

A Survey of Academic Anesthesiology

Submitted by ASA Subcommittee (Task Force) on Academic Anesthesia Manpower

John E. Steinhaus, M.D., Chairman

Robert M. Epstein, M.D., William K. Hamilton, M.D., C. Philip Larson, Jr., M.D., Robert M. Lawrence, M.D.

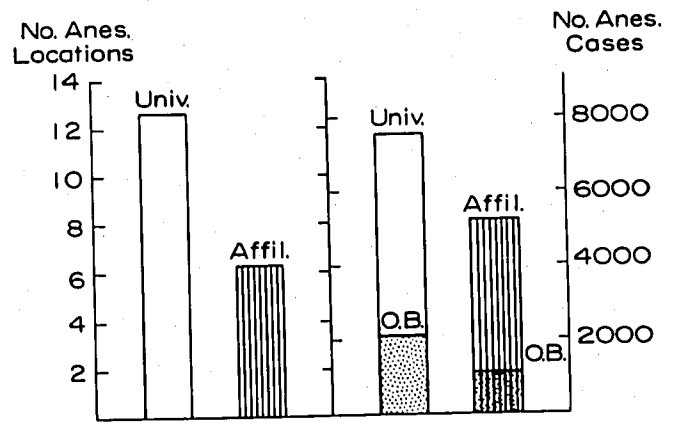
Part I. Survey

AN ASSESSMENT of the manpower situation for academic anesthesiology was approached by means of a questionnaire concerning present and future faculty size, clinical and educational work load, and budgetary support. Replies to this questionnaire were solicited from 109 medical schools in the United States and Puerto Rico. Seven schools reported that they did not currently have a Department of Anesthesiology, 12 schools must be classified as "non-respondents," and replies from four schools were received too late to be tabulated. Therefore, the responses from 86 schools of medicine currently organized to include a Department of Anesthesiology comprise the basis from which the information for this report has been drawn.

An overwhelming majority of the schools, 88 per cent, described their anesthesiology departments as "autonomous departments." Only a small number, ten of 86, indicated that the anesthesiology department was a "division of surgery" or shared autonomy jointly with surgery.

Clinical Work Load

University hospitals average just over 12 anesthetizing locations, and report 7,590 anesthetic administrations each year (fig. 1). In their affiliated hospitals, which range in number from none to six per medical school, an average of an additional 7.0 anesthetizing locations and 5,214 anesthetic administrations would be added. Variation in the sizes of clinical loads at the different schools makes it difficult to provide a simple evaluation from the above figures. The extreme differences are illustrated by comparing one program that had only five anesthetizing locations, 2,500 anesthetizations, and no obstetric load with a huge complex that listed 51 anesthetizing locations and 46,700 surgical anes-



84 University Hospitals
125 Affiliates (ranging 0-6 per medical school)

FIG. 1. Work loads in medical school hospitals. Anesthetic locations (left) in university and affiliated hospitals. Average number of anesthetic administrations (right) per hospital, including obstetrical cases (stippled).

thetic administrations plus 5,800 obstetric anesthetic cases. Nevertheless, the average number of anesthetizations does provide a rough guide for use by medical schools in planning for adequate clinical material for education without placing an undue burden of clinical responsibilities on its faculty. Previously applied standards for medical school approval have been based on four hospital beds/clinical student, which would mean 800 beds for a medical school whose classes average 100 students per year, and consequently, 200 students would be involved in clinical experiences. Such a hospital would probably provide 10,000 anesthetic administrations yearly, not far from the averages shown above.

Faculty Personnel in Anesthesiology

A total of 1,044 faculty positions was reported from 86 medical schools. The faculty distribution reveals the Associate Professor level numbers to be dispro-

Address reprint requests to Dr. Steinhaus: Department of Anesthesiology, Emory University School of Medicine, Atlanta, Georgia 30322.

Key words: Manpower, Academic; Survey; Anesthesia faculty; Personnel; Teaching load; Operating-room staffing.

