

The Paramedical Professions

General Assembly of the Commonwealth of Pennsylvania

JOINT STATE GOVERNMENT COMMISSION

Harrisburg, Pennsylvania

1970

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LETTER OF TRANSMITTAL

*To the Members of the General Assembly of the
Commonwealth of Pennsylvania:*

There is submitted herewith a report on the paramedical professions in Pennsylvania, in accordance with the directive contained in House Resolution No. 165, Session of 1967.

The Joint State Government Commission acknowledges the assistance and cooperation of the State Board of Medical Education and Licensure, the State Board of Nurse Examiners, the State Department of Health, the state and national health associations, and Pennsylvania universities, all of whom contributed materially to the study. On behalf of the Commission, the work and contribution of the members of the Task Force on Paramedical Professions is recognized with appreciation.

FRED J. SHUPNIK, *Chairman*

*Joint State Government Commission
Capitol Building
Harrisburg, Pennsylvania
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TABLE OF CONTENTS

	Page
Summary of Findings.....	ix
Recommendations.....	xi
Introduction.....	1
SECTION I. State Regulation of Paramedical Occupations.....	3
SECTION II. Training Facilities in Pennsylvania for Paramedical Careers.....	9
SECTION III. Utilization of Paramedical Personnel in Pennsylvania.....	17

LIST OF TABLES

	Page
Table 1. Health Occupations by Number of States Requiring Licensure, 1967.....	5
Table 2. Pennsylvania Public School Enrollments in Health Occu- pations by Type of Enrollment, 1959-1969.....	10
Table 3. Number of Students Completing Paramedical Curricula in Pennsylvania Institutions of Higher Education, Aca- demic Years 1966-1969.....	11
Table 4. Number of Students Completing Specified Paramedical Curricula in Pennsylvania Colleges and Universities, 1968- 1969.....	11
Table 5. Curricula Offered in the Paramedical Field by Pennsyl- vania Institutions by Specialty and by Type of Institution, 1968.....	12
Table 6. Graduates in Health Specialties from Pennsylvania Institutions, 1967.....	15
Table 7. Number of Physicians Per 100,000 Population in Penn- sylvania and United States, 1960-1967.....	17
Table 8. Hospital Personnel in Pennsylvania as Compared to Hos- pital Personnel in United States, 1966.....	19
Table 9. Comparison of Educational Facilities, Graduates, and Employed Health Personnel for Specified Health Occupations.....	21

APPENDIX TABLES

Page

Appendix Table 1. Health Occupations, 1968.....	25
Appendix Table 2. Pennsylvania Statutes Regulating Health Professions, 1970.....	34
Appendix Table 3. Biennial Licensure Renewal Fees in Pennsylvania, 1970.....	34
Appendix Table 4. Public School Adult Education Total Enrollments and Expenditures by Occupational Categories, 1964-1968.....	35
Appendix Table 5. Number of Institutions that Offer Curricula in the Paramedical Field by Type of Institution and Number of Specialties Offered, 1968.....	36
Appendix Table 6. Estimated Personnel in Hospitals, Pennsylvania, 1966.....	37
Appendix Table 7. Estimated Personnel in Hospitals, United States, 1966.....	38
Appendix Table 8. Estimated Personnel in Hospitals, Pennsylvania, 1968.....	40

SUMMARY OF FINDINGS

1. The State Board of Medical Education and Licensure licenses physicians, physical therapists, and midwives, and has the authority to license “. . . any person pretending to a knowledge of any branch or branches of medicine and surgery. . . .”
2. The State Board of Medical Education and Licensure has considered extending licensure to several paramedical disciplines such as medical technologists and surgical technicians and has been petitioned by x-ray technicians and opticians to be licensed.
3. Registered nurses and practical nurses are licensed by the State Board of Nurse Examiners.
4. More than 125 paramedical occupations in the entire health field are identified by the United States Department of Health, Education and Welfare.
5. Education and training for paramedical professions are presently being provided in the Commonwealth by universities with special paramedical schools, colleges, junior colleges, community colleges, hospitals, vocational schools, and public schools. Altogether 205 approved schools provide special training in one or more health professions.

RECOMMENDATIONS

The Joint State Government Commission recommends that:

1. The State Board of Medical Education and Licensure extend licensure to such medical specialties as it deems appropriate within the limits of its statutory authority; but rather than granting a separate license for each paramedical specialty, the board issue a paramedical license granting the right to practice the specialty or specialties in which the applicant qualifies. The qualifications and criteria for each paramedical specialty shall be prescribed with the counsel of an advisory committee of representatives of such specialty.
2. The Professional Nursing Law be amended to provide that the State Board of Nurse Examiners with the counsel of an advisory committee of medical specialists be responsible for licensing nurse anesthetists and other nursing specialties; and that after a period of nonpractice, renewal of the license for nurse anesthetist be contingent upon completion of a prescribed number of hours of training or a course of study.
3. Legislation be enacted to provide that in the nursing and paramedical fields, renewal of licenses after a period of nonpractice be contingent upon completion of a prescribed number of hours of training or a course of study.

INTRODUCTION

Man, as a matter of historic record, has placed a high priority on health and health care. In fact, the healing and care of the sick is an inherent tenet of Judeo-Christian doctrine. With the increase of medical knowledge and physician specialization, the availability of medical personnel, when and where needed, has become the concern of political jurisdictions as well as communities and individuals. Generally, great stress has been placed on increasing the number of trained physicians. In 1912, Abraham Flexner reported, after an exhaustive study of the supply of physicians in Europe: "Any conclusion as to the proper number must take into account the possibility of their earning a living in the community."¹ A 1955 report of the Joint State Government Commission states:

"Among the measurable factors which appear to influence the number of physicians serving the population of a given state or locality are degree of urbanization, extent of hospital and clinical facilities, per capita income, availability of public health services, number of residents who complete medical training in the state or elsewhere, and extent of medical training facilities."²

Even with the projected increases of more medical school graduates, the relative number of physicians cannot reasonably be expected to increase at the rate health services are being sought. In the last quarter century, private and public health insurance programs have brought medical care to a greater proportion of the population and have given new impetus to preventive medical services. The United States census shows that in the period from 1962 to 1966, patient hospital days for persons over 65 increased by 50 percent. From 1950 to 1965 the per capita expenditures in constant dollars on health services in the United States almost doubled, from \$111 to \$209.³ In contrast, the number of physicians per 100,000 population increased only 5 percent, from 149 in 1950 to 156 in 1966.

¹ *Medical Education in Europe*, A Report to the Carnegie Foundation of the Advancement of Teaching, Bulletin No. 6 (1912), p. 16.

² *Medical Training Facilities*, Report of the Joint State Government Commission (1955), p. 17.

³ U. S. Department of Health, Education and Welfare, Public Health Service, *Health Manpower, Perspective: 1967*, p. 6.

The public demand for increased health services and the problem of meeting rising costs may be partially resolved by increasing physician productivity with the use of paramedical personnel to carry out clinical and clerical duties. The actual time spent with the patient can be used more effectively. Doctors' responses to a 1968 survey questionnaire indicated that an increase in their productivity by 10 to 25 percent could be achieved through better use of qualified aides and better equipped offices without increasing their working hours,⁴ but increasing patient visits. The study indicates that physicians have increased their patient visits somewhat by limiting the number of home visits. In the United States as a whole 81 percent of the average general practitioner's patient visits were office, 17 percent hospital, and only 2 percent home. The study further indicates that the average physician in an urban or suburban community in Northeastern United States (Pennsylvania to Maine) worked 50 to 60 hours a week and had a total of about 118 patient visits. This number of weekly patient visits can be expected to increase further as physicians delegate technical procedures under their supervision to paramedical personnel such as medical or laboratory technologists, x-ray or radiological technologists, surgical technicians, inhalation therapists, and nurse anesthetists.

