

THE BALTIMORE ANESTHESIA STUDY COMMITTEE ORGANIZATION AND PRELIMINARY REPORT

OTTO C. PHILLIPS, M.D. AND TODD M. FRAZIER, A.B.

ON April 26, 1953, the President of the Baltimore City Medical Society, after conferring with the Commissioner of Health of the City of Baltimore, appointed a committee for the purpose of studying the causes of deaths and other sequelae during and following surgical and obstetrical procedures in the City of Baltimore. This committee is now known as the Baltimore Anesthesia Study Committee. The impetus given by Ruth's original paper in 1945 (1), the direction suggested by Pallin's report in 1951 (2), and ideas gleaned from visits with study committees in existence have all contributed to the development of the committee as it now functions. The purpose of this paper is to describe the organization, methods, and results of the first two and one-half years' activity of this committee.

HISTORICAL

As in other communities, several years were spent discussing the possibilities for establishing an anesthesia study committee. During this period the local anesthesia society sponsored occasional meetings at which the case histories of voluntary contributions were presented and discussed. Members of this group also met with representative medical leaders to discuss the organization of a more comprehensive type of study. Reference was made to a resolution adopted by the Baltimore City Medical Society on February 15, 1935 (3) responsible for instituting the Maternal Mortality Committee, now in active existence for over twenty years. A comparable resolution, presented below, was proposed and accepted at a meeting of the Medical Society on November 21, 1952; this was the first definitive step toward establishing an Anesthesia Study Committee.

WHEREAS, the incidence of mortality and morbidity resulting from the anesthetic management of surgical and obstetrical patients is recognized as higher than necessary, and

WHEREAS, all members of the medical profession are interested in reducing this mortality and morbidity to an absolute minimum, therefore be it

RESOLVED, that the Baltimore City Medical Society request the Baltimore City Health Department to undertake a study of the causes of deaths and

Accepted for publication October 12, 1956. The Baltimore Anesthesia Study Committee is jointly sponsored by the Baltimore City Medical Society and the Baltimore City Health Department. Dr. Phillips is Director, Anesthesiology Department, Hospital for the Women of Maryland, Baltimore, Maryland. Mr. Frazier is Director, Bureau of Biostatistics, Baltimore City Health Department, Baltimore, Maryland.

other sequelae during and following surgical and obstetrical procedures in the City of Baltimore with a view toward ascertaining the primary causes of these mishaps, and further be it

RESOLVED, that the Society endeavor in every way to support the Baltimore City Health Department in this study, and that it urge its members to cooperate fully in this undertaking.

Shortly thereafter a similar resolution was adopted by the Baltimore Hospital Council. On April 26, 1953, after consultation with the Commissioner of Health of the City of Baltimore, the President of the Baltimore City Medical Society appointed the first Joint Anesthesia Study Committee of the Baltimore City Medical Society and the Baltimore City Health Department.

OBJECTIVE

The objective of this committee, as adopted at its first meeting held on May 25, 1953, is "to discuss every death in this City that occurs the day of or the day after an operation, for the purpose of uncovering repetitive errors and for the dissemination of information on errors with no attempt by the committee, in any case, to identify any individual or any hospital."

ORGANIZATION

Membership.—The membership of the Baltimore Anesthesia Study Committee is decided upon by the President of the Baltimore City Medical Society, upon consultation with the Commissioner of Health of the City of Baltimore, and with suggestions from the present Chairman. Representation from medical fields other than anesthesiology has been invaluable, not only for guidance in formulating policy but in gaining the support of the necessary agencies, hospitals and contributing personnel in the City. To date, the following offices and personnel have been represented on the Committee: (1) Commissioner of Health, City of Baltimore, (2) Chief Medical Examiner, State of Maryland, (3) President, Baltimore Hospital Council, (4) professor of anesthesiology in the medical schools, (5) President, Anesthesiology Section, Baltimore City Medical Society, (6) Director, Bureau of Biostatistics, Baltimore City Health Department, (7) anesthesiologist engaged in private practice, and (8) specialists in other fields (for example, surgery and medicine).

The present chairman believes that the degree of response outlined in a later section could not have been obtained without the active interest and influence exerted by the many types of medical activities represented on this committee.

