

Y3.T22/2:2 L 62/v.3/man.

Life-Sustaining Technologies and the Elderly:  
Manpower for Selected Technologies

Prepared by: Ruth S. Hanft,  
Catherine C. White and Linda E. Fishman

January 1986

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## Introduction

This paper discusses manpower use and manpower issues related to five life-sustaining technologies widely used by the elderly: dialysis, mechanical ventilation, resuscitation, antibiotics, and nutrition support. These five technologies highlight issues of manpower, manpower training, organization and delivery of services and financing that go well beyond the specific technologies. The report is divided into three parts.

- I. Staffing Patterns for the Five Technologies
- II. Analysis of Major Issues in Manpower and Training
- III. Nutrition Support and the Elderly.

The case study of nutrition support was selected from among the five technologies because it exemplifies the range of problems and issues related to the increasing use of technology oriented services for the elderly. These issues include the efficacy of the specific technology and the appropriateness of its use, types of manpower that provide the technology, training and limitations on training of the personnel, sites of service, influence of reimbursement on use of service, and the sites of care and training.

## I. Staffing Patterns for Five Technologies

Manpower use for technologies varies widely by the specific technology, the sites of care, the specific institution or agency providing the care, availability of manpower specifically trained to use the technology, and reimbursement policies.

The attached charts depict the minimum typical health care team configuration for each of the five technologies: dialysis, mechanical ventilation, resuscitation, antibiotics and nutrition support. Team members are listed in hierarchical order, although in some cases, lines of authority are unclear. For example, members of a hospital nutritional support team, specifically the pharmacist, dietitian and social worker, have individual responsibilities and confer with each other, but all may report to the physician or nurse on the team.

The staff lists are minimum personnel configurations for the technologies. In a hospital setting the number of staff involved in the delivery of the technology will vary according to the size and type of hospital, including teaching or nonteaching hospital and proprietary or voluntary hospital.

The charts also list the settings in which the elderly receive these technologies. The comments in the cells note how and where patients gain access to the technology and major variations in the involvement of health care professionals.

TechnologyDialysisStaff

Physician: Nephrologist  
 Nephrology RN\*  
 LPN\*  
 Renal Dietitian (clinical)  
 Renal Social Worker  
 Nephrology Technician\*

Differences in staffing between hospital-based and free-standing facilities relate to number and not type of personnel, and on patient load and number of machines rather than facility status.

Patient SettingsHospital

Acute unit  
 Chronic unit

Most patients are ambulatory.

Inpatients are usually acute cases and require more intensive use of RNs and LPNs and technicians; staffing ratio may be one RN to each patient in acute unit; 1 RN for 4-5 patients in chronic unit.

Nursing homes

Skilled nursing facility (SNF)  
 Intermediate care facility (ICF)

Patients are sent to dialysis centers. If they are not ambulatory, they will be admitted to a hospital for care.

Self-care patients (peritoneal dialysis) attend training at a dialysis center, but are monitored in nursing home by RN.

Free-standing dialysis center or hospital satellite

Patient undergoes hemodialysis three times per week for four hours. Blood and other vital signs are monitored by RNs, LPNs or technicians.

Home

Patient attends 6-8 weeks of hemodialysis training at a dialysis center. Patient is then monitored once per month at the center. For peritoneal dialysis patient attends 1-2 weeks of training at a dialysis center. Patient is then monitored once per month at the center.

Hospice

Dialysis is not initiated by hospice. Patients using dialysis prior to entering hospice continue to receive care at a dialysis center or administer self-care at home (peritoneal dialysis).

\* Likely to have the most contact with the patient.