The following sections discuss possible means of assuring a minimal degree of competency, training facilities and utilization in Pennsylvania of paramedical personnel.

⁴ Arthur Owens, "Seeing more patients: best way to beat inflation," *Medical Economics* (January 1970), pp. 77-81.

SECTION I

STATE REGULATION OF PARAMEDICAL OCCUPATIONS

Currently 125 primary health occupations are identified⁵ by the United States Department of Health, Education and Welfare. The pursuit of each of these occupations requires special training. The specific techniques and theories involved vary among occupations and in the degree of competency demanded. A primary method of assuring a minimal level of competency in certain specific health occupations in the past has been the enactment of state legislation requiring licensure. In Pennsylvania nine separate administrative entities, presently licensing boards, have been established by legislative enactment in the period 1876 to 1951. These boards and the 14 health occupations which they license are listed below.⁶ In each instance the governing body is under the Commissioner for Professional and Occupational Affairs in the Commonwealth's Department of State.

<i>Licensing Board</i>	<i>Occupation</i>
State Board of Chiropractic Examiners	Chiropractor
State Dental Council and Examining Board	Dentist Dental Hygienist
State Board of Medical Education and Licensure	Physician (M.D.) Physical Therapist Midwife Drugless Therapist
State Board of Nurse Examiners	Nurse, Professional Nurse, Practical
State Board of Optometric Examiners	Optometrist
State Board of Osteopathic Examiners	Physician (D.O.)
State Board of Pharmacy	Pharmacist
State Board of Podiatry Examiners	Podiatrist
State Board of Veterinary Medical Examiners	Veterinarian

⁵ See Appendix Table 1.

⁶ See Appendix Table 2 for specific Pennsylvania statutes.

The separate boards are governed by separate statutes which differ as to both organization and operation. Administrative difficulties can arise when one licensed occupation is expanded by practice to include duties not within the ordinary scope of the license, e.g., a nurse performing specified duties relative to the administration of anesthesia is presently under the licensing authority of the State Board of Nurse Examiners solely as a professional nurse.

Under the Medical Practice Act of 1911 the State Board of Medical Education and Licensure has authority:

“. . . at its discretion, to examine any persons pretending to a knowledge of any branch or branches of medicine and surgery, for the purpose of establishing regulation and State licensure.”⁷

By this act the State Board of Medical Education and Licensure extended licensure to physical therapists and drugless therapists. Opticians and x-ray technicians in Pennsylvania have petitioned the board to be licensed. The State Board of Medical Education and Licensure is also considering licensure for several other paramedical disciplines such as inhalation therapists, medical technologists, nurse anesthetists, and surgical technicians. A federal survey⁸ in 1967 indicates that at that time no state licensed any of these occupations. There is considerable variation in state licensing of health specialties. The following table lists health occupations by the number of licensing states as reported in the survey.

⁷ 1911, June 3, P. L. 639, §6, as amended.

⁸ U. S. Department of Health, Education and Welfare, Public Health Service, National Center for Health Statistics, *State Licensing of Health Occupations* (1967).

TABLE 1

HEALTH OCCUPATIONS BY NUMBER OF
STATES REQUIRING LICENSURE

1967

<i>Occupation</i>	<i>Number of States</i>
(1)	(2)
Dentist*	50
Dental Hygienist*	50
Nurse, Practical*	50
Nurse, Professional*	50
Optometrist*	50
Pharmacist*	50
Physician (D.O.)*	50
Physician (M.D.)*	50
Podiatrist*	50
Veterinarian*	50
Chiropractor*	48
Physical Therapist*	48
Psychologist	36
Sanitarian	30
Midwife*	22
Optician	17
Drugless Therapist**	7
Nursing Home Administrator***	2
Health Department Administrator	1
Hospital Administrator	1
X-ray Technician	1

* Indicates those occupations licensed in Pennsylvania.

** Since 1951 new members of the profession have been licensed in Pennsylvania as chiropractors.

*** Acts creating the State Board of Examiners of Nursing Home Administrators and providing for licensing were approved by the Governor on June 22, 1970, being Act Nos. 121 and 122.

SOURCE: U.S. Department of Health, Education and Welfare, Public Health Service, *State Licensing of Health Occupations* (1967).

The range in the number of states requiring licensure in some of these specialties may indicate differences in health priorities as well as a lack of agreement as to the hazards to the public. Of the 21 occupations listed, 12 are licensed by at least 48 states including Pennsylvania. Psychologists, sanitarians, and opticians are not licensed in Pennsylvania but were licensed by 36, 30, and 17 states, respectively,

as of 1967. New York was the first state to license x-ray technologists.⁹ Since 1967, New Jersey and California have included x-ray technologists in their licensed health occupations.

Under present law discretionary responsibility for the supervision of instruction, examination, and licensing of persons in the paramedical field rests with the Pennsylvania State Board of Medical Education and Licensure. As greater use is made of the 125 major paramedical disciplines, to assure a minimal level of competency the board may exercise its discretion in the development of licensing regulations which can include the following objectives:

1. Flexibility in requirements to reflect new developments in education and practice;
2. Availability of avenues for advancement from health occupations requiring less formal training to those requiring more formal training;
3. Optimum utilization of personnel; and
4. Prevention of educational obsolescence.

As a rule, the original issuance of any professional license is dependent upon certain conditions relative to the moral character and age of the applicant, and for particular health disciplines it may be limited to persons having had specific training and experience. This is not the case with respect to renewal of state licenses in health occupations which are obtained by sending a remittance as a renewal fee. In most states the renewal period is one year; in Pennsylvania it is two years with no requirement for renewal that a health practitioner has been employed or has pursued formal study in his occupation during any part of the previous licensing period.¹⁰ A person well qualified in a specialty at the time of original licensure, but having neither practiced nor studied for some period of time, may be unaware of the availability of new drugs, equipment and techniques and their concomitant hazards. For example,

⁹ On July 1, 1964, legislation requiring the licensure of x-ray technicians became effective in New York State. Previously an estimated 12,000 to 14,000 individuals, other than physicians and related practitioners, were operating x-ray equipment. In 1965 the law was amended to provide for a special license for therapy technicians and chest radiographers. By 1968, 7,200 x-ray technicians, general and special, were licensed in New York State. In 1970, 8,300 were licensed.

¹⁰ State Licensure of X-ray Technicians: The Experience of New York State," *American Journal of Public Health*, Vol. 58, No. 3 (March 1968), pp. 528-533; "Radiological Health," *Newsletter of the Advisory Committee for the Study of Communications in Radiological Health*, Columbia University School of Public Health, No. 3 (1968).

¹¹ See Appendix Tables 2 and 3. Bills presently before the General Assembly proposing amendments to the Medical Practice Act and the optometry law provide for specific course requirements for the renewal of licenses of persons engaged in the practice of drugless therapy and optometry. Senate Bill No. 780, Pr. No. 1666 (1969) and Senate Bill No. 836, Pr. No. 3051 (1969).

certain health personnel are required to recognize adverse reactions or warning signals due to the use of various drugs, but 75 percent of the drugs used in hospitals in 1969 were not in use in 1964.¹¹ Technologies and mechanical devices such as multiphasic screening clinics, blood analysers, patient monitors, and kidney machines are constantly being revised, streamlined and otherwise improved, requiring specially trained personnel with up-to-the-minute information as to their use and possible dangers.

¹¹ Commonwealth of Pennsylvania, House of Representatives, Committee on Consumer Protection, Hearing before the Subcommittee on Insurance, Philadelphia, Pennsylvania (October 24, 1969), p. 47.