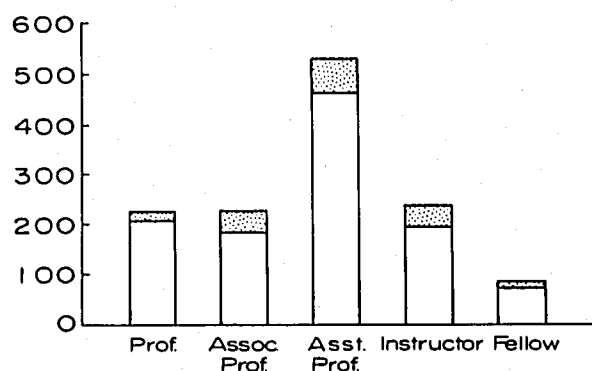


FIG. 2. Numbers of anesthesia faculty members by rank in 86 medical schools, and vacancies (stippled).

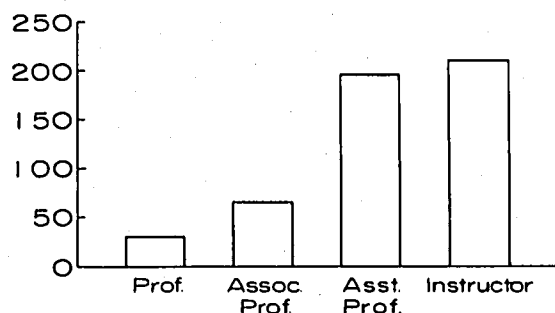


FIG. 3. Numbers of volunteer (clinical) faculty members by rank in 29 out of 86 medical schools.

portionately low (less than 50 per cent) compared with the Assistant Professor level (fig. 2).

The high Assistant Professor to Associate Professor ratio is probably explained by the fact that the preponderance of additions to the anesthesia faculty at this rank. A significant loss of senior faculty or a failure to promote substantial numbers to tenured positions could also contribute to this disproportion. The most recent Faculty Profile of the AAMC listed no other clinical department as having such a disproportion between these ranks.¹

The average number of academic faculty members per department is 13 (table 1), and the average clinical work load includes 19 (12 university plus seven affiliated) anesthetizing locations, as well as responsibilities for obstetric anesthesia, research, teaching, respiratory care, and other duties. This serious disproportion between work load and numbers of academic faculty personnel is notable and justifies a program that would provide substantial corrective measures.

Fewer than 30 medical schools utilize volunteer faculty members (fig. 3). While the contributions of voluntary faculty members are highly valued, they cannot have a substantial impact on total patient care or teaching in a medical school hospital.

Age distribution of the faculty members reveals a general correlation of older ages with the higher

ranks (fig. 4). Age distribution of anesthesia faculty members compared with data for the overall medical faculty, taken from the 1976 Faculty Profile, AAMC, reveals 8 and 25 per cent for anesthesia faculty members in the 55-64 and 45-54 age groups, in contrast to 12 and 29 per cent for these age groups in the overall faculty. This is compatible with the contention that anesthesiology is one of the younger, developing disciplines on our academic faculties.

Non-physician Personnel

Non-physicians employed for clinical anesthesia service in medical school hospitals are largely nurse anesthetists, and total 743 persons, or about half the number of residents in training in anesthesia (table 2). The combined residents and nurse anesthetists total approximately 2,000, about twice the number of faculty personnel. Other personnel assisting the

TABLE 1. Average Staff Positions—Medical School

	Budgeted	Filled
Professor	2.63	2.37
Associate Professor	2.63	2.15
Assistant Professor	6.25	5.30
Instructor	2.70	2.25
Fellow	1.00	.86
TOTAL	15.21	12.93

TABLE 2. Non-physician Personnel Employed for Clinical Duties

	Number	Number of Schools Responding	Average per School
Certified R.N. anesthetist	732	79	9.3
R.N.	300	24	12.5
Physician's assistant	11	4	2.75
Technician	207.5	59	3.4
Anesthesia aides	292	60	4.9
L.P.N.	13	5	2.6
Other	104.5	16	6.5

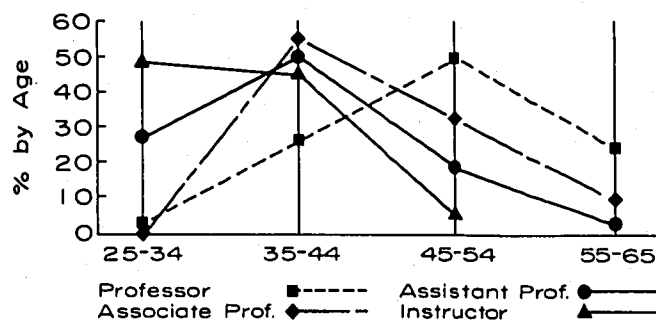


FIG. 4. Decade distribution of ages in percentages for academic ranks of anesthesia faculty members.

