

Trends in Medical School Staffing

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A TREMENDOUS increase has occurred since World War II in the number of persons teaching in medical schools. Some of this increase is accounted for by nine new medical schools and the conversion of seven 2-year basic science schools into full 4-year medical schools. By far the largest part of the increase is a result of the expansion of the staffs of the 66 accredited 4-year medical schools in operation in 1942.

In recent years considerable attention has been given to the measurement of faculty size in medical schools, notably the study of the Association of American Medical Colleges and the Office of Defense Mobilization in 1951 and that of the Association of American Medical Colleges in 1960. Findings of the 1942 study of the Procurement and Assignment Service, however, have been noted only briefly. Since these three studies over a period of 19 years were made in comparable fashion, it is possible, as is not always the case, to document changes in substance with a minimum problem of changing definition.

The sharp growth in the faculties of most medical schools has been accompanied by a more modest increase in the number of medical students. Two factors have been largely responsible for increases in medical school staffs. First, medical schools have greatly expanded their research programs, especially in the past few years. Second, the number of graduate students, postdoctoral fellows, and other students for whom the medical school has teaching responsibility has increased considerably. These growing responsibilities and the philosophical and pedagogical changes in medical

education have been well documented. This paper is more narrowly concerned with the extent of faculty growth.

Source of Data

In July 1942, the Procurement and Assignment Service of the War Manpower Commission obtained faculty rosters of all accredited medical schools in the United States. Information was obtained on age, academic title, military status, availability for military service, and amount of time devoted to the medical school.

Since these data were collected primarily for administrative use in recruiting physicians for the Armed Forces while maintaining essential civilian services, very little of the information was ever published. (A paper entitled "The Procurement and Assignment Service and Medical Education" was presented at the annual meeting of the Association of American Medical Colleges in 1942, and a few charts and tables supplementary to this paper were printed.)

A joint survey of medical school staffs by the Association of American Medical Colleges and the Health Resources Staff of the Office of Defense Mobilization was made in February 1951. In this survey, information was obtained on academic rank; medical school department; hours of teaching, research, and administration; year of birth; sex; and status under the "doctor draft" law. Two papers giving some of the findings of this study were published in the *Journal of Medical Education* (1, 2).

The Association of American Medical Colleges compiled a register of medical school faculties in July 1960. Information similar to that obtained in 1951 was sought, but only the total hours devoted to the medical school were

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requested and no attempt was made to allocate faculty time among the various functions of teaching, research, and administration.

Considerable analysis of the data collected in 1951 and 1960 is included in a report by members of the staff of the Association of American Medical Colleges which was published in a recent issue of the *Journal of Medical Education* (3).

The present report is concerned with data available for all three periods. Most of the analysis covers the 66 accredited 4-year medical schools included in the 1942 study. A few tables are based on smaller numbers of schools for which the particular data are available.

Although some information was obtained from each of the 66 medical schools for each period, a few schools' reports were incomplete. The figures shown in the tables and charts in this report include adjustments for the incompleteness of returns.

Number of Faculty

The 66 accredited 4-year medical schools reported a total of 13,915 faculty members in July 1942 (table 1). This figure omits faculty members on military leave but includes replacements for such faculty wherever there were replacements. By 1951, these same medical schools had 15,406 faculty members and by 1960 the number had increased to 27,301.

The increase in total faculty between 1942 and 1951 amounted to 11 percent and the number of medical students in these schools increased similarly. Between 1951 and 1960, the faculty increased 77 percent, but the number of medical students increased only 7 percent.

Departmental group. Of 45 medical schools for which data are available for 1942, the actual number of faculty members in the basic

Table 1. Physician faculty in relation to total faculty in 66 medical schools in the United States: 1942, 1951, 1960

Item	1942	1951	1960
Total faculty -----	13,915	15,406	27,301
Physician faculty -----	12,339	13,886	23,687
Percent physician faculty -----	88.7	90.1	86.8

Table 2. Total and equivalent full-time faculty in basic science and clinical departments in 45¹ medical schools in the United States: 1942, 1951, 1960

Item	1942	1951	1960
All departments:			
Total faculty -----	10,020	11,010	19,529
Equivalent full-time faculty ² -----	4,563	6,063	10,509
Basic science departments:			
Total faculty -----	1,806	1,785	2,848
Equivalent full-time faculty ² -----	1,431	1,471	2,400
Clinical departments:			
Total faculty -----	8,214	9,225	16,681
Equivalent full-time faculty ² -----	3,132	4,592	8,109

¹ Data for 1942 by departmental group available for only 45 medical schools.