SECTION II

TRAINING FACILITIES IN PENNSYLVANIA FOR PARAMEDICAL CAREERS

Complex equipment and techniques in clinical services and increased demand for health personnel in general have been accompanied by a growing interest in health service careers and have necessitated the establishment and expansion of educational facilities to train such persons. Credit for many types of health service experience could provide more efficient use of these facilities and the incentive to many individuals to seek advanced formal training in the medical and paramedical fields. Nursing aides and practical nurses who are interested in advancing may qualify for work-study programs; professional nurses may be induced to study in specialized areas such as anesthesia. Former medical corpsmen in the Armed Services, who had some formal medical training and experience in highly specialized areas, if given credit for their past training and experience, might be encouraged to follow civilian medical careers.

Pennsylvania institutions offering training for health careers include public schools, vocational schools, hospitals, community colleges, junior colleges, colleges, and universities. Health-oriented courses available in public schools are largely offered as adult education. Table 2 shows the enrollment in health occupation-oriented curricula in Pennsylvania public schools for each year from 1959 through 1969. During that decade the enrollment more than tripled.

In the last five years from 1964 to 1969, Pennsylvania public schools have registered an average of 3,174 adults a year in courses oriented toward some type of health occupation—a large part of this enrollment was in courses of practical nursing.¹² These enrollments in health-oriented courses represent 4.8 percent of the total adult registrations in occupational courses during this period.¹³ As a point of comparison, 5 percent of the total civilian labor force in the United States was employed in some type of health occupation in 1966. The Pennsylvania Department of Education¹⁴ reports that the expenditures for these

¹² Commonwealth of Pennsylvania, Department of Public Instruction, *Vocational, Technical and Continuing Education in Pennsylvania, A Systems Approach to State-Local Program Planning* (1969), p. 24.

¹³ See Appendix Table 4.

¹⁴ *Ibid.*

TABLE 2

PENNSYLVANIA PUBLIC SCHOOL
ENROLLMENTS IN HEALTH OCCUPATIONS BY TYPE OF
ENROLLMENT

1959-1969

School Year Ending	Type of Enrollment			Total
	Day ¹	Adult Preparatory ²	Supplemental ³	
(1)	(2)	(3)	(4)	(5)
1959	110	1,435	275	1,820
1960	205	1,833	268	2,306
1961	294	1,999	364	2,657
1962	393	2,469	522	3,384
1963	392	2,619	428	3,439
1964	386	2,880	421	3,687
1965	281	3,145	346	3,772
1966	307	3,317	276	3,900
1967	405	3,423	257	4,085
1968	414	3,935	1,031	5,380
1969	996	4,243	959	6,198

¹ Classes conducted within the high schools for 10, 11, and 12th grades.

² Training for specific jobs.

³ Upgrading for specific jobs.

SOURCE: Commonwealth of Pennsylvania, Department of Public Instruction, *Vocational, Technical and Continuing Education in Pennsylvania, A Systems Approach to State-Local Program Planning* (1969), p. 24.

health courses in adult education were \$3.8 million, an estimated 27.8 percent of the total amount spent on all public school adult occupation-oriented courses during the five-year period. The higher relative expenditure in the health area is due in large measure to the longer duration of courses in health occupations than of other adult courses.

In addition to the health occupation programs administered by local school districts, education and training for the paramedical professions are being provided by Pennsylvania's institutions of higher education. Table 3 shows the number of graduates of these courses in the three years, 1966 to 1969, by type of institution.

The number of graduates in health curricula from colleges and universities as shown in column (3) decreased slightly during the period. However, the number who completed a paramedical curriculum in a community college or junior college increased during the three-year

period from 100 to 306, reflecting the establishment of eight new community colleges in Pennsylvania in this period. More than half of the graduates of community college health courses completed training as practical nurse or nursing aide.

TABLE 3
NUMBER OF STUDENTS COMPLETING PARAMEDICAL CURRICULA IN PENNSYLVANIA INSTITUTIONS OF HIGHER EDUCATION
ACADEMIC YEARS 1966-1969

Year	Colleges and Universities					Junior Colleges		
	Grand Total	Total	Private			Total	Private	
			State Related	State Aided	Private		Junior	Community
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1966-1967	584	484	273	139	72	100	55	45
1967-1968	716	462	224	156	82	254	69	185
1968-1969	743	437	220	148	69	306	94	212

SOURCE: Commonwealth of Pennsylvania, Department of Education, *Our Colleges and Universities Today*, Vol. V, No. 2 (1966-1967); Vol. VI, No. 2 (1967-1968); Vol. VIII, No. 2 (1968-1969).

The number of graduates of specified programs in the colleges and universities in 1968-1969 is shown in Table 4.

TABLE 4
NUMBER OF STUDENTS COMPLETING SPECIFIED PARAMEDICAL CURRICULA IN PENNSYLVANIA COLLEGES AND UNIVERSITIES
1968-1969

Specialty	Total	Private		
		State Related	State Aided	Private
(1)	(2)	(3)	(4)	(5)
Dental Assistant	55	55	..	..
Dental Hygienist	144	105	39	..
Laboratory Technician	22	...	16	6
Nursing	202	60	79	63
X-ray Technician	14	...	14	..

SOURCE: Commonwealth of Pennsylvania, Department of Education, *Our Colleges and Universities Today*, Vol. VII, No. 2 (1968-1969).

TABLE 5
 CURRICULA OFFERED IN THE PARAMEDICAL FIELD BY PENNSYLVANIA
 INSTITUTIONS BY SPECIALTY AND BY TYPE OF INSTITUTION

1968

Specialty	Total	Hospitals			Junior or Community Colleges	Private Trade	Local School Districts
		Private or Public	Connected with Institutions of Higher Learning	Colleges and Universities or Medical Schools			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cytotechnologist	9	5	3	1	..	..	..
Dental Assistant	4	..	..	1	1	..	2
Dental Hygienist	3	..	3	..	..	..	..
Dental Laboratory Technician	1	..	..	..	..	..	1
Dietitian	2	1	..	1	..	..	..
Hospital Administrator	1	..	..	1	..	..	..
Inhalation Therapist	4	2	1	..	1	..	..
Library Scientist	2	..	..	2	..	..	..
Medical Assistant	1	..	..	..	..	..	1
Medical Laboratory Assistant	24	21	1	1	..	..	1
Medical Records—Librarian	1	..	1	..	..	..	..
Medical Technologist	40	34	4	2	..	..	..
Nurses' Aide	2	..	..	..	..	..	2

Specialty	Total	Hospitals					
		Private or Public	Connected with Institutions of Higher Learning	Colleges and Universities or Medical Schools	Junior or Community Colleges	Private Trade	Local School Districts
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Nurse, Anesthetist	52	46	6	..	..	..	..
Nurse, Practical	60	14	2	1	3	1	39
Nurse, Professional	113	89	6	11	6	1	..
Occupational Therapist	2	..	..	2	..	..	..
Pharmacist	4	..	..	4	..	..	..
Pharmacy Resident	3	1	2	..	..	..	..
Physical Therapist	2	..	..	2	..	..	..
Public Health Worker	1	..	..	1	..	..	..
Social Worker	3	..	..	3	..	..	..
X-ray Technician	86	80	5	..	..	..	1
Total number of different institutions	205	126	8	17	9	2	43

SOURCE: *The Journal of the American Hospital Association*, Part 2. Section: Health Organization, Agencies and Schools (August 1, 1969), pp. 434 to 456; "Essentials of an Acceptable School for Certified Laboratory Assistants," Board of Certified Laboratory Assistants, Revised to April 2, 1968; Commonwealth of Pennsylvania, Department of Education, *Health Occupation Programs* (January 1970); Commonwealth of Pennsylvania, Department of Education, Bureau of Statistics, *Our Colleges and Universities Today*, Vol. VII, No. 2 (1969-1970).