TABLE 3. Total Non-anesthesia Personnel in the 86 Responders

Pharmacologists	25
Engineers	16
Administrators	23

TABLE 4. Residency Assignment for 24 Months of Clinical Anesthesia (63 Medical Schools)

	Average Number of Weeks
Surgical Anesthesia	68.3
Obstetric Anesthesia	8.0
Recovery Room	6.9
I.C.U.	6.0
Resuscitation	3.4

TABLE 5. Residents in Training

Year	Interns and Residents	Foreign Medical Graduates
1972-1973	1,223	45 per cent
1973-1974	1,376	43 per cent

anesthesiologist number approximately 1,000, which averages more than ten persons per medical school. Anesthesia departments tend to have specialized non-medical personnel, which may include highly trained research personnel, professional administrators, etc. (table 3). These persons provide an additional dimension in medical school departments.

Residents in Training

The resident in anesthesiology, like all clinical trainees, represents both a resource for the care of patients and an educational obligation. The clinical care provided by a resident is very uneven. It is largely noncontributory during the first two or three months of training, but with increasing experience and the long hours of call, the resident carries a very substantial load, greater than that of the non-physician anesthetist, who works a 40-hour week. Assignment to special areas (table 4) decreases the resident's contribution to the routine clinical anesthesia load. Although surgical anesthesia occupies 70 per cent of the resident's 24-month period of clinical anesthesia training, obstetric anesthesia, recovery room, critical or intensive care, and other activities take a significant fraction of his time. There is an average of 16 residents per medical school and its affiliated hospitals distributed over four years. Foreign medical graduates account for almost half of this group (table 5), but may well decrease markedly with the new health manpower legislation, PL. 94-484.

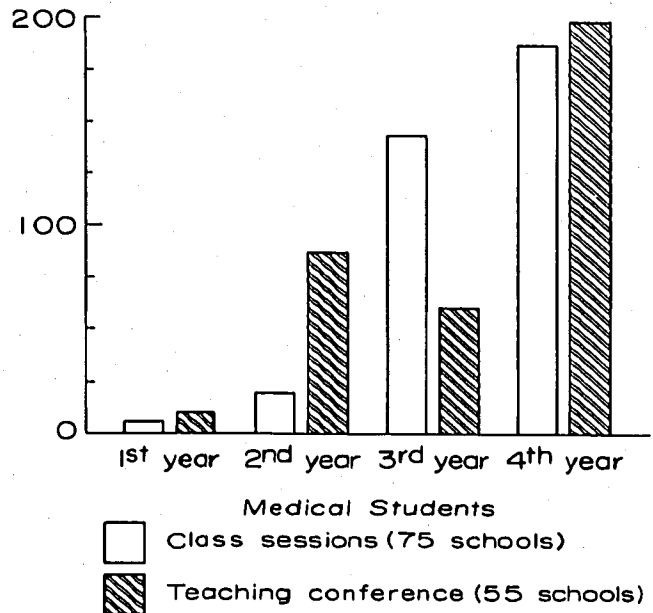


FIG. 5. Faculty hours of teaching, average per school. Medical student teaching shown in average numbers of total hours for reporting schools.

TABLE 6. Anesthesia Faculty Members Teaching Other Courses

	Per Cent
Pharmacology	82.6
Physiology	46.5
Anatomy	18.6
Biochemistry	14.0
Pathology	5.8
Community Medicine	4.7

Undergraduate Teaching Load

An anesthesia clerkship is available in every school reporting; 45.3 per cent had a required clerkship for all students. An average figure of 61.5 medical students per medical school had such a clerkship, distributed almost evenly between third and fourth years. A further indication of the teaching load is demonstrated in figure 5, which indicates that 75 medical schools reported class sessions with third-year medical students averaging 142 hours yearly. These sessions are not necessarily given to the entire class. The total hours reflect repeated sessions. The hours spent in individual and small group conferences would also indicate considerable teaching activities. Anesthesia faculty members teach in other departments as well (table 6). There is a very high incidence of faculty participation in pharmacology, as well as a substantial contribution to physiology. Compared with the survey made in 1964,² in which 81 per cent taught in pharmacology and 17 per cent in physiology departments, teaching

