few will want to read the text in its entirety, because the accounts tend to become repetitious, and Snow's motivation for keeping such a chronicle over the period of 15 yr is not apparent. However, anyone interested in anesthesia will profit by thumbing through the book randomly choosing selections from the large amount of material presented. A brief section on Snow's prescription records with tables summarizing medicines popular in Victorian times, their actions, and directions for their use will assist modern physicians to follow Snow's nonanesthetic practice. Another most helpful feature of the volume is provision of five separate indexes to categories of information presented in the text: dentists, surgeons and other medical men, patients and others, medical conditions, and places mentioned. In the comments on the brief case histories presented, one can discern the origins of many of the observations and conclusions recapitulated in Snow's book on the inhalation of chloroform.

Many questions and conclusions will strike the mind of the contemplative anesthetist on perusing these pages. When compared with medical writings from the era of Dr. Thomas Beddoes and his contemporaries less than two generations previously, advances in medical knowledge and accuracy of diagnosis in the interval become apparent. Snow's terminology is modern, and there is seldom any doubt as to the nature of the medical conditions with which he was dealing. An engaging profile of mid-19th century surgical practice emerges. The most common conditions encountered appear to be genitourinary or rectal problems, but a wide variety of complaints were treated. Opening of body cavities was avoided whenever possible, and strangulated hernia was almost always a lethal situation. Cupping and leeches were used by Snow in his practice, and he occasionally administered anesthetic vapors therapeutically for treatment of various disease states. Chloroform was the agent most commonly used, but he occasionally used ether, amylene, and the Dutch Liquid.

Snow often described the anesthetic course of his obstetric deliveries in far greater detail than many of his other cases, which may indicate his particular fondness for and interest in this branch of medical practice. His patients, sometimes from notable families, are identified in detail. He often included their address, family relationship, ethnic origin, and other personal facts. One can easily locate the accounts of his administrations of chloroform to Queen Victoria for labor and delivery. (On one of these occasions, Prince Albert administered chloroform to the Queen before Snow's arrival.)

Snow did not write much about upper airway obstruction occurring with anesthesia despite the presence in some of his patients of anatomic features that predispose to this problem, such as extreme obesity. Perhaps he was so highly skillful in managing this situation that it was not a concern to him. Also, a very high percentage of his patients vomited meals that they had taken immediately before anesthesia. Snow did not recognize the danger of this situation. One would have thought that, perhaps for no other reason than aesthetics, he would at some time in his career begin insisting on preanesthetic fasting.

"The Case Books of Dr. John Snow" deserves an honored place in the literature relating to anesthesia's past. The volume will be a valued addition to every collection dealing with the history of anesthesia.

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Anesthesia Simulator Consultant. Version 2.0. By Schwid HA, O'Donnell D. Issaquah, Anesoft, 1995. Price: $495.00.

Training anesthetists to manage rare but life-threatening events is difficult in the clinical setting. Simulators are ideally suited to this task and have been used extensively in other fields, such as aviation. However, complete simulation of critical anesthesia-related events in an operating room setting is costly and available at only a handful of centers. The promotional literature for version 2.0 of the *Anesthesia Simulator Consultant* (*ASC*) suggests that this personal computer program provides many of the features of a complete simulation for a fraction the cost. Although the idea is intriguing and many interesting cases are provided, the program's idiosyncrasies detract from the overall learning experience.

ASC is available for both the Macintosh and the MS Windows environments. Installation is straightforward on both systems, and we had no problem using the program on laptop and desktop computers. The 77-page instruction booklet includes information on installing and operating the program, the learning objectives for each of the 80 included patient scenarios, and the pharmacologic and physiologic models used for determining the effects of various interventions.

After starting the program, the user is offered the opportunity to select one of the simulated cases (*e.g.*, an 86-yr-old debilitated woman for total hip replacement) from a menu. The first five of these are designed as examples and offer the user an opportunity to select the types of critical incidents that will occur. The remaining cases are categorized according to the particular subspecialty area (*e.g.*, pediatric, neurosurgical, cardiac, and outpatient anesthesia) or the patient's underlying disease state (*e.g.*, hepatic, cardiac, pulmonary, or renal dysfunction). After this selection, you are presented with a vignette describing the patient's medical history, physical examination, laboratory data, and other factors useful in planning patient management. Read this carefully: once the simulation starts this information cannot be reaccessed. Clicking on "OK" brings the user to the main patient status screen. This includes real-time electrocardiogram, capnograph, and invasive pressure monitoring traces, as well as digital readouts for noninvasive blood pressure, pulse oximeter, spirometry, end-tidal gas analysis, and intravenous infusions. There is also a simulated anesthesia machine with flowmeters for oxygen, air, and nitrous oxide as well as a color-coded vaporizer capable of delivering the currently used potent anesthetics, including desflurane and sevoflurane. Finally, there is a still picture of the patient that shows the status of airway management (mask, endotracheal tube, or cricothyroidotomy); however, this picture does not reveal changes in the patient's skin color, level of consciousness, presence of seizures, or other events that would be immediately apparent from observing a real patient.