TechnologyMechanical VentilationStaff

Physician: Pulmonary specialist or  
Anesthesiologist  
RN\*  
Respiratory Therapist (RT)\*  
Respiratory Technician\*  
Clinical dietitian (may act as a consultant)

Patient Settings

Hospital  
ICU  
Non-ICU

Pulmonary specialists head about 60 percent of RT departments. Parameters of care are given by the department head. In an ICU setting the critical care nurse or ICU nurse is responsible for the physical care of the patient. The RT assigned to the ICU is primarily responsible for the machine. On the nursing floor, the RT takes more responsibility for the care of the patient. Respiratory technicians work on the nursing unit. The scope of independent decisionmaking is limited by state and sometimes by county regulations.

Nursing homes  
Skilled nursing  
facility (SNF)  
Intermediate care  
facility (ICF)

There is very little use of mechanical ventilation at this time. The American Health Care Association (nursing homes) is currently negotiating with AART to develop standards and procedures.

Home

Not common. Patients usually use machines from durable medical equipment (DME) companies who also provide personnel to operate and maintain machines. Personnel may be RNs or RTs depending on reimbursement capabilities. Medicare does not cover the services of RTs, but under Part B, Medicare covers 80 percent of the cost of oxygen equipment. A relative may also be trained to monitor equipment and assess patient's condition.

Hospice

Rarely requested. If a patient requests this technology, hospice may arrange for RN or contract for RT with another organization, e.g., home health care agency or oxygen company.

\* Likely to have the most contact with the patient.



TechnologyResuscitationStaffHospital Code TeamRescue Squad

Staff physician: emergency  
 medicine specialist or  
 on-duty staff resident  
 ) Anesthesiologist  
 ) Critical Care Nurse\*  
 ) Respiratory Therapist\*  
 These personnel work as a  
 team but each has individual  
 responsibilities.

Emergency Technician-Ambulance\*  
 Emergency Technician-Paramedic\*  
 Both consult with local emergency  
 resource center using procedures  
 in accordance with U.S. Department  
 of Transportation Guidelines.

Patient SettingsHospital

Emergency care

Hospital may agree to serve as emergency resource center  
 staffed by a physician, often an emergency medicine specialist.  
 Staff composition may vary by type of patient, e.g., shock  
 trauma, burn, cardiac.  
 Teaching hospitals may include medical or surgical residents,  
 floor nurses and interns in the response team.

Nursing homes

Skilled nursing  
 facilities (SNF)  
 Intermediate care  
 facilities (ICF)

Nursing home RN or LPN calls local rescue squad and  
 informs senior medical person at nursing home. All nursing  
 personnel are required to be certified in CPR techniques.

Home

Local rescue squad is called for basic life support procedures  
 and transport to hospital.

Hospice

Rarely requested. If patient requests technology, local rescue  
 squad would be called to home or professional staff at hospice  
 would initiate resuscitation procedure.

\* Likely to have the most contact with the patient.

TechnologyAntibioticsStaff

Attending physician: may be family practice physician or internist or virtually any other medical specialist who provides attending services

Staff physician: may be internist or other physician providing attending services

RN\* (IV nurse is RN with training in intravenous procedures)

LPN\*

Patient SettingsHospital

## ICU

The decision to administer in life-threatening situations depends on co-morbidities and stage of dying process in which illness occurs. In ICU setting critical care nurse would administer treatment.

## Non-ICU

In non-ICU setting primary nurse on floor or IV nurse (if necessary) would administer treatment and monitor patient. LPN may monitor patient under supervision of RN.

Nursing home

## Skilled nursing

## facility (SNF)

## Intermediate care

## facility (ICF)

The medical director makes the decision to administer antibiotics. Decision depends on co-morbidities and stage of dying process in which illness occurs.

Home

Physician prescribes antibiotics. RN or LPN with RN supervision administers antibiotics and monitors patient progress. Nursing personnel may be provided by a home health agency, visiting nurses' association (VNA) or proprietary home health care company.

Hospice

Rarely done.

\* Likely to have the most contact with the patient.

TechnologyNutritional SupportStaff

Attending physician: may be family practice physician or internist or any primary contact physician

Staff physician: may be family practice physician or internist or any primary contact physician

RN\* (IV nurse is RN with training in intravenous procedures)

LPN\*

- ) Dietitian
- ) Pharmacist
- ) Social worker

These personnel work as a team with individual responsibilities.