Collection of Cases.—The first step in the collection of cases for the Anesthesia Study Committee is made by the Baltimore City Health Department, which provides the committee with photostatic copies of

death certificates of all persons whose death occurred the day of or the day after an operative procedure. An identification number is assigned to each death certificate, and these are then kept in a separate file at the Health Department. An explanatory letter (fig. 1) is forwarded to the hospital concerned, along with an outline for a case study (figs. 2, 3 and 4) and an envelope addressed to the committee chairman in care of the Medical Society. Upon receipt by the chairman of the completed case protocol, the only identifying information on the form is the case number assigned.

After three months, follow-up letters of encouragement (fig. 5) are sent to the hospitals for case studies not yet returned. Two groups of letters are then sent annually to the hospitals in the community. One is a letter of appreciation from the chairman to the hospitals whose participation is better than the average for the city. The other is from the Executive Committee of the Baltimore City Medical Society to those hospitals whose average is below the overall average, with the suggestion that a greater degree of cooperation would be appreciated and anticipated. The latter communication has precipitated a prompt and encouraging display of interest from most of the previously non-participating hospitals.

JOINT ANESTHESIA STUDY COMMITTEE

of the Baltimore City Medical Society
and the Baltimore City Health Department
1211 Cathedral Street
BALTIMORE 1, MARYLAND

A Joint Anesthesia Study Committee has been sponsored by the Baltimore City Health Department and the Baltimore City Medical Society. The purpose of this committee is to study mishaps associated with anesthesia, with the expectation that errors may be discovered and discussed and possibly avoided in the future.

It is our understanding that the patient whose name appears below died recently at your hospital. We would very much appreciate your having the enclosed form completed and returned in the self-addressed envelope. It is preferable that this be accomplished by the person who administered the anesthesia.

Please note that a Case Number has been assigned this patient. Upon the return of the Study Form, the only record linking our Case Number to the patient will be in the files of the Baltimore City Health Department, and not available to the members of this committee. Every effort will be made to avoid retaining the identity of the patient, the hospital, or the physicians.

If an autopsy is being performed, the form may be retained until this information is available. However, for the Joint Anesthesia Study Committee to function effectively these forms must be returned at the earliest possible date.

Your cooperation in this study will be greatly appreciated.

Sincerely yours,

Chairman, Joint Anesthesia Study Committee

Patient's Name _____
Date of Death _____
Case Number _____

FIG. 1.

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JOINT ANESTHESIA STUDY COMMITTEE

of the Baltimore City Medical Society
and the Baltimore City Health Department
1211 Cathedral Street
BALTIMORE 1, MARYLAND

STUDY FORM

CASE NUMBER.....

Please complete and return this form as soon as possible. Fill in all spaces and answer all questions. If there is no record of the information requested, mark the space N.R. Please include all pertinent data. Use additional sheets if necessary. Omit all identifying data such as names of patients, doctors, and hospitals, and all dates. Instead of using dates, refer days to the operation (for example: 3 days preop, operative day, 14 hours postop). Whenever possible, this record should be completed by the person who administered the anesthesia.

PREOPERATIVE DATA

1. Age.....Race.....Sex.....Weight.....Height.....Physical Build.....

2. SUMMARY OF PREOPERATIVE HISTORY:

3. SUMMARY OF PREOPERATIVE PHYSICAL EXAMINATION:

4. SUMMARY OF PREOPERATIVE LABORATORY DATA:

Other Pertinent Laboratory Data
Including Blood Chemistry, BMR,
Various Analyses, etc.

Blood Count

Urine Analysis

HGB.....	Sugar.....	.....
RBC.....	Albumin.....	.....
WBC.....	Micro.....	.....

5. SUMMARY OF PREOPERATIVE PREPARATION IN HOSPITAL: Blood—Fluids—Specific Medication
Gastric Tube

6. PREOPERATIVE DIAGNOSIS:

7. POSTOPERATIVE DIAGNOSIS:

8. OPERATION PROPOSED:

Elective.....

9. OPERATION PERFORMED:

Emergency.....

10. PREOP STATUS 11. PREOPERATIVE MEDICATION 12. EFFECT OF PREOPERATIVE MEDICATION

Good.....	DRUG	DOSE	TIME	ROUTE	Satisfactory.....	Not Depressed.....
Fair.....	.....	.....	.....	.....	Apprehensive.....	Too Depressed.....
Poor.....	.....	.....	.....	.....	Worn Off.....	Others.....
Critical.....	.....	.....	.....	.....	.....	.....

FIG. 2.

PERIOD OF ANESTHESIA

13. ANESTHETIC AGENTS _____

14. TECHNIQUES _____

15. REASONS FOR CHOICE _____

16. Was choice of anesthetic and method made by anesthetist.....? By surgeon.....?

17. INDUCTION:

Uneventful..... Excitement..... Prolonged..... Cough.....