Information as to the number of students completing curricula in paramedical training in hospitals is incomplete, however, an indication as to the availability of training in hospitals, as well as other institutions, is given by the distribution in Table 5 which shows the number of institutions in Pennsylvania offering training in specified paramedical professions. A total of 205 different institutions offer some curriculum in the health field. The number of hospitals offering training in some allied health service increased from 117 in 1965 to 126 in 1968. Table 5 lists the types of curricula offered in Pennsylvania institutions. Training for professional nurses is offered at 113 institutions, more than double the number of institutions offering courses in all other allied health fields except x-ray technology which is given at 86 institutions and practical nursing at 60. The professions which rank next in terms of frequency of such courses are nurse anesthetist at 52 and medical technology at 40.

The number of graduates completing courses in 1967 at Pennsylvania institutions, including hospitals and institutions of higher learning, in certain specialties is shown in Table 6, column (2). Column (3) shows the Pennsylvania graduates as a percent of the United States graduates for each specialty. For example, the 13 graduates in occupational therapy represent 2.4 percent of all such graduates in the United States in 1967. A comparison of this percentage to 5.9 (Pennsylvania—United States population percentage) indicates that Pennsylvania has relatively fewer graduates than the United States as a whole. In contrast, the registered nurses graduating from Pennsylvania institutions represent 13.2 percent of all registered nurses graduating in the United States—a percentage more than double the population percentage. X-ray technology ranked next with 9.5 percent of the United States graduates having been trained in Pennsylvania institutions. These percentages are consistent with the data in Table 5 which shows that the latter two curricula are offered by the largest number of institutions.

TABLE 6

GRADUATES IN HEALTH SPECIALTIES
FROM PENNSYLVANIA INSTITUTIONS

1967

<i>Specialty</i>	<i>Number of Pennsylvania Graduates in Specialty</i>	<i>Pennsylvania Graduates as a Percent of United States Graduates in Specialty</i>
(1)	(2)	(3)
Cytotechnologist	26	7.5%
Dental Hygienist	115	6.6
Hospital Administrator	8	2.1
Medical Record Librarian	15	7.5
Medical Technologist	190	4.9
Nurse, Practical	1,403	5.1
Nurse, R.N.		
Associate Degree	98	2.1
Bachelor's Degree	160	2.6
Diploma	3,589	13.2
Occupational Therapist	13	2.4
Pharmacist	213	5.7
Physical Therapist	77	7.7
Physicians (M.D., D.O.)	718	8.8
Social Worker	206	4.8
X-ray Technologist	364	9.5

SOURCE: U.S. Department of Health, Education and Welfare, Public Health Service, *Health Resources Statistics* (1968).

SECTION III

UTILIZATION OF PARAMEDICAL PERSONNEL IN PENNSYLVANIA

The supply of health services available to Pennsylvanians is dependent upon the number of trained health personnel and their effective utilization. As was observed earlier, the productivity of the physicians in the state can be markedly increased by the use of new medical equipment and competent paramedical personnel. The supply of physicians in Pennsylvania is comparable to that of the United States as a whole as is shown in Table 7 which presents the number of physicians per 100,000 population for Pennsylvania and the United States for 1960 through 1967.

TABLE 7
NUMBER OF PHYSICIANS PER 100,000 POPULATION
IN PENNSYLVANIA AND UNITED STATES
1960-1967

<i>Year</i>	<i>Pennsylvania</i>	<i>United States</i> ¹
(1)	(2)	(3)
1960	143	142
1961	142	142
1962	148	144
1963	153	149
1964	155	151
1965	157	153
1966	158	156
1967	161	158

¹ Includes physicians in Federal service not allocated by State.

SOURCE: U.S. Bureau of the Census, *Statistical Abstract of the United States* (Washington, D. C., 1962 to 1969, inclusive).

If Pennsylvania physicians utilized on the average as many personnel in specific paramedical fields as the United States as a whole, the number of paramedical personnel practicing in Pennsylvania as related to the number of physicians in Pennsylvania would be comparable to the similar ratio in the United States. Likewise, the number of paramedical personnel in a specific specialty expressed as a percentage of the corresponding number for the United States would be similar to 6.4 percent (the percentage of United States physicians practicing in Pennsylvania).

In 1966 the 43,382 professional nurses employed in Pennsylvania represented 7.3 percent of the professional nurses in the United States. The fact that 7.3 is significantly larger than 6.4 (the percent of physicians practicing in Pennsylvania) indicates that Pennsylvania physicians may be utilizing the services of professional nurses to a greater extent than the average physician in the United States. The Pennsylvania supply of physical therapists and x-ray technologists appears comparable to that of physicians—6.2 and 6.3 percent, respectively. On the other hand, occupational therapists in Pennsylvania represent only 4.8 percent of those in the United States. Since 1967 approximately 7,500 individuals were licensed in Pennsylvania as practical nurses by waiver of examination as provided by statute.¹⁵ According to hospital surveys,¹⁶ many of these licensed practical nurses are employed as nursing aides. Detailed information concerning the staffs employed in Pennsylvania hospitals is available for 1966 and 1968.

Hospital personnel data from the 1966 national survey are presented for Pennsylvania and the United States in Table 8; the number of hospital staff personnel with specified training per 100,000 population is shown in columns (2) and (3), respectively. In the hospital nursing services there are 51 more professional nurses in Pennsylvania per 100,000 population than in the United States; the hospitals in the United States as a whole employed eight more practical nurses and 37 more aides, orderlies or attendants, and two more surgical technical aides per 100,000 population than Pennsylvania.

While these comparisons are helpful in the case of professions having numerous members, the relative supply of professions such as cytotechnologists is more easily observed by consideration of the percent of persons in a particular service in the United States employed in Pennsylvania. For example, this survey reported 151 cytotechnologists employed in Pennsylvania hospitals; this is 9.2 percent of the total number employed in all United States hospitals. A comparison of 9.2 percent to 5.9 percent (Pennsylvania population as a percent of United States population in 1966) indicates that Pennsylvania hospitals have 50 percent more cytotechnologists as related to Pennsylvania population than is generally true in the United States. In contrast, surgical technical

¹⁵ Act of 1966, January 13, P. L. (1965) 1295, §2(1)

¹⁶ See Appendix Tables 6, 7 and 8.

aides in Pennsylvania represent 4.5 percent of the total number employed in all United States hospitals. Column (4) of Table 8 presents corresponding percentages for the specified paramedical services in Pennsylvania hospitals.

TABLE 8
HOSPITAL PERSONNEL IN PENNSYLVANIA
AS COMPARED TO HOSPITAL PERSONNEL
IN UNITED STATES

1966

Specialty	Staff per 100,000 Population		Staff in Pennsylvania as a Percent of Staff in United States	
	Pennsylvania	United States	Actual	Increased by Estimated Need
(1)	(2)	(3)	(4)	(5)
Aide, Orderly, Attendant	214	251	5.1%	5.1%
Cytotechnologist	1	1	9.2	9.6
Inhalation Therapist	3	3	7.0	7.1
Laboratory Technologist	8	7	6.7	6.7
Medical Technologist	27	28	5.8	5.7
Nurse, Practical	69	77	5.3	5.4
Nurse, Professional	235	184	7.6	7.5
Occupational Therapist	2	2	6.3	6.2
Physical Therapist	3	4	4.8	4.9
Physicians (Full-time Staff)	10	8	6.9	N.A.
Surgical Technical Aide	7	9	4.5	4.8
X-ray Technologist	12	12	5.9	5.8

SOURCE: *Manpower Resources in Hospitals—1966*, Summary Report of a Survey Conducted by the Bureau of Health Manpower, U. S. Department of Health, Education and Welfare, Public Health Service, and the American Hospital Association (1966); U. S. Department of Health, Education and Welfare, Public Health Service, *Health Resources Statistics* (1968).