To obtain additional information about the patient, it is necessary to actively request data by using the menu bar at the top of the screen. Options here include "Patient" (*e.g.*, breath sounds, mental status, pulse, neurologic exam), "Monitor" (*e.g.*, train-of-four, noninvasive and invasive blood pressure), and "Vent" (*e.g.*, check circuit). Note that these options provide information at only a single time. For example, to observe changes in mental status, it is necessary to repeatedly select "Mental status" from the "Patient" menu; otherwise, the program will not indicate that any change has occurred. Changes in patient management also are handled *via* the menu bar. Selections include "Fluids," "Airway" (*e.g.*, place mask, laryngoscopy, cricothyroidotomy), "Vent" (*e.g.*, spontaneous, bag control,

ventilator), "Drugs" (*e.g.,* narcotics, neuromuscular, cardiovascular), and "Surgeon" (*e.g.,* preparation, make incision, start cardiopulmonary resuscitation). This interface is somewhat cumbersome, for it is frequently necessary to navigate through several submenus before selecting the proper intervention. While changes in patient management are being selected, the patient may continue to deteriorate. This is particularly disconcerting when the menu location of a particular intervention is not immediately apparent.

One of the choices available from the "File" menu is "Accelerate." This option, which disables the real-time waveforms, would seem ideally suited to situations when "nothing is happening." Beware: after waiting 5 min for an interscalene block to take effect, the only indication that our "patient" suffered a seizure was a change in the digital pulse oximeter readout. The program provided no warning that a change had occurred, did not automatically switch out of accelerated mode, and did not offer the option of backtracking to the point where the "patient" began to deteriorate. We repeated the simulation in real-time mode and found that the first indication of an abnormality was a slight drop in Sp_{O_2}; this was subtle, because there is no "beep" tone accompanying the pulse oximeter and no indication of a change in respiration. Although previous checks of mental status indicated "awake and alert" with no premonitory signs of local anesthetic toxicity, clicking on "Mental status" revealed that the patient was "unresponsive."

Several other idiosyncrasies detract from the teaching value of the simulations. For example, even in healthy simulated patients, the electrocardiogram monitor frequently shows PVCs when $P_{ET_{CO_2}}$ increases to about 45 mmHg. Inspired gas composition responds very slowly to changes in flowmeter settings; real circle absorbers are designed to deliver fresh gas preferentially to the patient rather than for uniform mixing. Don't forget to flush oxygen whenever applying the mask or beginning ventilation *via* an endotracheal tube; otherwise, inspired oxygen concentrations will be much lower than you expect, even with maximum (71/min) oxygen inflow. After administering succinylcholine to a "patient" with previous burn injuries, we discovered yet another problem: The ECG went from its normal configuration directly to ventricular fibrillation without demonstrating peaked T-waves or other indications of hyperkalemia.

A unique feature of the program is the availability of an on-line "Consultant." This menu is designed to offer context-sensitive suggestions regarding the cardiovascular, respiratory, and pharmacologic aspects of case management. For example, clicking on "Cardiovascular" when a patient's heart rate exceeds 100 beats/min reveals suggestions regarding the differential diagnosis and management of tachycardia; calculated values for systemic and pulmonary vascular resistances are also available from this menu. The "Pharmacology" consultant offers a brief profile and recommended doses of many anesthesia-related drugs; after a drug has been "administered," plots of plasma and effect site concentrations as a function of time can be displayed. The consultant also offers general information regarding the learning objectives of each case. However, the absence of feedback regarding the appropriateness of the various patient management decisions made during the simulation is a serious drawback.

Once a case has been completed, you are presented with the option of printing the "case log," which records the patient's status as well as the interventions made throughout the case. This can be used to review one's performance and may be submitted to the publishers for continuing medical education credit ($\frac{1}{2}$ h per case).

In summary, although *ASC* 2.0 suggests the potential of desktop anesthesia simulation, numerous shortcomings must be addressed to improve its utility as a realistic teaching tool. For example, the computer's internal speaker or a sound card could easily be configured to simulate the saturation-dependent "beep" of a pulse oximeter. An option should be provided to allow for automatic repetition of common patient evaluation functions such as mental status, breath sounds, and neuromuscular monitoring. The accelerated mode should automatically terminate when a significant change in patient status occurs. Better feedback should be provided to indicate the specific causes underlying abnormalities in patient physiology. With the implementation of these improvements, the next version of the program might prove to be an effective means of training and evaluating students of anesthesiology.

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