² Computed by adding to the actual number of full-time faculty one equivalent full-time faculty for each 1,000 hours reported by the part-time faculty.

science departments decreased slightly between 1942 and 1951 (table 2). In the clinical departments for the same period there was a 12 percent increase in the total number of faculty members. In the period from 1951 to 1960, the basic science departments had a 60 percent increase in total faculty members while the clinical departments experienced an 81 percent increase.

Physician faculty. In 1942, there were 12,339 faculty members with M.D. degrees in the 66 medical schools (table 1). This represented 89 percent of the total faculty. Between 1942 and 1951, the physician faculty increased proportionately a little more than the total faculty. Between 1951 and 1960, however, the increase in physician faculty was 71 percent compared with 77 percent for the total faculty.

Full-Time and Part-Time Faculty

In the 1942 study, full time was defined as "devoting essentially entire time to school duties." For those faculty members devoting less than full time to the school, the number of hours per week and weeks per year was requested. Based on the returns, 1,000 hours or more per year were considered full time.

In the 1951 study, the hours per week and weeks per year devoted to the work of the medi-

cal school were requested for all faculty members and the schools were not asked to indicate which faculty members were considered full time.

The schedule used for the 1960 study asked each faculty member for a yes or no answer to the question "Are you a full-time faculty member?" but no definition of full time was supplied. The part-time faculty members were asked how many hours a year they devoted to medical school duties.

These methodological differences in the collection of the data make it impossible to have completely comparable information for the three studies. However, to make the best pos-

sible use of the diverse data, each faculty member in 1951 who devoted 1,000 hours or more to the medical school was considered full time. For 1960, all "part-time faculty" members who devoted 1,000 hours or more to the medical school were added to those who reported themselves as "full time" to obtain an adjusted full-time figure.

The figures shown here for numbers of full- and part-time faculty in the 66 medical schools differ from those in the report published by the Association of American Medical Colleges because the latter report considered 1,920 or more hours a year as full time.

The number of full-time faculty in the 66 medical schools increased from some 3,500 in 1942 to more than 5,200 in 1951 and about 10,600 in 1960 (table 3). This was an increase of 48 percent between 1942 and 1951 and more than 100 percent between 1951 and 1960. The part-time faculty decreased 10 percent between 1942-51 and increased 54 percent between 1951-60. The net result of these varied rates of change was an increase in the proportion of the faculty who were full time from 26 percent in 1942 to 43 percent in 1960.

A detailed breakdown of the number of hours a year devoted to the medical school by the part-time faculty is not available for 1942. The distribution of faculty members by annual hours for 1951 and 1960 is shown in table 3. This table includes both the full-time and part-time faculty. Under the definition used in this study, the figures shown in all three lines at the top of the table are the full-time faculty.

Table 3. Distribution of faculty members in 66 medical schools in the United States, by annual hours: 1942, 1951, 1960

Annual hours	1942	1951	1960
	Number of faculty members		
Total.....	13, 915	¹ 15, 406	² 27, 301
Full time.....	3, 547	5, 249	10, 596
1,920 or more.....	3, 547	3, 697	9, 454
1,500-1,919.....		635	282
1,000-1,499.....		917	860
Part time.....	10, 368	9, 289	14, 279
500-999.....	10, 368	1, 630	1, 737
300-499.....		1, 206	1, 864
200-299.....		1, 988	2, 281
100-199.....		2, 357	4, 536
25-99.....		2, 108	3, 861
	Percent distribution		
Total known.....	100. 0	100. 0	100. 0
Full time.....	25. 5	36. 1	42. 6
1,920 or more.....	25. 5	25. 4	38. 0
1,500-1,919.....		4. 4	1. 1
1,000-1,499.....		6. 3	3. 5
Part time.....	74. 5	63. 9	57. 4
500-999.....	74. 5	11. 2	7. 0
300-499.....		8. 3	7. 5
200-299.....		13. 7	9. 2
100-199.....		16. 2	18. 2
25-99.....		14. 5	15. 5

¹ Includes 868 faculty members with hours not reported.

