
ABSTRACT. The typical, handwritten anesthesia record of the 1980s does not satisfy its many users. The document is used for clinical care by the anesthetist, nurses, physicians, and technicians in postanesthesia, intensive, and postoperative surgical care units; for historical information by the billing officer, the statistician, and the anesthetist in preparation for a future anesthetic; and for the review of the quality of care by clinical peers and lawyers. For all of these users the typical record contains some to much unnecessary information and lacks some to much needed information. Electronic capture, storage, retrieval, and formatting of data can generate electronic displays or paper records tailored to answer the needs of specific users. The anesthetist in particular will benefit from a well-designed system that takes the place of the traditional handwritten anesthesia record.


Currently, the typical anesthesia record is a paper document with information that serves not only the anesthetist practitioner during the administration of anesthesia, but also others in several strikingly different, specific settings (Table). The record contains demographic, historical, administrative, and clinical information. During and soon after anesthesia, the record is consulted for data helpful in making clinical decisions. At other times it serves as a source of historical information and in the review of the quality of care. It will become apparent that for every setting the typical anesthesia record is burdened with superfluous information while it fails to contain intelligence that would be of assistance in one of the other settings. No single-page, handwritten record will be able to satisfy all users.

An examination of the information sought from the anesthesia record in the different settings can be helpful in the design of future data display systems that will exploit the advantages of electronic data storage and retrieval [1]. If electronic capture, storage, retrieval, and display of anesthesia-related information could be accomplished with ease and without loss of data in case of system failure, a computerized anesthesia data system would have many advantages over the current anesthesia paper record.

FORMAT OF DATA

Before focusing on the content of the paper record itself, it will be helpful to analyze the format of data captured on the record. In general, the data come in three guises: text, lists, and graphics.

I classify everything as text that is expressed in sentences, phrases, or words and that has not been repre-
Uses of the Anesthesia Record

Clinical Care
- During anesthesia
- In the postanesthesia care unit
- In the intensive care unit
- In the posturgical ward

Historical information
- For billing
- For the generation of statistics
- For review of a previous anesthetic

Quality of care review
- For peer review
- For legal defense

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sent by a number or is contained in prepared lists or forms. Text includes words or abbreviations entered by the user.

Lists are used to capture single events that may be checked off in prearranged and labeled spaces, and material that is charted numerically. Examples are tables of chemical data, symbols for events (for example, the beginning of anesthesia) entered on a time plot, and numbers showing changes over time (see Fig 1 for the repeated listing of oxygen saturation and end-tidal carbon dioxide tensions).

I consider as graphics, data that have been plotted on a prepared grid, usually showing the height of the variable on one axis and time on the other. The typical heart rate charted once every 3 to 5 minutes, or more often, represents one of the historically oldest graphic presentations. Graphic portrayals also include electrocardiograms, roentgenograms, and hand-drawn sketches.

USE DURING ANESTHESIA

For the sake of legibility, the original handwritten record shown in Figure 1 is reproduced after typing the document and spelling out some of the abbreviations (Fig 2). The focus of this discussion is not a comparison of this record with other paper records, but a generic examination of handwritten records. Therefore, I did not attempt to find or write a perfect record nor shall I attempt criticism of the anesthetic. Several of the shortcomings of this individual record (for example, fluid therapy, mixing trade and generic names, giving doses in milliliters instead of milligrams, inconsistencies in recording urine output, or not explaining what was done with the central venous catheter) were not corrected.

Text

The anesthesia record is used to write terse statements but, because of limited space, not whole sentences. This invites the use of abbreviations that are meaningful only to the user, and that can be obscure even to the user when challenged years later to decipher the meaning of a barely legible abbreviation. When the need for prose arises, for instance in the unusual circumstance of a cardiac arrest, an extra sheet of paper is used.

Observe that in this typical anesthesia record much text is devoted to the recording of single events or details of no interest to the anesthesiologist during anesthesia. For instance, the name of the surgeons and the facts that the patient's eyes were "lubed" and taped, that monitors were applied, and that the patient had spontaneous respiration, a sustained tetanus, and good reflexes at the end of anesthesia when the tube was removed contribute nothing to the intraanesthetic care of the patient. These and some other facts may be of interest to the personnel in the postanesthesia care unit (PACU) or in the post-hoc assessment of the quality of care, but not in the ongoing care of the patient during anesthesia itself.

While this record contains text superfluous to the patient's care, it fails to offer other text of potential use, for example, relevant details gathered during the preoperative evaluation of the patient. In current medical records, often amounting to several volumes, such historical medical information is difficult to locate and tedious to extract. A separate paper record of the preoperative anesthetic evaluation can help to shorten the search for a specific bit of medical intelligence, but paper records are limited by size and flexibility. Preoperative information stored electronically, collated automatically, and displayed on demand and for as long as needed would be of great help to the practitioner in the operating room. Such textual historic information is needed, for example, if the preoperative therapy of a diabetic, hypertensive, or asthmatic patient demands review because of an unexpected change in the patient's intraanesthetic status. Also, when the anesthesiologist asks to be relieved, the colleague stepping in will wish to review the patient's medical history.

List

Much information of interest to the anesthesiologist during anesthesia comes from lists. For example, in this record (see Fig 2) the dose and the time of administration of vecuronium was noted by the clinician; the drug has a reasonably predictable duration of action and may have to be readministered before the anesthetic has run its course. The administration of fluids was also listed so that their total could be ascertained and compared with the estimated loss of fluids, which was also listed.

Also listed on the sample record shown in Figure 2