TABLE 7. Sources of Professional Income for the Faculty

	Per Cent
Medical school	28.5
Teaching hospital	19.2
Affiliated hospital salaries	6.6
Patient-generated income (fee for service)	42.5
Grants or foundation monies	2.1
Contract for health services	1.1
	100.0

TABLE 8. Predicted Increases in Service Load

	Per Cent
Additional O.R.'s	22.9
Outpatient anesthesia	31.6
Increased anesthesia schedule	22.5
I. C. U.	21.7
Other outside O.R. duties	22.8

in other departments has shown a modest increase. Further increases are probably not possible unless there are substantial increases in anesthesia faculty.

Sources of Professional Income

The sources of professional income are multiple, with fees from patient care being the largest single source (table 7).

Predicted Changes in Work Load and Personnel

There was almost unanimous agreement among respondents that the overall work load will increase in most areas of anesthesia over the next five years (table 8). Additional faculty personnel needed to handle this increased load was estimated to be six anesthesiologists, which, when added to the present average staff of 12, represents an average increase of 50 per cent. Nurse anesthetists or physician assistants were anticipated as being needed in equal

numbers. This projected increase in personnel would be utilized for: clinical care, 57 per cent; teaching or research, 35 per cent; administrative duties, 8 per cent. In a question asking for judgment as to the capability of other professional personnel in relieving the anesthesiologist of clinical duties, the response indicated that nurse anesthetists could relieve the anesthesiologist of 35 per cent of his duties, with lesser amounts for other clinical personnel, down to a value of 2 per cent for the non-anesthesia-trained nurse.

Summary and Recommendations

The construction of a questionnaire that properly states the questions and produces accurate data is difficult. Nevertheless, we believe this survey provides useful information to evaluate the current manpower situation in academic anesthesiology, even though the presentation of such data as averages does not provide a true picture of the wide range in numbers of faculty existing at the various medical schools. The clinical anesthesia load of the operating room is the single most important factor in determining the size of the faculty. Since a questionnaire can, at best, provide information about the situation as it presently exists, the personnel needed at approved medical schools for satisfactory levels of anesthesia care, educational programs, research and other clinical activities, *e.g.*, respiratory care and pain therapy, must be determined by other methods. Our obligations in respiratory therapy, pain therapy, and other related areas of clinical care for the approved medical school should be determined. Furthermore, the American Society of Anesthesiologists should provide this information to the American Medical Association, American Association of Medical Colleges, governmental agencies, and all other appropriate organizations. It is the intention of the Task Force to provide a further document with specific recommendations related to the above guidelines.

Part II. Recommendations for Anesthesia Faculty

RECOMMENDATIONS for physician manpower requirements have frequently been based on surveys of present personnel, and the conclusions concerning the adequacy of physician coverage are drawn from a deviation in numbers of such physicians from national averages, based on population. Such studies have limited usefulness since the national averages themselves may reflect excessive or inadequate numbers of physicians for a given educational or medical need.

In Part I, a 21-fold variation in numbers of anesthetic administrations from 86 medical centers was found, while faculty sizes ranged from two to 46 members, not necessarily related to the number of anesthetic administrations. The proportions of anesthetic administrations to the sizes of the medical school classes varied markedly, as illustrated by six well-established medical schools, three schools having high ratios of 21, 24, and 35 and three having low ratios of 3, 4, and 5. During a period in which the cost of medical education and the quality of medical care are serious public and legislative concerns, the limitation of using such variable averages as standards for manpower requirements is obvious.

It is the purpose of this presentation to assess the faculty requirement for academic anesthesiology based on this faculty's assigned work load of clinical care in anesthesiology, teaching, research, and administration. Obviously, the largest proportion of patient care provided by anesthesiologists (65 to 85 per cent) is surgical anesthesia. Nonetheless, obstetric anesthesia, respiratory therapy, pain therapy, intensive care, and resuscitation are other essential areas in which anesthesiology has a logical and proper responsibility.

Surgical Anesthesia

Although the academic institution draws its purpose from education and research, the pressure on the academic Department of Anesthesiology has been predominantly directed toward the provision of clinical anesthesia care for the surgical patient. The size of the clinical anesthesia work load for surgical procedures varies to a much greater extent than does the educational work load (as indicated by class sizes), with the two factors appearing to vary independently. Since quality patient care is an essential requirement of clinical education, a faculty size adequate to provide quality care for the surgical and obstetric patient would appear to be also a prime element in determining the faculty requirements for academic centers.