Emesis..... Laryngospasm..... Anoxia..... Others.....

Spinal Anesthesia: Site of Tap..... Level of Anesthesia..... Position of Patient.....
Agent

18. TRACHEAL INTUBATION: Yes..... No.....

Size of Tube..... Difficult..... Traumatic..... Times Attempted.....

19. MAINTENANCE

Describe the course of anesthesia in detail including blood pressure levels, pulse and respiratory rates. Also indicate complications during anesthesia, time of occurrence and treatments administered (fluid therapy, medication, resuscitative measures, etc.). Indicate position of patient on table during anesthesia. Estimate blood loss during operation. Correlate complications with surgical trauma, traction, etc.

20. RECOVERY

State of reflexes upon leaving O. R.

State of consciousness upon leaving O. R.

Was airway (oropharyngeal, endotracheal) in place when patient left O. R.?

Retching..... Emesis..... Excitement..... Others.....

21. CONDITION AT END OF OPERATION:

Good..... Fair..... Poor..... Critical..... Expired.....

FIG. 3.

Meetings.—There are three types of meetings:

(1) Organizational Committee Meetings: As soon as possible after appointment, a meeting is called of the committee in its entirety, with the President of the Baltimore City Medical Society invited as an ex-officio member. This type of meeting is held just once a year, and is for the purpose of orienting new appointees with the nature of the committee activities, reviewing the development of the committee, discussing problems which have arisen during the preceding year, and outlining proposed plans and direction of the project.

(2) Screening Committee Meetings: During the entire year there are held, at irregular intervals, a number of "Screening Committee" meetings. A Screening Committee consists of at least three or four committee members, preferably representing several specialties.

POSTOPERATIVE COURSE

22. DID PATIENT RECOVER CONSCIOUSNESS POSTOPERATIVELY? Yes..... No.....
23. Describe the interval from end of operation until death, including complications, time of occurrence, and treatment rendered. What medication, blood, plasma, fluid therapy, oxygen therapy, etc., were given?

MORTALITY DATA

24. PHYSICAL SIGNS IMMEDIATELY PRIOR TO DEATH:

- Respiratory Rate and Rhythm..... Eye Signs.....
- Pulse Rate and Rhythm..... Color.....
- Blood Pressure..... Airway.....
- Pharyngeal Reflexes..... Muscular Relaxation.....

25. HOW LONG AFTER THE BEGINNING OF ANESTHESIA DID DEATH OCCUR? Hours.

26. WHERE DID DEATH OCCUR?

- In Operating Room: Before..... During..... After..... Operation.
- In Transit..... In Patient's Room.....

27. WHAT WAS THE CAUSE OF DEATH on the hospital chart?

28. WAS A POSTMORTEM EXAMINATION PERFORMED? Yes..... No.....

29. IF SO, WHAT WERE THE PERTINENT FINDINGS?

30. Would the hospital chart be available to the committee if a more detailed study of the case were desired?

31. CHECK THE APPROPRIATE BOX.

- A. Anesthesiologist—practice limited entirely to anesthesia.....
- B. Anesthesiologist—practice limited partly to anesthesia.....
- C. Resident in anesthesiology.....
- D. Other interne or resident.....
- E. Surgeon.....
- F. Other physician.....
- G. Anesthesia nurse.....
- H. Others (specify).....

ANESTHESIA		
ADMINISTERED BY	MAINTAINED BY	SUPERVISED BY

FIG. 4.

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Re:

Patient's name

Date of death

Case number

Dear Sir:

The Joint Anesthesia Study Committee is reviewing all deaths in the City of Baltimore which occur the day of or the day after operation. A letter was sent you dated _____ requesting a completed study form of the above captioned case. This Committee again requests your cooperation.

Delay in supplying this information adds considerably to the work of this Committee. It is necessary that adequate reply be incorporated in the record in order to complete the tabulation of statistics and to close the record of this case as submitted by the Baltimore City Health Department.

Your immediate cooperation is earnestly requested.

Very truly yours,

Chairman

FIG. 5.

These smaller committees review the case protocols as returned by the hospitals. All cases in which there is unanimous agreement that anesthesia had no plausible role in the eventual outcome are disposed of. The cases in which anesthesia did play a role, and also all cases in which there is not unanimous opinion on the part of committee members as to the role of anesthesia, are set aside for discussion at open meetings.