Patient SettingsHospital

The decision to administer in life-threatening situations depends on co-morbidities and the stage of the dying process in which the illness occurs.

In a hospital setting, the physician (attending) prescribes the treatment. The hospital pharmacist mixes the solution according to the dietitian's specifications, and a nurse (RN or IV nurse) pours the solution. LPNs, under supervision of RNs, may change dressing, stop and start flow of nutrients in parenteral nutrition.

Nursing homes

Skilled nursing facility (SNF)

Intermediate care facility (ICF)

The medical director makes the decision to administer nutritional support. Decision depends on co-morbidities and stage of dying process in which illness occurs. The RN may be provided by a home health agency, visiting nurses' association, or home health company, if trained nurse (e.g., IV nurse) is not on staff. LPNs are supervised by RNs.

Home

The RN (or IV nurse) who visits the home may be provided by a home health agency, visiting nurses' association or a proprietary nutritional support/home care company. Solution may be provided by a hospital pharmacy, local pharmacy or a proprietary home care company. A relative may also be trained to mix the solutions and administer feedings.

Hospice

Rarely done.

\* Likely to have the most contact with the patient.

## II. Analysis of Major Issues in Manpower and Training

### Introduction

Techniques for estimating manpower needs are crude and are dependent on a number of variables that can change rapidly. These variables include but are not limited to: level of technology; epidemiologic and demographic characteristics of the population; financing and reimbursement policies; consumer demand; provider-induced demand; overlap among manpower categories and substitution; licensure and credentialing. Furthermore, skill levels affect the ability of manpower supply to respond. For example, at aide and technician levels only short time periods may be needed (less than one year) to train or retrain manpower either in on-the-job or in academic settings. In the technologies described in Task-1, I, the actual routine delivery of services is frequently provided by aides and technicians who require one or two years of post-high school training, while supervision is provided by existing, more highly skilled personnel. Certain generic professional skills such as nursing may be easily adapted to new skill development. On the other hand, subspecialties requiring physician or other doctoral level manpower may take a number of years to develop, and there will be a time lag between perceived need and manpower availability, during which rapid changes can occur.

Dialysis is an example of a specialty, nephrology, which developed relatively rapidly once the financing for use of the technology was available. The number of allied manpower who assist in the delivery of dialysis grew very rapidly. In fact, the financing and development of this technique and subspecialty may have impeded the optimal development of alternative therapies such as transplantation and may have led to inappropriate and excess use of the technology.

To some extent because of the "uncertainty" of medical decisionmaking and existing alternative technologies, provider-induced demand is a major factor in actual use of health care services. Medical uncertainty and provider-induced demand are current facts of life. The absence of systematic technology assessment of medical procedures and practices impedes planning for and control of the use of technologies and hence structured manpower policy. On the other hand, reimbursement policies relating to levels of payment, sites of payment, and covered services affect the rapidity of diffusion of technologies and their use rates. The current changes in the financing and delivery of services and payment policies make projections of future use of services and future manpower needs difficult to predict.

Social and ethical values also affect the use of life-sustaining technologies. The growth of "living wills" and "do not resuscitate" instructions can have a major effect on use of these technologies and consequently on manpower. Finally, a major issue that recurs in health manpower is the territorial issue, including skill levels, substitutability and exogenous barriers such as licensure, credentialing and accreditation.

The major factors that will influence the future use of the five technologies are highlighted in this ~~report~~ section.

### Growth and Aging of the Elderly Population

The elderly population in the United States, defined as those over 65, more than doubled from 1950 to 1980, from 12.4 million to 24.9 million, increasing from 8.1 percent of the total population to 11.2 percent. This trend is expected to continue. Current projections to the year 2030 show that the aged will comprise 18.3 percent of the total population at that time (Table 1) (Feinstein and Gornick, 1984), representing a rate of increase among the elderly population that will greatly exceed the increase in the U.S. total population. In 1980, one in nine persons was 65 or older. In 2030 it is expected that one in five persons will be aged 65 or over.