A long established "rule of thumb" for evaluation of residency programs in anesthesiology has been a minimum ratio of one anesthesiologist in attendance in the operating room for each two residents. In

clinical anesthesia the capabilities of residents range from that of the rank beginner to the almost fully trained anesthesiologist. Furthermore, patient care demands include the very sick patient scheduled for open-heart surgery, as well as the healthy young man having a hernia repair. Weighing carefully this variability in clinical circumstances, it was the final judgement of the Task Force that regular staffing of the surgical anesthesia program should be based on no fewer than one anesthesia faculty in attendance in the operating room suite for each two residents administering anesthesia. Consequently, a ten-room suite in full operation would require at least five anesthesiologists in attendance for the provision of quality anesthesia care. Since it is essential for both the teaching of medical students and the maintenance of professional competence, each faculty member must personally administer anesthesia to at least a minimum number of patients. To meet this objective, 20 per cent of the operating rooms should be assigned for faculty coverage on a 1:1 basis, permitting the personal administration requirement and the continuous instruction of the medical student administering anesthesia. This provision would raise the minimum number of anesthesiologists for a ten-room suite to six. If funding for anesthesia care by third-party payers requires continuous personal attendance by the anesthesia faculty, as opposed to the anesthesia care team, this faculty requirement would double (ten anesthesiologists). The Task Force also agreed that direct attendance of the patient by nurse anesthetists would necessitate the same ratio, namely, one anesthesia faculty member per two operating rooms in which anesthetic administrations are occurring simultaneously. A survey conducted at a meeting of the Society of Academic Anesthesia Chairmen indicated almost unanimous support for the concept of a minimum of one faculty member in attendance for two anesthetizing locations in operation. The House of Delegates of the American Society of Anesthesiologists also supported this recommendation (Resolution No. 12, 1975).

It might be asked whether uncomplicated surgical procedures such as herniorrhaphy or dilatation and curettage would permit a lesser ratio of faculty to anesthetizing location if trained nurse anesthetists were assigned. However, the anesthesiologist can only direct, manage complications of, and take responsibility for, a limited number of simultaneous anesthetic administrations out of the sheer necessity of being present at multiple places for unscheduled critical times. Furthermore, complex surgical procedures, such as coronary bypass, vascular prosthesis operations, and kidney transplantation, require the complete attention of one anesthesiologist and frequently, the assistance of an additional anesthetist.

Consequently, combining patients requiring 1:1 coverage with those needing less anesthetic attention provides an average anesthetic coverage for the overall operating room suite of a 1:2 ratio of anesthesiologists to anesthetic administrations.

Other Clinical Needs

OBSTETRIC ANESTHESIA

In many hospitals and medical centers of this country, the provision of anesthesia care for the expectant mother and newborn has never reached an appropriate level from either a humanitarian or a societal point of view. For the provision of adequate clinical teaching material, authorities on obstetrics have cited the need for 2,000 to 4,000 deliveries per year for medical schools with class sizes of 100 students or more. Accepting these judgements, eight obstetric deliveries daily, as well as the need for a faculty member devoting full professional attention to this critical area, would affirm the need for at least one full time faculty assigned to this duty. Even with the allocation of one anesthesiologist to obstetric anesthesia, the demanding evening and night obstetric work would require participation by other members of the anesthesia faculty, as is the case for emergency surgery.

RESPIRATORY CARE, INTENSIVE CARE, AND PAIN THERAPY

There is no uniform pattern for handling the clinical demands of these anesthesia-related clinical services at many medical school centers, and in some instances expert physician service is not even available. Each of these services should be provided by the medical educational center that is dedicated to furnishing comprehensive quality medical care. In many locations, anesthesiologists have initiated these clinical services, and there is strong and logical support for the continuation of this assignment; consequently, a manpower allotment must be added adequately to serve the clinical and educational demands thereby created. In small medical centers, these functions may be performed by part-time faculty assignments; however, professional and academic leadership will come from those institutions that have faculty members who devote full time to these areas.