² Includes 2,426 faculty members with hours not reported.

Table 4. Proportion of faculty time accounted for by full-time faculty members in 66 medical schools in the United States: 1942, 1951, 1960

Item	1942	1951	1960
Equivalent full-time faculty: Total ¹	6, 024	8, 156	14, 203
Actual full-time faculty.....	3, 547	5, 249	10, 596
Equivalent of part-time faculty.....	2, 477	2, 907	3, 607
Percent of faculty time by full-time faculty.....	58. 9	64. 4	74. 6

¹ Computed by adding to the actual number of full-time faculty one equivalent full-time faculty for each 1,000 hours reported by the part-time faculty.

Under the definition used in a recent report (3) by the Association of American Medical Colleges, only the first line (1920 or more) is full time. This group increased from 25 percent to 38 percent of the total faculty between 1951 and 1960. Among the faculty devoting less than 1,000 hours a year to the medical school, the proportions in each group between 200 and 999 hours decreased while the proportions devoting less than 200 hours increased in the 9-year period.

The changing pattern of part-time faculty is also indicated by the average number of hours per man per year devoted to the medical school. In 1942 the part-time faculty devoted an average of 239 hours a year to the medical school; in 1951 this had increased to 286 hours; by 1960 the average had dropped to 216 hours a year.

Equivalent Full-Time Faculty

Since there was such variation in the number of hours per year devoted to the medical school by members of the part-time faculty, some measure was needed to compare staffing from school to school and from one period to another. Such a measure is the number of "equivalent full-time faculty." The components of this measure are shown in table 4. To the actual full-time faculty members (those reporting 1,000 hours or more per year) a full-time equivalent was added for each 1,000 hours reported by the part-time faculty members. For

Table 5. Proportion of faculty time accounted for by full-time faculty members in 36¹ medical schools in the United States, by size of city: 1942, 1951, 1960

Size of city ²	Number of schools	Percent of faculty time by full-time faculty		
		1942	1951	1960
Total.....	36	62.6	67.0	75.8
Under 100,000.....	6	84.1	80.1	86.9
100,000-499,999.....	15	61.8	73.7	78.0
500,000-999,999.....	9	59.7	62.5	74.8
1,000,000 or more.....	6	49.1	54.3	66.8

¹ Data for 1942 by size of city available for only 36 medical schools.

² Based on 1960 Census of Population.

Table 6. Number of equivalent full-time faculty and faculty-student ratios in 66 medical schools in the United States: 1942, 1951, 1960

Item	1942	1951	1960
Equivalent full-time faculty ¹	6,024	8,156	14,203
Number of students.....	21,662	24,145	25,778
Faculty per 100 students.....	27.8	33.8	55.1

¹ Computed by adding to the actual number of full-time faculty one equivalent full-time faculty for each 1,000 hours reported by the part-time faculty.

Table 7. Faculty-student ratios in 66 medical schools in the United States: 1942, 1951, 1960

Equivalent full-time faculty per 100 students ¹	1942	1951	1960
Total.....	66	66	66
Less than 20.0.....	24	11	0
20.0-39.9.....	28	38	19
40.0-59.9.....	11	10	21
60.0-79.9.....	3	7	14
80.0 or more.....	0	0	12

¹ Computed by adding to the actual number of full-time faculty one equivalent full-time faculty for each 1,000 hours reported by the part-time faculty.

example, the 1,000 hours could be made up of two faculty members each with 500 hours or it could be contributed by 10 faculty members who devote 100 hours each to the medical school.

The number of equivalent full-time faculty members in the 66 medical schools increased from a little more than 6,000 in 1942 to 14,200 in 1960 (table 4). The proportionate increase was 34 percent from 1942 to 1951 and 75 percent from 1951 to 1960. The last line of table 4 shows that the actual full-time faculty as a percent of the equivalent full-time faculty increased steadily from 59 to 75 percent. A comparison of these percentages with the percentage of full-time faculty (26, 34, and 39 percent in the three periods) shows that the full-time faculty accounts for about twice as much service to the medical school. In 1960, for example, 39 percent of the faculty were full time, but they accounted for 75 percent of the faculty time.