While the relative number of elderly persons in this country has been increasing since 1950, the distribution of aged has shifted toward the older age groups. The 75-84 and 85+ age groups continue to show the most rapid rate of growth. The number of people aged 85 and over increased from 600,000 in 1950, or less than one percent of the over 65 age group, to 2.5 million in 1982, or 14 percent of the over 65 population. The number of people 75 to 84 years of age more than doubled during the same period (National Center for Health Statistics, 1984). The increase in the proportion of the population that is elderly, and especially in the over 85 group, is expected to continue during the next few decades (Table 2).

The rise in life expectancy has contributed significantly to the increase in the elderly population. Much of the early increase in the life expectancy of the elderly resulted from the introduction of antibiotics which reduced mortality from infectious diseases, and allowed a larger proportion of the population to survive beyond childhood. The use of antibiotics also reduced

Table 1

U.S. Population Aged 65 Years and Over:  
Selected Years and Projections, 1950-2030

Year	Number in thousands	Percent of U.S. population
1950	12,397	8.1
1970	20,087	9.9
1980	24,927	11.2
2000	31,822	12.2
2010	34,837	12.7
2020	45,102	15.5
2030	55,024	18.3

Source: U.S. Bureau of the Census, In: Long-Term Care Financing and Delivery Systems. Health Care Financing Administration, Washington, D.C. 1984.

**Table 2**  
**Ten-Year Percent Increases in Aged U.S.**  
**Population, by Age Groups: Selected Years and**  
**Projections 1950-2010**

Period	All ages	65-74	75-84	85+
1950-1960	18.7	30.1	41.2	59.3
1960-1970	13.4	13.0	31.7	52.3
1970-1980	8.7	23.4	14.2	44.6
1980-1990	10.0	13.8	26.6	20.1
1990-2000	7.1	-2.6	15.6	29.4
2000-2010	6.2	13.3	-2.4	19.4

Source: U.S. Bureau of the Census, In: Long-Term Care Financing and Delivery Systems. Health Care Financing Administration, Washington, D.C. 1984.



the mortality rate from pneumonia--once a leading cause of death among the elderly--from 26.2 per 100,000 in 1950 to 11.2 per 100,000 in 1983 (National Center for Health Statistics, 1984). In more recent years the development and use of oxygen therapy for chronic respiratory diseases, and the growing use of dialysis and nutritional support, together with the use of increasingly sophisticated resuscitation measures have contributed to extend the life expectancy of the elderly.

It is quite clear that the longer a person lives, the greater is the possibility he will develop a chronic illness or disability. As persons age, then, their need for medical and personal care rises significantly. One of the reasons why the aged account for a disproportionate share of health care expenditures is that the last year of a person's life tends to be highly medically intensive (HCFA, Fall 1984).

The elderly tend to use more hospital care per capita than does the general population. In 1982, 28 percent of all discharges from non-federal short-stay hospitals were elderly patients, and hospital use among the elderly seems to be increasing. A survey of community hospitals by the American Hospital Association (AHA) found that admissions reached a level of 11.8 million in 1983, an average growth of 4.8 percent per year since 1977. While length of stay declined during the period, the number of patient days rose 3.0 percent annually, to 114 million in 1983. (Admissions for the rest of the population fell 0.4 percent per year; inpatient days fell 1.1 percent per year) (HCFA, Fall 1984). Recent changes in reimbursement for hospital care have accelerated the decline in average lengths of stay.

Personal care needs also rise with age. A 1977 survey showed that 3.5 percent of persons aged 65-74 required assistance with activities of daily living (ADL). This percentage rose to 35 percent for those over 85 (Table 3).