ADMINISTRATION

Additional faculty time must also be allocated to administration in the modern medical center with its multiple demands for clinical service, education, planning, and research. Financial support from numerous sources, continuous evaluation of the quality of patient care, and increased demands of personnel management have all contributed to the

work load carried by the clinical faculty. The first part of this survey reveals that the average medical school department has a total of 50 persons in all categories.

Emergency Call Coverage

The emergency loads of the active medical centers usually require additional allocations of faculty time or positions. If an anesthesiologist works 24 hours providing anesthesia care for emergency patients, additional faculty members must be available to cover his normal work assignment for the next day. A very active open-heart program, high numbers of obstetric deliveries, or surgical emergencies may increase the need for such faculty time and positions. Such faculty allocations would be determined by the size of the emergency service.

Anesthesia Research

A medical school committed to research as a part of its program must allocate faculty time on the basis of resources available and the strength of its research commitment. It is difficult to believe that an academic department can be truly effective and occupy its proper place in the medical center without at least a modest research effort. With the sophistication of medical research today and the competition for research funding, part-time efforts will have limited success, especially when the research activity is merely added on to a day spent in clinical or educational activities. Since leading medical institutions will undoubtedly adopt a higher research commitment than the modest 20 per cent effort used in our projected model, additional manpower for research activities would be necessary.

Nonclinical Activity

In addition to the above-suggested allocations of faculty positions or time, it was the unanimous opinion of the Task Force that a *Minimum* of one day per week or its equivalent should be designated for each faculty member for the purposes of scholarly activities outside the operating room suite. Without such an allocation, it is difficult to justify the academic position completely devoted to clinical care as being "academic" in character, even though it is obviously justified as patient care responsibility. The obvious difference in financial remuneration between private practice and an academic position will make the recruitment of an adequate faculty purely for clinical work virtually impossible so long as there are unmet needs in the private practice sector. Should the availability of manpower in anesthesiology improve markedly in the future, the academic faculty will be left with the least desirable physicians unless their profes-

sional responsibilities and opportunities include not only patient care but also nonclinical, scholarly work, such as classroom teaching and writing. The Society of Academic Anesthesia Chairmen strongly supports the position that all academic anesthesia staff members should have the equivalent of at least one day of nonclinical assignment each week. A similar approval was given by the House of Delegates of the American Society of Anesthesiologists (Resolution No. 12, 1975).

Full-time Equivalency—Required for Clinical Schedule Coverage

Call coverage has compounded the traditionally long working hours of the physician. When medical work is paid for on a fee-for-service basis, as in the private practice of medicine, financial remuneration is increased with additional hours of work. However, in salaried positions, which are common in academic institutions, duties are assigned and vacation, sick, and professional leaves are standard provisions.

Most hospitals schedule surgical operations 250 days each year. A full-time anesthesiologist assigned solely to clinical anesthesia (FTE_c)* provides regular schedule coverage 85 per cent of the time. If one further deducts one day each week for nonclinical activity, each faculty position (FTE_a)* will then provide 68 per cent coverage of clinical anesthesia duties. Computed in reverse, each regularly scheduled clinical assignment (RSCA) will require 1.5 faculty positions. Such calculations always make the presumption that vacation, professional leave, and sick leave fall into a nicely scheduled pattern, which, of course, is never the case.

CALCULATION—FTE_a*—RSCA†

<i>Regularly Scheduled O.R. Days Yearly</i>	
260	O.R. work days (Monday–Friday)
<u>-10</u>	Holidays
250	Regularly scheduled O.R. days
<i>Days Worked by Full-time Faculty</i>	
250	Hospital work days
<u>-22</u>	Vacation (1 month calendar time)
- 5	Average sick leave
<u>-10</u>	Professional leave
213	Work days by each staff yearly
<i>RSCA†/One Anesthesiologist (FTE_a)</i>	
$\frac{213}{250}$	= 85 per cent of regular scheduled clinical assignment
<i>Non-Clinical Time Allowance for Faculty</i>	
20 per cent	time allowed for nonclinical activities (teaching, committee work,

* FTE_c = full-time equivalency—(CLINICAL); FTE_a = full-time equivalency—(academic).
† RSCA = regularly scheduled clinical assignment.

organization, administration)—
1 day/week

85 per cent × 20 per cent = 17 per cent

85 per cent
-17 per cent

68 per cent RSCA per academic staff position
 $1.0 \div .68 = 1.47$

therefore, 1 RSCA requires 1.47 faculty positions.