In 1966, 45 percent of nursing services was provided by professional nurses in Pennsylvania hospitals and only 35 percent of nursing service in all United States hospitals was provided by professional nurses. The 1968 survey of Pennsylvania hospital staffs indicated that only 41 percent of the nursing service was provided by professional nurses. In both the United States and Pennsylvania, hospital nursing service comprises approximately three-quarters of all professional and technical employes excluding physicians.

It may be observed that physicians, dentists and registered nurses account for a significantly larger percent of the personnel in United States health services than they do in military medical departments. In 1967 in the nation as a whole physicians, dentists and registered nurses accounted for 31 percent of those active in health occupations; the corresponding percentage in military medical departments was 21 percent.¹⁷

Another section of the 1966 hospital survey dealt with possible additional staff needs—those considered to be necessary to provide optimum care. Table 8, column (5), shows the percentage of health personnel that would be employed in hospitals if the hospital staffs were augmented in accordance with their estimated needs. Judging by the similarity between the percentages in columns (4) and (5), it appears that Pennsylvania hospitals estimated their additional personnel needs in such manner to retain similar relative numbers of paramedical specialties; a continuance of the utilization pattern of the paramedical services prevailing in Pennsylvania hospitals in 1966.

Unless Pennsylvania hospital patients are receiving a higher level of nursing care than the average hospital patient in the United States, the utilization of relatively more professional nurses in Pennsylvania hospitals may be inefficient. The existence of 113 institutions in Pennsylvania which offer courses for professional nursing and the fact that 13.2 percent of all graduates in professional nursing in the United States graduated from Pennsylvania institutions indicates that professional nurses will continue to be in a relatively good supply in Pennsylvania as compared to the United States.

A further comparison of some of the data presented in Tables 5, 6 and 8 of this report together with percentages of the relative number of all personnel employed in certain of the specialties provides a guideline as to relationships and possible trends in some of the health specialties. These data are shown in Table 9. The asterisks in column (1) indicate that the occupation is licensed in Pennsylvania. Column (2) shows the number of institutions in Pennsylvania that offer courses leading toward a career in that occupation. A large number signifies a widespread geographic distribution of such courses and is generally associated with a comparatively high supply of personnel. As may be seen by observa-

¹⁷ *Allied Health Personnel, A Report of Their Use in the Military Service as a Model for Use in Nonmilitary Care Programs* (Washington, D. C., Ad Hoc Committee on Allied Health Personnel, Division of Medical Sciences, National Academy of Sciences, 1969).

tion of the medical technicians, this relationship does not always hold; while 40 institutions offer the course, Pennsylvania graduates represent only 4.9 percent of all United States graduates in medical technology and only 5.8 percent of the medical technicians on hospital staffs in the United States are employed in Pennsylvania hospitals.

Table 9, column (3), regarding Pennsylvania graduates as a percent of United State graduates by specialty, indicates the expected trend of the supply. If the percentage in column (3) is less than that in columns (4) or (5), the future relative supply can be expected to decrease unless Pennsylvania imports graduates from other states. Similarly, if the percentage in column (3) is greater than either of the percentages in columns (4) or (5), the future relative supply in Pennsylvania can be expected to increase unless the new graduates move out of the state or simply do not practice.

TABLE 9
COMPARISON OF EDUCATIONAL FACILITIES,
GRADUATES, AND EMPLOYED HEALTH PERSONNEL
FOR SPECIFIED HEALTH OCCUPATIONS

<i>Specialty</i>	<i>Number of Educational Facilities in Pennsylvania 1968</i>	<i>Pennsylvania Graduates as a Percent of U.S. Graduates 1966-1967</i>	<i>Pennsylvania Employed Personnel as a Percent of U.S. Employed Personnel</i>	
			<i>Hospital Staff 1966</i>	<i>Total 1967</i>
(1)	(2)	(3)	(4)	(5)
Cytotechnologist	9	7.5%	9.2%	N.A.
Medical Technologist	40	4.9	5.8	N.A.
Nurse				
Professional*	113	13.2	7.6	7.3%
Practical* or Vocational	60	5.1	5.3	9.5
Physician*	7	8.8	6.9	6.4
Therapist				
Physical*	2	7.7	4.8	6.2
Occupational	2	2.4	6.3	4.8**
X-ray Technologist	86	9.5	5.9	6.3**

* Licensed occupations in Pennsylvania.

** Active or inactive members of national association.

SOURCE: See sources to Tables 5, 6 and 8.

The Eighteenth Decennial Census figures and a special study in 1969 indicate that the probability of individuals migrating to another state increases as the level of education increases. In other words, more physicians can be expected to move between states than professional nurses and more professional nurses can be expected to move than practical nurses.

Movement from Pennsylvania may be offset by a large percentage of graduates as related to the percent of employed personnel in Pennsylvania. For example, the percentage of Pennsylvania graduates in professional nursing as shown in Table 9 is almost double the percentage employed in Pennsylvania and the relative supply of professional nurses can, therefore, be expected to increase in spite of some movement to other states. The relative supply of x-ray technologists can likewise be expected to increase since the percentage of Pennsylvania graduates substantially exceeds the percentage employed in Pennsylvania. Occupational therapists, whose educational training encompasses a four-year post-high school course, can only increase if more persons are trained in Pennsylvania or imported from other states.

The availability of personnel in Pennsylvania does not appear to differ significantly from that in the United States as a whole. Differences in physician productivity in health services may be traced to the variation in patterns of utilization of paramedical personnel. Better methods are being sought for paramedical personnel to assume a more substantial portion of the burden of medical care. Programs have been launched at Duke University and jointly between the University of Washington and the Washington State Medical Association to give additional training as physicians' assistants or medex to ex-medical corpsmen retiring or discharged from the Armed Services. The Frontier Nursing Service in Kentucky expands the traditional role of the professional nurse to include tasks a physician's assistant might perform. The expansion and acceleration of medical services in Pennsylvania will require the teaming together of educational institutions, licensing boards, and professional health associations to launch pilot programs in Pennsylvania to test new ways and means to extend physician and paramedical roles in the health services.

APPENDIX

APPENDIX TABLE 1
HEALTH OCCUPATIONS
1968

<i>Primary title (1)</i>	<i>Alternate title</i>
1. ADMINISTRATION:	
Health administrator.....	Health officer or commissioner. Environmental control administrator. Health agency executive director. Health care administrator. Hospital administrator. Medical care administrator. Nursing home administrator. Public health administrator.
Health program analyst.....	Public health analyst. Public health specialist.
Health program representative.	Public health advisor. Public health representative.
Health systems analyst.....	
2. BIOMEDICAL ENGINEERING:	
Biomedical engineer.....	Bioengineer. Medical engineer.
Biomedical engineering technician.....	Medical engineering technician.
Biomedical engineering aide...	
3. CHIROPRACTIC AND NATUROPATHY:	
Chiropractor.....	Doctor of chiropractic.
Naturopath.....	Naturopathic physician.
4. CLINICAL LABORATORY SERVICES (2):	
Clinical laboratory scientist (3).....	Clinical chemist (3). Microbiologist (3).
Clinical laboratory technologist.....	Medical laboratory technologist. Medical technologist. Blood banking technologist. Chemistry technologist. Hematology technologist. Microbiology technologist. Nuclear medical technologist.