The proportions of faculty time accounted for by the full-time faculty are minimal figures. In the computations, 1,000 hours a year was used to obtain the full-time equivalents of the part-

time faculty. Many members of the full-time faculty devote considerably more time than this to the medical school.

Size of city. One factor which usually influences the relative importance of the full-time and part-time faculties in medical school staffing is the size of the community. Medical schools in large cities can call upon large numbers of practicing physicians to share the teaching load in the clinical departments. In smaller cities, which have fewer specialists available, the medical schools must employ more full-time faculty members to provide instruction in the clinical specialities. An inverse relationship is shown in table 5 between size of city and percent of faculty time provided by the full-time faculty. Since 1942 the increased proportion of full-time (from 63 to 76 percent) is due to the increased proportion of full-time faculty in large cities. The big city schools are moving toward the full-time pattern of the small communities, and the differences are diminishing. Data for only 36 of the 66 medical schools are included in this table since these are the schools

Table 8. Total faculty, equivalent full-time faculty, and faculty-student ratios in 18 research-oriented and 48 other medical schools in the United States: 1942, 1951, 1960

Item	1942	1951	1960
18 research-oriented schools: ¹			
Total faculty	5, 733	6, 077	10, 109
Equivalent full-time faculty ²	2, 970	3, 716	5, 967
Ratio, equivalent to total 52	. 61	. 59
Number of students	6, 713	7, 077	7, 542
Equivalent full-time faculty per 100 students	44. 2	52. 5	79. 1
48 other schools:			
Total faculty	8, 182	9, 329	17, 192
Equivalent full-time faculty ²	3, 054	4, 440	8, 236
Ratio, equivalent to total 37	. 48	. 48
Number of students	14, 949	17, 068	18, 236
Equivalent full-time faculty per 100 students	20. 4	26. 0	45. 2

¹Schools so designated by the Procurement and Assignment Service in 1942 on the basis of high faculty-student ratios and other criteria.

²Computed by adding to the actual number of full-time faculty one equivalent full-time faculty for each 1,000 hours reported by the part-time faculty.

Table 9. Faculty-student ratios in 18 research-oriented and 48 other medical schools in the United States, by size of enrollment: 1942, 1951, 1960

Size of enrollment	Equivalent full-time faculty per 100 students		
	1942	1951	1960
18 research-oriented schools: ¹			
All sizes	47. 3	55. 0	82. 9
Less than 300	60. 3	66. 8	93. 5
300-399	44. 4	55. 6	88. 0
400-499	44. 2	53. 4	88. 7
500 or more	35. 8	40. 7	68. 6
48 other schools:			
All sizes	21. 5	26. 8	46. 8
Less than 300	23. 7	29. 0	51. 2
300-399	21. 6	27. 2	48. 3
400-499	14. 4	24. 7	40. 6
500 or more	16. 6	21. 6	40. 6

¹Schools so designated by the Procurement and Assignment Service in 1942 on the basis of high faculty-student ratios and other criteria.

for which such data are available for all three periods.

Departmental group. Basic science departments have proportionately more full-time faculty members than have clinical departments. An increasing proportion of the basic science is being taught by holders of Ph.D and Sc.D. degrees.

Unfortunately, data are not available for 1942 on the number of full-time and part-time faculty members in basic science and clinical departments. For 45 of the 66 medical schools the total number of faculty members and the equivalent full-time faculty are available by departmental group (table 2). From these two figures a ratio of equivalent full-time faculty to total faculty has been computed for basic science and clinical departments separately.

For each of the three periods the ratio is higher for the basic science than for the clinical departments, reflecting the higher proportion of full-time faculty in the basic science departments. For both departments, the ratio increased between 1942 and 1951, with the increase for the clinical departments much greater than for the basic science departments. Between 1951 and 1960 there was a further increase in

the ratio for the basic science departments but the ratio stayed essentially the same for the clinical departments.