As one would expect, there is a greater likelihood of being in a nursing home as an individual ages. In 1977, about 1.1 million persons, or about 5 percent of those over 65, were nursing home residents. Of these, 41 percent were between 75 and 84 years of age, and 40 percent were over 84 years old. Only 7 percent of elderly nursing home residents were completely independent with respect to performing daily personal care activities. About 45 percent received intensive nursing care, and another 40 percent were receiving a lesser level of nursing care (National Center for Health Statistics, 1984).

The perceived health status of many elderly persons is low relative to the general population. In a 1976 survey of the non-institutionalized population, 31 percent of those 65 and over assessed their health as fair or poor, and 39 percent reported a health problem that limited or prohibited the performance of a major activity of daily living or home management (National Center for Health Statistics, 1984).

Older individuals at the end of life are subject to multiple chronic illnesses and ultimately terminal illnesses which may require life-sustaining care for varying periods. Advances in technology have enabled health professionals to prolong life, but medical treatment may require various life-sustaining and maintenance techniques with potentially high costs and differing results in quality of life (Petet et al, 1981) (Ladefoged, 1981) (Twomey, 1985).

Table 3

Percent of Persons Having ADL Dependency  
and Percent of Persons in Nursing Homes,  
by Age: 1977

Age Group	(1) Percent Having ADL Dependency	(2) Percent Residing in Nursing Home	Ratio between (2) and (1)
45-64	1.2	0.3	.24
65-74	3.5	1.4	.40
75-84	11.3	6.4	.56
85+	35.1	21.6	.61

Source: 1977 National Nursing Home Survey and 1977 National Health Interview Survey, In: Long-Term Care Financing and Delivery Systems. Health Care Financing Administration, Washington, D.C. 1984.

## Emergence of Geriatrics as a Specialty

### Medicine

The evolution of geriatrics in the United States can be traced to the late 1800s and early 1900s. I. L. Nascher published the first American textbook on geriatric medicine in 1914. During the next three decades interest in geriatrics waned and resurfaced periodically until the 1940s when two societies concerned with the elderly and diseases of old age were formed. The American Geriatrics Society, composed of physicians, was formed in 1942; the Gerontological Society was established in 1945 and served broader interests. The formation of these groups coincided with the development of most of the life-sustaining technologies during World War II. In fact, technology advancement during the period spurred the development of most of the subspecialties in medicine and surgery after World War II.

As in the 1920s and 1930s, concern about the status of the elderly waned during the 1950s. The 1960s saw a reawakening of interest in the elderly which culminated in the passage of the Medicare amendments to the Social Security Act. It was not until the middle 1970s, however, that ~~the American Geriatrics Society~~ organizations with an interest in the health of the elderly began to explore the necessity for special education opportunities in geriatric medicine. ~~The Society also~~ These organizations also addressed the issue of recognition of geriatrics as a separate and distinct medical specialty.

The federal government, by providing massive amounts of funds for the health care of the elderly, became intimately involved in the needs and status of the elderly. In 1971 the White House Conference on Aging was convened, and in 1974 the National Institute on Aging (NIA) was established. The NIA funded studies by the Institute of Medicine (IOM) to explore the extent to which aging was part of the curriculum of U.S. medical schools, and to address the issue of geriatrics as a separate specialty.

In examining the issue of a separate geriatrics medical specialty, the IOM recommended against the establishment of a formal board-certified specialty, expressing a belief that aging should continue to be the subject of special emphasis within the purview of the internist or general (family) practitioner. Both the American Board of Internal Medicine and the American Board of Family Practice have provided for recognition of specialty training in geriatrics within their training programs.

The IOM found that few medical schools had required courses in geriatrics, and recommended increased efforts on the part of medical schools to recruit faculty to develop the necessary academic courses in geriatrics and gerontology.\* (Robbins, Vivell, Beck, 1982).