Model Anesthesia Faculty Projection

The method of calculation described can be employed for determining the number of faculty members needed and can be *modified to fit any particular anesthesia load*, research commitment, or selected special clinical duties. The following proposal, based on a model medical school with ten regularly scheduled operating rooms, represents a modest but reasonable faculty for medical schools with a class size of 100 students. This proposed faculty would provide adequate personnel for quality patient care, clinical instruction and other academic requirements, including administration, committee work, etc. It should be noted that in this model a major academic obligation, namely research, would be limited to a modest 20 per cent of the total activity.

Since clinical anesthesia for surgery is the major determinant in staffing, a further rule of thumb will be derived from this model by utilizing an overall ratio of 1.8 faculty positions for each regularly scheduled operating room (anesthetizing location) as a guideline for an acceptable standard. It should be noted that this ratio is probably a little low for the smaller clinical programs and possibly a little high for the larger clinical centers, since neither educational nor research demands will decrease or increase proportionately with the surgical anesthesia load. The elimination of obstetric anesthesia, respiratory care, pain therapy, and research, would leave a faculty-to-operating room ratio of 1.0 and a “stripped” academic anesthesia program with limited effectiveness. Any reduction of faculty numbers represented by low ratios will dilute physician contribution and thus diminish the quality standards of patient care to a level not compatible with the stated goals of patient care. The faculty projection presented will not provide the expected physician coverage of quality care if the hospital design is substandard and the anesthetizing locations are widely scattered. The above projection presumes that the anesthetizing locations are contiguous.

It should be emphasized that the number of faculty members proposed is in no way luxurious, and in fact represents a “bare-boned” projection if we are sincere about our teaching, research and clinical care goals. Provision for a full-time faculty position

TABLE 9. Distribution of Faculty to O.R. Ratio

	Faculty to O.R.				
	0.50	0.50 to 0.75	0.76 to 1.00	1.01 to 1.50	1.51
Number of schools	14	32	20	22	3

dedicated to education or the adoption of a not uncommon request for 50 per cent of the faculty time for teaching and research would necessitate a substantial increase in the faculty numbers.

ANESTHESIA FACULTY PROJECTION

Medical School Assumptions

500 beds	400 medical students (100 students per class)
10 regularly scheduled operating rooms	2,500 obstetric deliveries

Anesthesia Duties

	Faculty Positions
8 O.R.'s (1:2 Coverage)	6.0
2 O.R.'s (1:1 Coverage)	3.0
Obstetric anesthesia	1.5
Respiratory care	1.5
Pain therapy	1.0
Administration	1.0
Research	3.0
Call duty	1.5
	<u>18.5</u>

†Possible Additional Positions

Sabbatical leave (50 per cent of faculty eligible)	0.5
--	-----

Recommended Guide

Faculty to O.R. ratio	1.8
-----------------------	-----

Faculty to O.R. Ratio Survey

Using data collected in the survey of academic anesthesiology, the faculty-to-operating room ratio was calculated for 91 of 106 medical schools. Statistics were not available from a number of new schools that have not yet established all of their clinical departments. Ratios ranged from a high of 3.5 to a low of 0.25, with a median of 0.75 faculty members to each regularly scheduled operating room. In table 9, the distribution of schools into four levels of staffing is presented.

Should all budgeted positions be filled, there would be approximately a 10 per cent movement to higher ratios. A number of the low ratios were

reported by medical schools with very large clinical care services and severely limited physician participation in total anesthesia care. Conversely, medical schools with limited patient loads often had higher ratios, since fewer faculty members were required for administration of anesthetics. While interpretation of these data must be limited, it appears that 75 per cent of the medical schools in the survey have faculties of anesthesiology significantly below the standards that have been adopted by academic anesthesiologists.

Assessment of Recommended Staffing in Academic Anesthesia

As judged by "peer review," faculties of anesthesiology in our medical centers are not adequate in numbers and certainly fall below the levels available in the private practice of anesthesia in many areas. If one looks for possible errors in the survey and its findings, one might assume that the number of anesthetizing locations is overstated by 20 per cent. If such were the case, the highest 25 per cent of the schools would be moved toward a ratio (faculty: O.R.'s) approaching the 1.8 figure recommended by the model study. Similar adjustments with the lower three fourths of the schools would do little to correct the deficiency of anesthesiologist participation in the patient care in our medical centers.