Faculty-Student Ratios

As stated above, the number of persons other than medical students for whom the medical school faculty members have teaching responsibilities has increased greatly, and it varies from one medical school to another. In the recent Association of American Medical Colleges report (3) an attempt was made to count these other responsibilities and equate them to full-time students. The present analysis is confined to medical students for several reasons: (a) information was not available for other teaching responsibilities for 1942, and (b) it is quite difficult to equate these other persons to full-time students.

In terms of medical students, there were 28 equivalent full-time faculty members per 100 students in 1942, 34 in 1951, and 55 in 1960 (table 6). This doubling of the faculty-student ratio in 18 years does not mean that medical students today are receiving twice as much faculty time as in 1942. Much of the additional time is taken up with research activities, with training of graduate and other students, and with purely administrative matters.

There is great variation among the 66 medical schools in faculty-student ratios. In 1942, 24 schools had ratios of less than 20 equivalent full-time faculty members per 100 medical students while 3 schools had ratios between 60 and 80 (table 7). In 1951, only 11 schools had ratios of less than 20 and 7 schools fell between 60 and 80. By 1960, no school had a ratio of less than 20 and 12 schools had ratios of 80 or more.

Two Types of Medical School

At the time of the Procurement and Assignment Service study in 1942, the medical schools seemed to fall into two rather distinct groups. A small group of 18 or so medical schools stood out from the others in the size of the faculty in relation to the number of students. From knowledge of the programs of these schools, it was felt that one important reason for the higher level of staffing was larger programs of

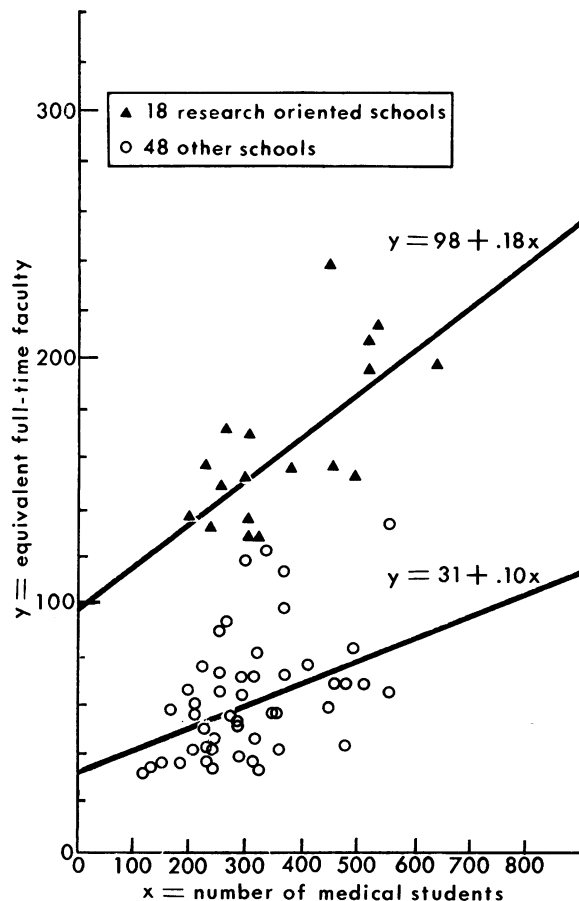
research. Since 1942, largely as a result of Federal support, the research programs of all medical schools have grown tremendously. However, the sharp difference between these two groups still exists.

Data for 1958-59 show that 14 of these research-oriented schools had \$2.0 million or more for separately budgeted research; the other 4 schools spent between \$1.0 and \$2.0 million. Only 2 of the other 48 schools in the present study spent \$2.0 million or more for separately budgeted research in 1958-59.

Available data for the two groups of schools are summarized in table 8. In both periods, the total number of faculty members increased proportionately more among the group of 48 "other" schools than among the research-oriented schools.

Equivalent full-time faculty. The number of

Figure 1. Relation between equivalent full-time faculty and medical students in 66 medical schools in the United States, 1942



equivalent full-time faculty increased 25 percent between 1942 and 1951 among the research-oriented schools and 45 percent among the other 48 schools. Between 1951 and 1960, the increases were 61 percent for the research-oriented schools and 86 percent for the other schools.