#### Growth of Geriatrics Training

A survey conducted between 1979 and 1981 identified 86 medical schools and 6 non-affiliated institutions, 68 percent of the schools, with programs in geriatrics. Of these, 12 reported geriatrics training at all three levels of medical education--undergraduate, graduate and fellowship--and 36 reported training opportunities at only one level (Table 4). More than half of all the geriatrics programs surveyed were established after 1979. Only 9 percent of the undergraduate programs and 32 percent of the graduate programs were required curricula (Table 5).

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\* There is a technical distinction between the fields of gerontology and geriatrics with the former subsuming social and behavioral aspects of aging and the latter focused on medical care. The subsequent discussion is limited to geriatrics.

Table 4

## Programs in Geriatric Medicine Training Identified and Surveyed, 1979-80

Type of Program	No. of Institutions <sup>1/</sup> with Programs	No. of Programs Identified	No. of Program Surveys Completed	Percent of Surveys Completed
Undergraduate	76	133	108	81.2
Graduate	35	44	37	84.1
Geriatric Fellowship	34	42 <sup>2/</sup>	39	92.9
Total	92	219	184	84.0

<sup>1/</sup> 86 medical schools; 6 non-affiliated institutions.

<sup>2/</sup> On re-survey for 1981-82, 36 fellowship programs were identified.

Source: Robbins, A.S., Vivell, S., Beck, J.C.: A Study of Geriatrics Training Programs in the United States. J. Med. Educ. 57: February 1982. (Adapted from Table 1.)

Table 5

General Characteristics of Undergraduate and Graduate  
Geriatrics Training Programs

<u>Characteristic</u>	<u>Undergraduate Medical Education</u>		<u>Graduate Medical Education</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
<b>Year Began</b>				
Before 1970	0	-	0	-
1970-1972	3	3	5	14
1973-1975	6	6	2	5
1976-1978	26	24	8	22
1979-1981	57	53	16	43
Not Reported	16	15	6	16
Total	<u>108</u>	<u>100</u>	<u>37</u>	<u>100</u>
<b>Program Status</b>				
Required	10	9	12	32
Elective	89	82	25	68
Selective	9	8	0	-
Total	<u>108</u>	<u>99</u>	<u>37</u>	<u>100</u>

Source: Robbins, A.S., Vivell, S., Beck, J.C.: A Study of Geriatric Training Programs in the United States, J. Med. Educ. 57: 79-86, February 1982.

Faculty members with administrative responsibility for geriatrics programs tended to be drawn from the specialties of internal medicine or psychiatry, with few identifying themselves as "geriatricians." Nursing homes served as major sites of training for undergraduate students; for graduate medical education, nursing homes and the general medical ward figured almost equally as training sites (Table 6) (Robbins, Vivell, Beck, 1982).

A more recent survey reporting on 100 medical schools showed 72 percent with required time for geriatric education. Allowing for definitional variations between the two surveys, it appears that opportunities to obtain geriatric training are increasing rapidly (Barry, Ham, 1985).

While the availability of geriatric education is expanding, considerable controversy continues as to whether geriatrics should be a separate medical specialty. Among the arguments set forth for the recognition of geriatrics as a separate specialty is that, with the growth of the elderly population, including the number of very old, primary care or gatekeeper physicians and nurse clinicians specifically trained in the physiologic, behavioral and functional changes of aging will be required (Somers, 1983) (Kane et al, 1980). Kane et al project that by 1990 there will be a need for about 8,000 geriatricians in the United States. Aging, proponents argue, has particular effects on the body and its functions which require specialized knowledge on the part of the physician. Therefore, a separate, identifiable body of knowledge and set of skills do exist which are criteria for specialty recognition (Robbins et al, 1982). In addition, proponents of the separate specialty claim that family practitioners and internists as well as other specialists are not trained to recognize the special needs of the aging and often do not take into account physiologic and life style changes that affect the outcome of various treatment modalities.