(3) Open Committee Meetings: Monthly discussion meetings are held during the academic year. Protocols are summarized in advance of the meeting and forwarded to the presiding discussant; additional copies are distributed to the audience at the time of the meeting. (A copy of each case discussed at an open meeting is also forwarded to the "Case Reports" Editor of the "Newsletter" of the American Society of Anesthesiologists, Inc.) Four cases are usually discussed at each meeting, with an attempt to limit the time devoted to each case to thirty minutes. Guest discussants have included most of the anesthesiologists in the community, and an attempt is made also to have at least one visiting discussant from some other specialty at each meeting. Specialists participating to date have included otolaryngologists, pediatricians, obstetricians, gynecologists, general surgeons, neurosurgeons, thoracic surgeons, orthopedists, urologists, and internists. Following presentation of the case and comments by the discussant, the members of the audience are invited to offer their contributions. After a full hearing of all new ideas, the majority vote is taken from those persons present.

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DISPOSITION OF CASES

Each completed case is voted upon, either by the Screening Committee or by the open discussion group, according to the following systems of questions: (1) Did the anesthetic management of this case contribute to the death of the patient? (a) Yes. (b) No. (2) If "Yes," was it: (a) The principal cause? (b) One of several contributing factors? (3) Which phase of the anesthetic management of the case was *principally* at fault? Vote for one: (a) Preoperative preparation and medication. (b) Error in selection of agent or method. (c) Improper management of the anesthetic. (d) Improper resuscitation. (e) Postoperative medication or management.

In deciding upon this approach to the voting, it was believed that in a number of cases in which anesthesia did contribute to the outcome, it might not be possible to categorize accurately the death as definitely preventable. Obviously votes of "1 (a), 2 (a)" (anesthetic management did contribute to the death of the patient, and it was the principal cause) would include most of the preventable anesthetic deaths. A vote of "1 (a), 2 (b)" (anesthetic management was one of several contributing factors), however, would incriminate the anesthetic factor in many cases which would otherwise be classified as "nonanesthetic" under the simple "preventable, nonpreventable" dichotomy.

There is no consideration given in the voting as to the organization of the anesthesia department or to the relative responsibilities of the anesthetists in the institution involved. Thus, in the case where the anesthetist recommends a tracheotomy following a neck procedure, and the surgeon declines, it is considered a part of the anesthetic management if the patient succumbs owing to airway difficulty during the postoperative period. Another instance would be the case in which a patient dies because of a reaction to a local anesthetic given by a surgeon, obstetrician or radiologist, for example, without even an anesthetist in attendance. It is the role of anesthesia which is being considered, the optimum management being used as the yardstick; for academic and long-range considerations the type of personnel responsible for this management is not considered pertinent in assigning the responsibility to anesthesia.

REPORT OF THE FIRST 500 CASES

Because of the limited experience available within the first two and one-half years study, the first two annual reports issued by the Baltimore Anesthesia Study Committee have been confined to a tabulation of the frequency and type of anesthetic errors. A summary of the statistical section of the 1955 committee report is shown in table 1.

At the time that the 1955 report was prepared the committee had received adequate replies for 362 of the 500 cases queried, a response rate of 72 per cent. As a result of the follow-up techniques already

referred to, the response rate has now increased to nearly 85 per cent.

Table 1 shows that of the 362 cases received during the period August, 1953 to February, 1956, 149 or 41 per cent had not been reviewed by the study committee at the time that this annual report was prepared. This backlog of completed cases has recently been reduced by increasing the activities of the Screening Committees.

When 750 to 1,000 cases have been collected, two or three years hence, the statistical reports will become more extensive and will include much of the detail recorded in the Joint Anesthesia Study Committee study form. This study form will be edited and coded by an anesthesiologist and a Health Department nosologist. Some of the

TABLE I
SUMMARY OF THE STATISTICAL SECTION OF THE 1955 BALTIMORE ANESTHESIA STUDY COMMITTEE REPORT

Disposition of Cases:

Total number of cases			500
Number of adequate reports returned			362 (72%)
Cases reviewed		213	
Screening Committee	156		
Open Meeting	57		
Cases to be reviewed		149	
Cases not returned			138
Role of Anesthesia			
Cases in which anesthesia contributed to death of patient			49 (23% of reviewed cases)
As primary cause	17 (8%)		
As one of several contributing causes	32 (15%)		

Phase of anesthetic management principally at fault:

Phase	Total	Primary	Contributory
All phases	49	17	32
Preparation and premedication	4	1	3
Choice of agent or method	10	6	4
Improper management of anesthesia	28	4	24
Improper resuscitation	3	2	1
Postoperative management and medication	4	4	0

items that will be coded include: age, race, sex, preoperative condition, preoperative and postoperative diagnosis, operation proposed and performed, primary anesthetic agent and technique, relaxants, technique for maintaining airway, postoperative condition, and vote of the Anesthesia Study Committee.

