room or intensive care unit for final patient evaluation. Despite its compactness, it can drive the same peripherals used by other personal computers.

The computer's liquid crystal display lists subsections of a typical anesthesia record in menu fashion. Once a subsection is selected, the user is prompted to make data entries and also is instructed on how to make them. The operation of the computer becomes familiar in about the same time it takes to learn a video game.

Vital signs data may be entered manually or automatically through the RS-232 interface. This acquires the information from any equipment with a compatible interface. Products that currently or soon will have this capability include monitors, both invasive and noninvasive, mass spectrometers, anesthesia machines, infusion pumps, and even urimeters. The internal clock of the computer assures the timely acquisition of the data without disrupting any ongoing activity.

The system has been designed for flexibility, in that it visually reminds the user to input information but does not require that any entry be made. Furthermore, entries can be made in any order at any time before, during, or after the case. The machine allows full editing of any data, whether entered manually or automatically. Residents or student nurses can devise anesthetic plans that then could be altered if necessary.

Printing of the record takes place outside of the operating room, which means virtually noise-free operation during the case. A Hewlett-Packard® 7470A plotter prints the record with accuracy and clarity, heretofore unattainable. It is equipped with two pens of optional colors, which allow the fixed portions of the record to be plotted with one color and the variable data with another. Any number of identical copies can be made as well as stored on tape or disc. Figure 1 shows a sample record generated by the system. Unlike preprinted records, no information is included unless it has been entered purposely.

What is the cost-benefit of the computerized record? No definitive study has been done. A more legible and accurate record is a better defense in malpractice suits. Use of the automated record therefore may even decrease malpractice premiums.

The software can be obtained from United Medical Technologies, 848 Walnut Street, Allentown, Pennsylvania 18102, for \$2,000. The computer and plotter can be purchased for about \$2,100.

ALLAN S. ROSEN, M.D.
Staff Anesthesiologist
Ormond Memorial Hospital
875 Sterthaus Drive
Ormond Beach, Florida 32074
Humana Hospital
400 North Clyde Morris Blvd.
Daytona Beach, Florida 32014

WALTER ROSENZWEIG, PH.D.
Technical Consultant
1407 Stoneridge Road
Allentown, Pennsylvania 18104

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