Tabulation of Anesthetic Data: An Improved System

DANIEL C. MOORE, M.D.,* L. DONALD BRIDENBAUGH, M.D.,* PHYLLIS A. BAGGI, M.D.,* PHILLIP O. BRIDENBAUCH, M.D.,* HERBERT STANDER,† AND GORDON B. THOMAS ‡

To date, a comprehensive, generally acceptable system which will produce accurate anesthetic data has not been developed.1-20 For many anesthesiologists, some sort of record keeping is a "necessary evil"; therefore, a system which will produce accurate, reliable statistics, yet conserve the anesthesiologist's time and provide an incentive to keep pertinent data is continually being sought. Data processing through a computer-oriented approach is the only practical solution, and the anesthetic record is the essential ingredient.

A new anesthetic record has been developed which: (1) can be coded by the anesthetist (physician, nurse, etc.); (2) is flexible, open-ended and adaptable to all types of anesthetic practice; (3) can be employed to compare data from many institutions; (4) improve record keeping; (5) provides for comparison of data; and (6) reduces the amount of space necessary for storage of records. The record is an integral part of a computer-oriented system for processing anesthetic records. The system has been researched since June 1964. From June 1966 it has been our method of tabulating anesthetic data.

*The Mason Clinic and Virginia Mason Hospital, Seattle, Washington.
†Sterling-Winthrop Research Institute, Rensselaer, New York.
‡Winthrop Laboratories, Medical Communications Division, 80 Park Avenue, New York, N. Y.
Presented at Work in Progress Section of the annual fall meeting of the American Society of Anesthesiologists, Las Vegas, Nevada, October 1, 1967.

The record presented here is similar to those presently employed by most anesthesiologists. However, areas for entering data are placed in specific locations. In addition, other boxes for coding are available if the anesthesiologist desires to use them and subject his material to analysis at any future date. The record is not complex; it is designed specifically for computer analysis, and all data may be transferred directly to 80-column computer cards. The categories are rigidly defined by a dictionary of terms, yet open-ended in all categories, that is, multipurpose-oriented. The record may be used for all age groups, for surgical and obstetrical procedures as well as therapeutic and diagnostic blocks, regardless of whether general or regional anesthetic methods are selected.

The record is printed on three sheets and a cardboard. The first sheet is used for physician billing. The second sheet is the same as the front of the cardboard; when completed at the end of a procedure, it is placed in the patient's chart (fig. 1). The third sheet is designed to contain anesthetic and surgical data necessary to make hospital charges for material. It is completed by the operating room supervisor and sent to the hospital business office for posting on the patient's bill. The first and second sheets may vary, depending on the type of anesthetic practice and hospital requirements for billing of material charges. The cardboard record, which must be standard to accomplish its purpose, is kept.
CLINICAL WORKSHOP

Fig. 1. Front of cardboard anesthetic record.
Fig. 2. Back of cardboard anesthetic record.
by the anesthetist. Information about pre-
and postoperative rounds is written on it, as
well as the anesthetic method and the course
of anesthesia (Figs. 1 and 2). When the data
are recorded, the chart is stored or sent for
computer analysis.

The record uses a business (addressograph)
plate and employs a carbonless duplication sys-
tem. The dictionary of terms for the items
which are not self-explanatory is present on
the back of the first three sheets, and wherever
possible, employs standard nomenclature.11

ADVANTAGES

Conservation of Anesthesiologist's Time:
The "write-it-once" system, along with the
business (addressograph) plate, conserves time
and avoids mistakes. The dictionary of terms
on the back of the first three sheets is a rapid
reference for code numbers so that all coding,
with the exception of postoperative rounds,
can be done prior to and during the operative
period. For all studies, but for routine reports:
in particular, i.e., hospital accreditation, Ameri-
can Board of Anesthesiologists' information,
etc., this system is a time-saver, because once
the record is coded, the computer will provide
the necessary information.

Flexibility: The system may be used for all
types of anesthetic practice. The record which
is the principle part of the system is similar
to those used by most anesthetists. Although
the record is designed for coding, it need not
be used for that purpose. Space is available
to write in all data required on anesthetic
records now in use.

Uniformity: The data obtained are current,
not retrospective. Any or all institutions in
the United States, as well as those over the
world, could thus compare data, provided a
standard dictionary of terms is agreed upon.
This would permit large-scale studies to be
done in many institutions and allow for the
accumulation of a large series of cases as was
done in the National Halothane Study.12

Security: Area code number and institu-
tional number, as well as the record identifi-
cation number, could be placed on the record
by the manufacturer prior to distribution to an
institution. The institution would then assign
numbers to personnel. The distributor of the
record, but no one else, would know the insti-
tution; and only that institution, not the dis-
tributor, would be able to identify specific
personnel.

Improved Standard of Record Keeping
and Practice: Data must be entered in spe-
cific areas to complete the record. If the rec-
cords are turned in when postoperative rounds
are completed, and a secretary checks the rec-
cords for boxes which are left uncoded, the rec-
cord can be returned to the anesthetist and
data recovered while the procedure is still
fresh in memory. Furthermore, requesting
specific items makes the anesthetist aware of
the details of his practice.

Storage of Records Eliminated: The tapes
used in our system, on reels which are ap-
proximately one inch wide and ten inches in
diameter, will accommodate approximately
10,000 records. Obviously, tapes will require
less space than cardboard records.

Type of Computer: Most computers may
be employed. All of our programming to date
has been for a relatively low-powered
business-type computer with magnetic disc
storage. Any digital computer having auxiliary
storage is adequate for tabulating data
from this chart.

DISADVANTAGES

Unfortunately, the computer itself is often
identified as the problem rather than the fol-
lowing set of factors leading up to the use
of the computer.

Errors of Omission: In filling out compre-
prehensive forms, there are often errors of omi-
sion. For this reason, an entry is required in
every category on the record, if for no other
reason than to insure that negative entries are
intentional and not lapses in memory.

Errors of Commission: Most of these are
introduced through: (1) illegibility or the
writer applying insufficient pressure in writing
to give a clear duplicate copy; (2) entries not
recorded according to stated instructions; and
(3) entry of false, surmised, or unknown data.
It should be apparent that if meaningless data
are read into the computer, meaningless results
will emerge.
Errors by Keypunch Operator: Although most keypunching facilities include verification of the individual punching by a second operator, where interpretation plays a major role it is quite possible for the same mistake to be made twice.

Programming: Because of the large amount of data available from the record, the number of program possibilities is almost limitless. The only problem to be met is that of communication between the clinician and the programmer. As with most other data analysis systems, however, if the record becomes available through a national or international distributor, “canned programs” for the routine types of data analysis would also be available. The individual institutions and distributor would then be faced primarily with the programming of special studies.

SUMMARY

A thorough analysis of relatively large numbers of records cannot be accomplished with conventional sorting and tabulating equipment, and certainly not by manual methods. At the present state of data processing, the anesthetologist who wishes to search the records rapidly and exhaustively will find the only practical solution through a computer-oriented approach. However, the computer approach is not a panacea for all data-processing ills, for the computer introduces problems of its own. The usefulness of any data produced by a computer system rests with the integrity of the persons using it.

REFERENCES