These data will be transferred to punch cards and the tabulations required for statistical analysis of the Study Committee findings will be prepared by the Bureau of Biostatistics of the Baltimore City Health Department.

DISCUSSION

The most notable aspects of the first few years activity of the Baltimore Anesthesia Study Committee have been related to: (1) the

mode of formation of the committee, (2) the method of selection of cases for study, (3) the technique of collecting case studies, and (4) interpretation of results.

Mode of Formation.—Informal surveys and polls of opinions of physicians in anesthesiology and other representative fields indicated a general enthusiasm in the value of an anesthesia study committee. The step which brought about the establishment of the Anesthesia Study Committee was the adoption by the Baltimore City Medical Society of a formal resolution proposing that such a study be undertaken jointly with the Baltimore City Health Department. This technique has now been used successfully in establishing both the Baltimore Anesthesia Study Committee and the Baltimore Maternal Mortality Committee.

Selection of Cases.—Participation of the Baltimore City Health Department in assigning copies of the death certificates as described above assures a steady and comprehensive source of material. The value of this contribution is made evident by the fact that in the City of Baltimore, about 200 cases are made available for study each year, or about 20 per 100,000 persons per year, whereas with the strictly voluntary method of submitting cases, in a city twice the size of Baltimore, only 307 cases were submitted in 11 years (4) a rate of approximately 1.4 per 100,000 persons per year. This represents a fifteen-fold difference in rates, and there is a reasonable conjecture that the distribution of case studies throughout the community is more representative than with the voluntary method of submitting cases.

Collection of Cases.—Details of the procedures employed to collect case studies have been presented, along with a discussion of the methods utilized in encouraging greater participation from the less responsive sources. The efficacy of these techniques is evident by the fact that to date, an adequate response to requests for protocols has been obtained in almost 85 per cent of the cases, whereas at the latest published report, the King's County Study Committee (2) was receiving returns on only 51 per cent of their potential cases. Undoubtedly, a most important contributing factor is the wide representation on the committee, thus assuring many avenues of education and influence throughout the community.

Results.—It is interesting that of the protocols reviewed to date by the Baltimore Anesthesia Study Committee, it was voted that anesthesia was the principal contributing factor in 8 per cent of the cases. This closely parallels the report of the King's County Committee, in which 9 per cent of the cases were classified as preventable. Although the Philadelphia study reported 47 per cent of their cases as preventable, this rate cannot be compared to those of the other two committees cited; the cases surveyed were not as representative and comprehensive as that of the other committees, and with the voluntary method of submission of cases it was likely that the most interesting

and educational anesthetic mishaps were reported. On an annual basis, however, 6.8 deaths with anesthesia as the principal factor are being reviewed by the Baltimore committee each year, whereas in Philadelphia, with twice the population, 13 preventable anesthetic deaths were reviewed per year; again the results are comparable.

Several sources of error in assigning any significance to these results should be pointed out. It is quite possible with the voluntary method of submitting reports that where the personnel giving anesthesia are less interested in an academic review of their misadventures, few protocols would be turned in for review. Thus, the reported incidence of anesthetic mishaps might be appreciably lower than the true picture. Even with the assigning of death certificates by the health departments, however, if only half of these requests result in an adequate case study, it might be that some of the most glaring examples of anesthetic mismanagement are among those not reported. Some disparity might also exist owing to a difference in the philosophies of the committees. For example, in the King's County study group, the role of anesthesia is contingent upon the circumstances and standards that exist in the institutions where the death occurred, whereas in the Baltimore Study Committee, the criterion for accepting a case as an anesthetic death is independent of institutional standards.

SUMMARY

Pertinent steps in the development and organization of the Baltimore Anesthesia Study Committee have been outlined. Included are copies of essential forms used by this committee. Details of the methods of collecting and disposing of case studies have been discussed, along with a preliminary report of the results of this study to date, and the more extensive statistical studies now under way. The program of this committee has become one of the more interesting medical activities in the community. It is anticipated that the regular discussions and evaluation of mishaps occurring will eventually contribute to better anesthetic care. It is also hoped that the material included herein may be of help in the setting up of other anesthesia study committees.

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