<i>Primary title (1)</i>	<i>Alternate title</i>
Clinical laboratory technician.	Medical laboratory technician. Medical technician. Cytotechnician. Cytotechnologist.
Clinical laboratory aide.	Laboratory assistant. Certified laboratory assistant. Histologic aide. Histologic technician. Pathology laboratory aide.
5. DENTISTRY AND ALLIED SERVICES:	
Dentist.	Endodontist. Oral pathologist. Oral surgeon. Orthodontist. Pedodontist. Periodontist. Prosthodontist. Public health dentist.
Dental hygienist.	
Dental assistant.	
Dental laboratory technician..	Dental laboratory assistant (aide).
6. DIETETIC AND NUTRITIONAL SERVICES:	
Dietitian,	Administrative dietitian. Consultant (public health) dietitian. Research dietitian. Teaching dietitian. Therapeutic dietitian.
Nutritionist (3).	Public health nutritionist.
Dietary technician.	Dietary (food service) assistant. Food service manager. Food service technician.
Dietary aide.	} Dietary (food service) worker.
Food service supervisor.	
7. ENVIRONMENTAL CONTROL (4):	
Environmental scientist (3) . . .	Sanitary sciences specialist (3). Air pollution meteorologist (3). Environmental control chemist (3). Estuarine oceanographer (3). Ground water hydrologist (3). Health physicist (3). Limnologist (3).

<i>Primary title (1)</i>	<i>Alternate title</i>
Environmental engineer	Sanitary engineer. Air pollution engineer. Hospital engineer. Industrial hygiene engineer. Public health engineer. Radiological health engineer.
Environmental technologist	Sanitarian. Air pollution specialist. Industrial hygienist. Radiological health specialist.
Environmental technician	Sanitarian technician. Environmental engineering technician. Radiological health technician (monitor).
Environmental aide	Sanitarian aide. Environmental engineering aide. Sewage plant assistant. Waterworks assistant.
8. FOOD AND DRUG PRO- TECTIVE SERVICES:	
Food technologist	
Food and drug inspector	
Food and drug analyst	
9. HEALTH EDUCATION:	
Health educator	Community health educator. Public health educator. School health coordinator. School health educator.
Health education aide	
10. INFORMATION AND COMMUNICATION:	
Health information specialist	Biomedical communication specialist.
Health science writer	Medical writer.
Health technical writer	Medical technical writer. Medical editor.
Medical illustrator	Medical photographer.
11. LIBRARY SERVICES:	
Medical librarian	
Medical library assistant	
Hospital librarian	Patients' librarian.
12. MATHEMATICAL SCIENCES (4):	
Mathematician	Biomathematician. Demographer.
Statistician	Biostatistician. Health statistician. Vital record registrar.

13. MEDICAL RECORDS:

Medical records librarian	Medical record specialist.
	Medical record technologist.
Medical record technician	Medical record assistant.
Medical record clerk	Medical record aide.

14. MEDICINE AND
OSTEOPATHY:

Physician	Doctor of medicine—M.D.
Osteopathic physician	Doctor of osteopathy—D.O.

M.D. or D.O.	}	Allergist.
		Anesthesiologist.
		Aviation medicine specialist.
		Cardiovascular disease specialist.
		Colon and rectal surgeon (proctologist).
		Dermatologist.
		Forensic pathologist.
		Gastroenterologist.
		General practitioner.
		Gynecologist.
		Internist.
		Manipulative therapy specialist.
		Neurological surgeon.
		Neurologist.
		Occupational medicine specialist.
		Obstetrician.
		Ophthalmologist.
		Orthopedic surgeon.
		Otolaryngologist (otorhinolaryngologist).
		Pathologist.
		Pediatrician (5).
		Physiatrist (physical medicine and rehabilitation specialist).
		Plastic surgeon.
Preventive medicine specialist.		
Psychiatrist (6).		
Public health physician.		
Pulmonary disease specialist.		
Radiologist (7).		
Surgeon.		
Thoracic surgeon.		
Urologist.		
Intern.		
Resident.		
Fellow.		

<i>Primary title (1)</i>	<i>Alternate title</i>
15. MIDWIFERY:	
Midwife.....	Lay midwife. Nurse midwife (8).
16. NATURAL SCIENCES (4):	
Anatomist.....	Cytologist. Embryologist. Histologist.
Botanist.....	
Chemist.....	Bioanalyst. Biochemist. Clinical chemist (9). Environmental control chemist (10).
Ecologist.....	
Entomologist.....	
Epidemiologist.....	
Geneticist.....	
Hydrologist.....	Ground water hydrologist (10).
Immunologist.....	
Meteorologist.....	Air pollution meteorologist (10).
Microbiologist (9).....	Bacteriologist. Mycologist. Parasitologist. Virologist.
Nutritionist (11).....	
Oceanographer.....	Estuarine oceanographer (10).
Pathologist.....	
Pharmacologist.....	Toxicologist.
Physicist.....	Biophysicist. Health physicist (10).
Physiologist.....	
Sanitary sciences specialist (10).....	
Zoologist.....	Limnologist (10).
17. NURSING AND RELATED SERVICES:	
Nurse.....	Registered nurse—R.N. Graduate nurse. Professional nurse. Hospital nurse. Occupational health (industrial) nurse. Office nurse. Private duty nurse. Public health nurse. School nurse. Nurse anesthetist. Nurse midwife (12).

<i>Primary title (1)</i>	<i>Alternate title</i>
	Obstetrical nurse.
	Pediatric nurse.
	Psychiatric nurse.
	Surgical (operating room) nurse.
Practical nurse.....	Licensed practical nurse.
	Vocational nurse.
	Licensed vocational nurse.
Nursing aide.....	} Nursing assistant.
Orderly.....	
Attendant.....	
Home health aide.....	Psychiatric (mental health) aide.
	Home aide—homemaker.
	Visiting health aide.
Ward clerk.....	Floor clerk.
18. OCCUPATIONAL THERAPY:	
Occupational therapist.....	
Occupational therapy assistant.....	Occupational therapy technician.
Occupational therapy aide.....	
19. ORTHOTIC AND PROSTHETIC TECHNOLOGY:	
Orthotist.....	Orthopedic brace maker.
Orthotic aide.....	
Prosthetist.....	Artificial limb maker.
Prosthetic aide.....	
Restoration technician.....	
20. PHARMACY:	
Pharmacist.....	Community pharmacist.
	Hospital pharmacist.
	Industrial pharmacist.
Pharmacy aide.....	Pharmacy helper.
21. PHYSICAL THERAPY:	
Physical therapist.....	
Physical therapy assistant.....	Physical therapy technician.
Physical therapy aide.....	
22. PODIATRY:	
Podiatrist.....	Chiropodist.
	Foot orthopedist.
	Foot roentgenologist.
	Podiatric surgeon.
	Pododermatologist.

23. RADIOLOGIC TECHNOLOGY:

Radiologic technologist.....	
Radiologic technician.....	X-ray technician. Nuclear medical technician. Radiation therapy technician.

24. SECRETARIAL AND OFFICE SERVICES (4).

Secretary.....	Dental secretary. Medical secretary.
Office assistant.....	Dentist's office assistant. Medical assistant. Optometrist's office assistant. Physician's office assistant.

25. SOCIAL SCIENCES (4).

Anthropologist.....	Cultural (social) anthropologist. Physical anthropologist.
Economist.....	Health economist.
Psychologist.....	Clinical psychologist. Counseling psychologist. Measurement psychologist (psychometrist). Social psychologist.
Sociologist.....	Medical sociologist.

26. SOCIAL WORK:

Clinical social worker.....	Medical social worker. Psychiatric social worker.
Clinical social work assistant..	
Clinical social work aide.....	Clinical casework aide.

27. SPECIALIZED REHABILITATION SERVICES:

Corrective therapist.....	
Corrective therapy aide.....	
Educational therapist.....	
Manual arts therapist.....	
Music therapist.....	
Recreation therapist.....	Therapeutic recreation specialist.
Recreation therapy aide.....	
Homemaking rehabilitation consultant.....	