For both groups of schools, the equivalent full-time faculty increased proportionately more than the total faculty in the period from 1942 to 1951, while from 1951 to 1960, the total faculty increased proportionately more than the equivalent full-time faculty for the research schools. The effect of these differential increases can be seen in table 8 in the ratios of equivalent to total faculty. For the research-oriented schools, the ratio rose from 0.52 in 1942 to 0.61 in 1951 and then dropped to 0.59 in 1960. For the other schools, the ratios for the three years were 0.37, 0.48, and 0.48.

Figure 2. Relation between equivalent full-time faculty and medical students in 66 medical schools in the United States, 1951

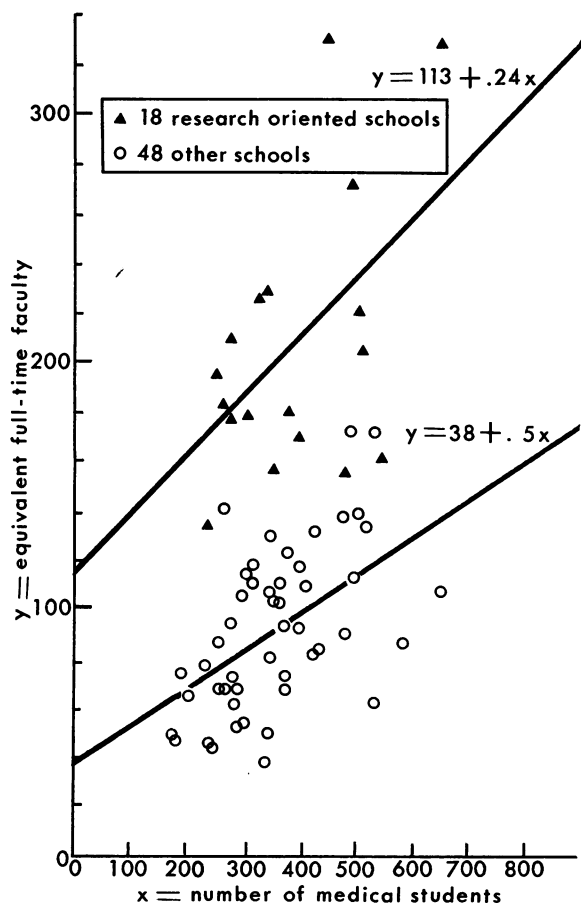
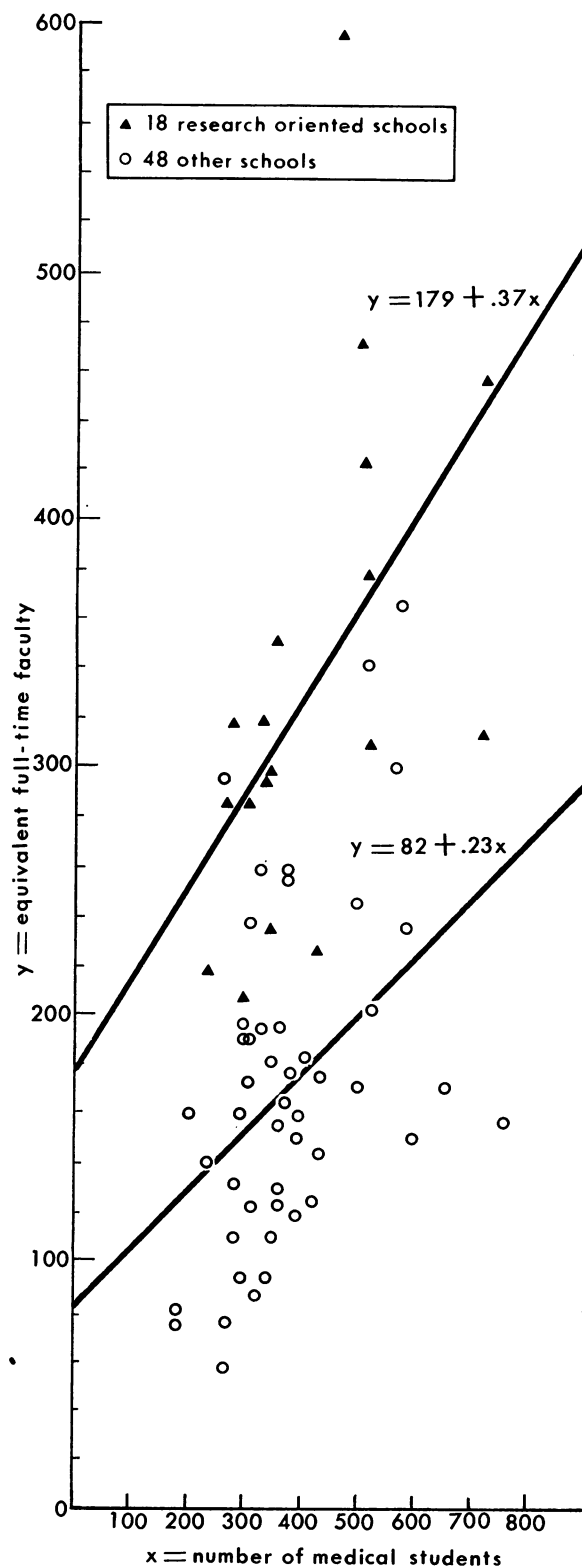