Another factor in this analysis leading to the indication of deficiency in numbers of anesthesia faculty members is the proposed standard that one faculty member (anesthesiologist) is needed for each two simultaneous anesthetic administrations. Recognizing that a cardiopulmonary arrest will produce irreversible brain damage in 3 minutes, the hazard to elective surgical patient of inadequate anesthesiologist participation must be faced openly. If academic medical centers dictate a lesser assignment of physician manpower to academic anesthesiology, then consideration for an increased anesthetic death rate should be allowed. At the present time our courts of law leave little or no room for error in medical practice. As a consequence, the anesthesiologist finds himself facing the threat of the highest malpractice judgments in medicine, as well as very expensive insurance premiums. Since many cardiac arrests during anesthesia are not the result of disease, they frequently contain the elements necessary for successful malpractice actions, especially when the anesthesiologist is not available at the critical time of the arrest episode. Any reduction of physician presence or participation can be justified only when the possibility of significant risk to the patient is eliminated.

Due to the acute and critical episodes involved in the clinical anesthesia training of residents and students, the immediate and continuous presence

of faculty members necessary is for the inexperienced trainee during the first several months. One faculty member for each two anesthetic administrations at this time is defensible only because 50 per cent of the residents have had a year's training. The shortage of anesthesia residents and the costs of training preclude medical centers from appointing the numbers of residents that would be needed if only experienced residents were used in the administration of anesthesia. Unfortunately, a general shortage of physicians in anesthesiology and an increasing demand for anesthesia care has led to the recruitment of residents who have substandard medical training, further aggravating these deficiencies. Employment of trained nurse-anesthetists or physician assistants in supplying anesthesia care for patients not needed for training purposes in the residency training program does not eliminate the need for faculty members. Although the technical proficiency of this group is high, the medical training of its members is limited, and consequently they must have anesthesiologist direction and support. As mentioned previously, the proper ratio of anesthesiologists to nurse-anesthetists (simultaneous anesthetic administrations) will depend on two factors—complexity of surgical procedure and the disease state of the patient. In a situation in which the patient is healthy and the operation reasonably short and simple, such as cystoscopy or electroconvulsive therapy, a minimum of anesthesia faculty time is needed when trained personnel are utilized. The minimum anesthesiologist contribution to such an anesthetic procedure would include patient evaluation and management and/or assistance with complications. In the judgment of experienced anesthesiologists, it is doubtful that a ratio of fewer than one faculty member to three anesthetic administrations could be justified if quality care is to be maintained, even with relatively low-risk procedures. Balanced against these relatively simple procedures are the most demanding cardiovascular and pediatric surgical procedures, which

require the complete attention of one or more anesthesiologists along with additional assistance from a resident or nurse anesthetist. The distribution of surgical procedures in most academic centers is weighted in the direction of the complex surgical procedures and seriously ill patients. Averaging the low- and high-risk procedures certainly justifies the recommended one faculty to two simultaneous anesthetic administrations as a minimum. Furthermore, statutes regulating the clinical activity of physician assistants in most states usually specify a limit of two physician assistants to one physician. The major deficiencies in the staffing of academic departments of anesthesiology are largely due to this recommended assignment of one faculty member for each anesthetic administration, the basis for which is strongly supported by the above judgments and considerations.

Part I of the Survey was accepted for information by the House of Delegates of the American Society of Anesthesiologists on October 15, 1975. The House of Delegates adopted a Resolution "that Guidelines for Academic Anesthesia Faculties be established which include: (a) a *minimum* ratio of 1 anesthesia faculty on duty for medical direction of each 2 simultaneously scheduled anesthetizing locations; (b) provision for a *minimum* of 1 nonclinical day per week per faculty member for scholarly activities, such as teaching, lecture preparation, writing, etc., (c) sufficient anesthesia faculty for obstetrical anesthesia, research, intensive care, pain therapy, and other clinical and nonclinical (administrative) duties as determined by the needs of the institution."

The ASA Committee on Manpower acknowledges that the report does not give full consideration to the peculiarities of each individual academic organization and its goals.

References

1. Medical education. JAMA 236:2957-2970, 1976
2. Orkin LR: Teaching by anesthesiologists in medical school. Clin Anesth 4:41-56, 1966