28. SPEECH PATHOLOGY AND AUDIOLOGY:

Audiologist.....	Hearing therapist.
Speech pathologist.....	Speech therapist.

<i>Primary title (1)</i>	<i>Alternate title</i>
29. VETERINARY MEDICINE:	
Veterinarian	Laboratory (animal medicine) veterinarian. Public health veterinarian. Veterinary laboratory diagnostician. Veterinary microbiologist. Veterinary pathologist. Veterinary radiologist. Veterinary surgeon. Veterinary toxicologist.
Veterinary technician	Animal technician.
30. VISION CARE:	
Ophthalmologist (13)	
Optometrist	
Vision care technologist	Ocular care technologist. Ophthalmic technologist. Optometric technologist.
Technician:	
Vision care technician	Ocular care technician. Ophthalmic technician (assistant). Optometric technician (assistant).
Orthoptic technician	Orthoptist.
Optician	Dispensing optician. Ophthalmic dispenser (optical fitter). Contact lens technician. Lens grinder-polisher (14). Optical (laboratory) mechanic.
Visual care aide	Ocular care aide. Ophthalmic aide. Optometric aide. Visual training aide.
31. VOCATIONAL REHABILITATION COUNSELING:	
Vocational rehabilitation counselor	Rehabilitation counselor.
32. MISCELLANEOUS HEALTH SERVICES:	
Physician's associate (15)	Pediatric associate.
Physician's assistant	Orthopedic assistant.
Physician's aide	Obstetrical aide Pediatric aide. Surgical aide.

Primary title (1)

Alternate title

Community health aide	School health aide. Dental health aide. Mental health aide (worker).
Medical machine technician . . .	Biomedical equipment technician. Cardiopulmonary technician. Electrocardiograph technician. Electroencephalograph technician.
Miscellaneous health workers:	
Extracorporeal circulation specialist	
Inhalation therapist (technician)	
Inhalation therapy aide	
Medical emergency technician	
Ambulance attendant (aide).	

REFERENCES

- | | |
|---|--|
| (1) The occupations listed are those which make a significant contribution to the health field and for which individuals have developed specialized competence. | (7) Includes specialists in diagnostic and therapeutic radiology. |
| (2) Includes pathology laboratory. | (8) See Nursing and Related Services. |
| (3) See Natural Sciences. | (9) See Clinical Laboratory Services. |
| (4) For some of the occupations listed, only a minority of the workers may be engaged in health related work. | (10) See Environmental Control. |
| (5) Includes specialists in pediatric allergy and cardiology. | (11) See Dietetic and Nutritional Services. |
| (6) Includes specialists in child psychiatry. | (12) See Midwifery. |
| | (13) See Medicine and Osteopathy. |
| | (14) Also known as assembler, benchman, edger, or surfacer; optical technician or shopman. |
| | (15) Baccalaureate or higher educational background. |

SOURCE: U. S. Department of Health, Education and Welfare, Public Health Service, *Health Resources Statistics* (1968).

APPENDIX TABLE 2
 PENNSYLVANIA STATUTES REGULATING
 HEALTH PROFESSIONS
 1970

<i>Short Title</i>	<i>Citation</i>
(1)	(2)
Chiropractic Registration Act of 1951	1951, Aug. 10, P. L. 1182, as amended
The Dental Law	1933, May 1, P. L. 216, as amended
Medical Practice Act	1911, June 3, P. L. 639, as amended
Midwives	1929, April 4, P. L. 160
Practical Nurse Law	1956, March 2, P. L. 1211, as amended
The Professional Nursing Law	1951, May 22, P. L. 317, as amended
Optometrists	1917, March 30, P. L. 21, as amended
Osteopaths	1909, March 19, P. L. 46, as amended
Pharmacy Act	1961, Sept. 27, P. L. 1700
Podiatry Act of 1956	1956, March 2, P. L. 1206, as amended
The Veterinary Law	1945, April 27, P. L. 321 1959, Dec. 15, P. L. 1765

APPENDIX TABLE 3
 BIENNIAL LICENSURE RENEWAL FEES
 IN PENNSYLVANIA
 1970

<i>Specialty</i>	<i>Fee</i>
(1)	(2)
Chiropractor	\$10
Dental Hygienist	4
Dentist	10
Drugless Therapist	5
Nurse, Practical	2
Nurse, Professional	4
Optometrist	10
Pharmacist	5
Physical Therapist	5
Physician (M.D.)	10
Physician (D.O.)	10
Podiatrist	10
Veterinarian	10
Midwife	5

APPENDIX TABLE 4
 PUBLIC SCHOOL ADULT EDUCATION
 TOTAL ENROLLMENTS AND EXPENDITURES
 BY OCCUPATIONAL CATEGORIES

1964-1968

<i>Occupational Category</i>	<i>Enrollments Number</i>	<i>Percent of Total</i>	<i>Expenditures Amount</i>	<i>Percent of Total</i>
(1)	(2)	(3)	(4)	(5)
Agriculture	17,166	5.2%	\$1,692,468	12.4%
Distribution	28,027	8.6	71,798	0.6
Home Economics	105,144	32.1	1,774,407	13.0
Health	15,872	4.8	3,810,832	27.8
Office	34,901	10.6	519,990	3.8
Technical	20,600	6.3	958,618	6.9
Trade and Industry	106,094	32.4	4,876,962	35.5
Totals	327,804	100.0%	\$13,705,075	100.0%

SOURCE: Commonwealth of Pennsylvania, Department of Public Instruction, *Vocational, Technical and Continuing Education in Pennsylvania, A Systems Approach to State-Local Program Planning* (1969), p. 24.

APPENDIX TABLE 5

NUMBER OF INSTITUTIONS THAT OFFER CURRICULA IN THE PARAMEDICAL FIELD BY
TYPE OF INSTITUTION AND NUMBER OF SPECIALTIES OFFERED

1968

	Number of Specialties plus Professional Nursing								No Course in Professional Nursing. Number of Other Specialties Offered			
	Professional Nursing		1	2	3	4	5	6 or more	1	2	3	4
	Total	Only										
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Private and Public Hospitals and Medical Centers	126	18	26	22	13	8	2	..	25	9	3	..
Hospitals Connected with Institutions of Learning	8	..	1	2	..	1	1	1	1	1	..	..
Colleges, Universities or Medical Schools	17	6	2	..	..	1	1	1	5	1	..	..
Junior and Community Colleges	9	5	1	..	..	..	..	..	2	..	1	..
Trade Schools	2	..	..	..	..	..	..	..	2	..	..	..
Local School Districts	43	..	..	..	..	..	..	..	41	1	..	1
Total	205	29	30	24	13	10	4	2	76	12	4	1

SOURCE: *Journal of the American Hospital Association*, Part 2. Section: Health Organization, Agencies and Schools (August 1, 1969), pp. 434 to 456.

APPENDIX TABLE 6

ESTIMATED PERSONNEL IN HOSPITALS
PENNSYLVANIA

1966

<i>Category of Personnel</i>	<i>Present Staff*</i>	<i>Additional Needs*</i>
(1)	(2)	(3)
All professional and technical—Total	88,205	15,826
Nursing service		
Professional nurses	27,279	5,703
LPN's or vocational nurses	7,986	2,393
Surgical technical aide	794	248
Aides, orderlies, attendants	24,860	3,890
Diagnostic services		
Medical technologist	3,137	473
Laboratory assistants	986	156
Cytotechnologists	151	58
Histologic technicians	266	66
Electrocardiographic technicians	464	35
Electroencephalographic technicians	**	**
Therapeutic services		
Occupational therapists	254	137
Occupational therapy assistants	382	146
Physical therapists	404	156
Physical therapy assistants	334	64
Social workers	615	268
Social work assistants	120	53
Recreation therapists	284	86
Inhalation therapists	389	162
Speech pathologists and audiologists	119	48
Radiology		
Radiologic technologists	1,416	195
X-ray assistants	338	72
Radiation therapy technologists	**	**
Radiation therapy assistants	**	**
Medical records		
Medical records librarians	296	78
Medical record assistants	471	74

<i>Category of Personnel</i>	<i>Present Staff*</i>	<i>Additional Needs*</i>
(1)	(2)	(3)
Dietary		
Dietitians	660	185
Food service managers	266	49
Pharmacy		
Pharmacists	532	88
Pharmacy assistants	261	30
All other professional and technical	15,141	913

* Estimates, not made for all categories, are based on sample representing 88 percent of the average daily census in registered hospitals in this area.