Figure 3. Relation between equivalent full-time faculty and medical students in 66 medical schools in the United States, 1960



Faculty-student ratios. The faculty-student ratios are also shown in table 8 for the research-oriented schools and for the other schools. In 1942 the research-oriented schools had 44 equivalent full-time faculty members per 100 students, while the other schools had less than half that many. By 1960 the ratio for the research-oriented schools had almost doubled and that for the other 48 schools had more than doubled, resulting in ratios of 79 and 45 respectively.

For both research-oriented schools and the other group of schools, there is an inverse relationship between the faculty-student ratio and the size of the school as measured by the number of medical students enrolled (table 9). Some irregularities appear in the trends, but for both groups of schools the faculty-student ratios are considerably lower for the largest schools than for the smallest schools. The ratios for the research-oriented schools are $1\frac{1}{2}$ to 3 times as high as the rates in the same size group for the other group of schools.

These average faculty-student ratios mask great variation among the individual schools in each group. A better picture can be obtained from figures 1-3. These figures show the relationship between the equivalent full-time faculty and the number of medical students for each medical school for each of the 3 years. A least-square line has been fitted to the data for the research-oriented schools and other schools separately.

The figures show that there has been an increase in the equivalent full-time faculty for all schools, but the most outstanding change is the wider scatter of the schools around the fitted line in the latter years. This is especially true of the research-oriented schools where for 1960 a few schools have very large equivalent full-time faculties in relation to number of medical students.

Summary

Data collected by the Procurement and Assignment Service during World War II and surveys made in 1951 and 1960 by the Association of American Medical Colleges have been used to analyze trends in medical school staffing in 66 accredited 4-year medical schools in the United States.

There has been a tremendous increase, especially since 1951, in the number of faculty in medical schools. The increase has been greater for the clinical departments than for the basic science departments, and greater for full-time than for part-time faculty.

The number of hours a year devoted to the medical school by the part-time faculty members varies widely. Because of this variation, faculty-student ratios from school to school or from period to period can be compared only on the basis of full-time faculty equivalents. In this study 1,000 hours of service a year is considered equal to one full-time faculty, since this figure was used originally for the 1942 study. At the present time, 1,920 hours is a better basis for calculating full-time equivalents.

The average faculty-student ratios for the 66 medical schools in the study increased from 28 equivalent full-time faculty members per 100 students in 1942 to 34 in 1951, and to 55 in 1960.

The medical schools studied by the Procurement and Assignment Service in 1942 seemed to fall into two distinct groups on the basis of faculty-student ratios. Eighteen schools with high ratios were categorized as "research-oriented" schools. In 1960 these schools could still be identified in the high-faculty group. Between 1942 and 1960 the faculty-student ratios increased for both the research-oriented schools and for the other group of schools, but the increase was somewhat greater for the latter group. The result of this differential increase was to somewhat narrow the gap between the two groups of schools, although very large differences still remain.

For both groups of schools, there was an inverse relationship between the faculty-student ratios and the number of medical students enrolled. This inverse relationship was more pronounced for the research-oriented schools.

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