** Included with all other professional and technical.

SOURCE: *Manpower Resources in Hospitals—1966*, Summary Report of a Survey Conducted by the Bureau of Health Manpower, U. S. Department of Health, Education and Welfare, Public Health Service, and the American Hospital Association (1966).

APPENDIX TABLE 7
ESTIMATED PERSONNEL IN HOSPITALS
UNITED STATES

1966

<i>Category of Personnel</i>	<i>Present Staff*</i>	<i>Additional Needs*</i>
(1)	(2)	(3)
All professional and technical—Total	1,332,052	257,217
Nursing service		
Professional nurses	360,969	79,470
LPN's or vocational nurses	150,569	41,404
Surgical technical aide	17,623	3,913
Aides, orderlies, attendants	492,007	69,746
Diagnostic services		
Medical technologist	54,488	9,172
Laboratory assistants	14,623	2,492
Cytotechnologists	1,634	539
Histologic technicians	3,907	678
Electrocardiographic technicians	5,932	823
Electroencephalographic technicians	**	**

<i>Category of Personnel</i>	<i>Present Staff*</i>	<i>Additional Needs*</i>
(1)	(2)	(3)
Therapeutic services		
Occupational therapists	4,059	2,271
Occupational therapy assistants	3,812	1,177
Physical therapists	8,470	2,846
Physical therapy assistants	5,246	1,092
Social workers	10,665	5,143
Social work assistants	1,467	516
Recreation therapists	3,807	1,603
Inhalation therapists	5,560	2,231
Speech pathologists and audiologists	1,155	544
Radiology		
Radiologic technologists	24,011	3,862
X-ray assistants	5,954	878
Radiation therapy technologists	**	**
Radiation therapy assistants	**	**
Medical records		
Medical record librarians	6,341	1,809
Medical record assistants	10,093	1,836
Dietary		
Dietitians	12,659	3,537
Food service managers	5,402	842
Pharmacy		
Pharmacists	9,437	1,872
Pharmacy assistants	5,630	946
All other professional and technical	106,532	15,975

* Estimates made by addition of states' figures.

** Included with all other professional and technical.

SOURCE: *Manpower Resources in Hospitals—1966*, Summary Report of a Survey Conducted by the Bureau of Health Manpower, U. S. Department of Health, Education and Welfare, Public Health Service, and the American Hospital Association (1966).

APPENDIX TABLE 8

ESTIMATED PERSONNEL IN HOSPITALS
PENNSYLVANIA

1968

<i>Personnel Category</i>	<i>Full-time Personnel</i>	<i>Part-time Personnel</i>	<i>Full-time Equivalents</i>	<i>Budgeted Vacancies</i>
(1)	(2)	(3)	(4)	(5)
All professional and technical—Total	73,315	17,996	81,934	4,891
<i>Nursing Services</i>				
Nurses, Professional	20,672	10,668	25,843	1,986
Nurses, Licensed, Practical or Vocational	8,864	1,674	9,845	857
Nursing Aides, Orderlies, and Attendants	24,322	2,577	25,497	972
Surgical Technicians	1,060	89	1,103	78
<i>Diagnostic Services</i>				
Medical Technologists—ASCP Reg.	875	172	959	124
Medical Technologists—Other Reg. or Certified	597	102	647	36
Other Medical Technologists (Technicians)	1,307	463	1,498	62
Cytotechnologists—ASCP Reg.	91	18	98	10
Cytotechnologists—Other	58	8	61	2
Histologic Technicians—ASCP Reg.	77	5	79	2
Histologic Technicians—Other	148	7	152	9
Electrocardiograph Technicians	423	69	457	7
Electroencephalograph Technicians	102	23	111	2
Laboratory Assistants—ASCP Cert.	261	21	273	17
Other Laboratory Assistants and Aides	589	237	684	8
<i>Therapeutic Services</i>				
Occupational Therapists—AOTA Reg.	187	22	197	33
Occupational Therapists—Other	60	16	67	4
Occupational Therapy Assistants—AOTA Certified	32	...	32	3
Other Occupational Therapy Assistants and Aides	366	9	369	6
Physical Therapists—Licensed	372	139	375	60
Physical Therapists—Other	58	7	62	5

<i>Personnel Category</i>	<i>Full-time Personnel</i>	<i>Part-time Personnel</i>	<i>Full-time Equivalents</i>	<i>Budgeted Vacancies</i>
(1)	(2)	(3)	(4)	(5)
<i>Therapeutic Services (Cont.)</i>				
Physical Therapy Assistants and Aides	400	42	418	8
Speech Pathologists and Audiologists—ASHA Certified	61	14	66	6
Speech Pathologists and Audiologists—Other	40	16	49	5
Recreation Therapists	247	37	260	9
Inhalation Therapists—ARIT Reg.	85	11	91	24
Inhalation Therapists—Other	340	60	373	12
Social Workers—Masters	441	48	464	51
Other Social Workers—Baccalaureate	447	33	461	22
Social Work Assistants and Aides	104	15	112	11
<i>Radiology</i>				
Radiologic Technologists (X-ray Tech.) ARRT Registered	1,218	86	1,261	52
Other Radiologic Technologists (X-ray Tech.)	299	33	312	9
X-ray Assistants	335	48	357	4
Radiation Therapy Technologists (Technicians) ARRT Registered	84	2	85	5
Other Radiation Therapy Technologists (Technicians)	30	3	31	1
Radiation Therapy Assistants	21	2	21	...
<i>Medical Records</i>				
Medical Librarians—MLA Cert.	40	11	43	5
Medical Librarians—Other	120	17	128	3
Medical Records Librarians—AAMRL Registered	147	10	150	15
Other Medical Records Librarians	129	13	135	2
Medical Records Technicians—AAMRL Certified	59	6	62	8
Other Medical Records Technicians	411	102	457	6
<i>Dietary Services</i>				
Dietitians—ADA Qualified	389	78	421	59
Other Dietitians	217	42	238	13
Food Service Managers	363	14	371	14

<i>Personnel Category</i>	<i>Full-time Personnel</i>	<i>Part-time Personnel</i>	<i>Full-time Equivalents</i>	<i>Budgeted Vacancies</i>
(1)	(2)	(3)	(4)	(5)
<i>Pharmacy</i>				
Pharmacists—Licensed	524	152	589	29
Pharmacy Assistants	293	92	327	3
<i>Other Professional and Technical Personnel</i>				
Medical Secretary	1,914	154	1,983	48
Ward Clerk	2,316	323	2,450	118
All Others	1,720	206	1,810	66

SOURCE: *Pennsylvania Hospital Manpower Demand*, Appendix "A," Hospital Educational and Research Foundation of Pennsylvania (1968).

- ASCP American Society of Clinical Pathologists
- AOTA American Occupational Therapy Association
- ASHA American Speech and Hearing Association
- ARIT American Registry of Inhalation Therapists
- ARRT American Registry of Radiologic Technologists
- MLA Medical Library Association
- AAMRL American Association of Medical Record Librarians
- ADA American Dietetic Association