Table 6

**Geriatric Training Sites in Order of Decreasing Frequency  
for all Programs**

Training Sites*	Percent Clinical Medical Students (n=59)	Percent Graduate Medical Education (n=34)	Percent Geriatric Medicine Fellowships (n=25)	Percent Geropsychiatry Fellowships (n=13)
Nursing home	76.3	52.9	72.0	46.2
Geriatric evaluation unit	40.7	35.3	68.0	
Geriatric clinic	35.6	35.3	80.0	
General medicine ward		47.1	60.0	
Senior citizen center	40.7			
Patient's home	32.2			
Home care program	32.2	26.5		
Rehabilitation ward			44.0	
Geropsychiatry ward		26.5		53.8
Psychiatry ward				46.2
Psychiatric clinic				69.2
Integrated health and social service center				30.8

\* Other training sites included day care center, retirement home, family practice unit, general medical clinic, hospice, outpatient geriatric evaluation unit, surgical and other specialty wards, neighborhood health clinic, private practice, and public health clinic.

Source: Robbins, A.S., Vivell, S., Beck, J.C.: A Study of Geriatric Training Programs in the United States, J. Med. Educ. 57: 79-86, February 1982.

The opposing view holds that specialists are already trained in physiologic and behavioral aspects for all age groups and the elderly as well as other adult groups suffer from the same basic acute and chronic illnesses, heart disease, hypertension, and diabetes with different incidence at various age groups (Robbins et al, 1982).

Furthermore, some fear that if geriatrics were a separate specialty, demand would mount for such specialists and would diminish the limited resources and energy available to improve the quality and training of nurses and allied health professionals who provide routine and maintenance care of the elderly (Robbins et al, 1982).

### Nursing

Traditionally nursing has played a crucial role in the care of the elderly, especially in long-term care settings, and indeed registered nurses comprise the largest number of health professionals providing long-term care. There is currently an estimated shortage of nurses with expertise in long-term care and with projected increases in the size of the aged population, this shortage is expected to become more serious (Reif, 1982). However, it is possible that the reduction in the general nursing shortage of earlier years may provide a new, available pool of nursing manpower to serve the elderly.

Specialty training in geriatric nursing is a relatively recent development. Efforts to include geriatric nursing content in entry-level nursing programs began in the late seventies but achieved only minimal success.. There are no data on major changes in curriculum content in most entry-level nursing programs.

More geriatric curriculum content is found in nurse practitioner and graduate level programs. In 1982, there were 23 programs designed to produce geriatric

nurse specialists. Most of these programs were dependent on federal funding which was to be reduced in the 1983 federal budget (Reif, 1982). However, Congress has consistently rejected reductions in nurse training programs.

Although ultimate legal responsibility for medical care lies with the physician, coordination of daily activities related to prescribed care has traditionally fallen to a nurse, especially in long-term care and long-term care settings. Some educators think nursing programs need to provide students with opportunities to gain experience by working as members of interdisciplinary health care teams, "working in a peer relationship with physicians," or working as equal partners with patients and family members "when designing and executing a plan for care" (Reif, 1982). Nursing education programs have effectively fulfilled the need for these types of opportunities in hospitals, especially in critical care settings (Mechanic and Aiken, 1982). However, this is not now the case for long-term care in most nursing education programs, leaving the long-term care nurse to seek out the few universities with geriatric training centers, or to seek out opportunities through informal, in-service training experiences.

The past decade has seen the emergence of geriatric nurse practitioners as important providers of long-term care. There are 25 geriatric nurse practitioner programs that award graduate degrees, and 10 that award continuing education certificates (Ebersole, 1985). Seven certificate programs allow nurses with a diploma or an associate degree to advance their education while remaining in their chosen field of long-term care. These programs are especially important in view of the finding that 83 percent of nursing home directors are diploma-educated, 7 percent hold associate degrees, and only 10 percent hold a bachelor's degree (Shields, Kick, 1982).

Because they are trained to manage common acute and chronic health problems, geriatric nurse practitioners probably can reduce the incidence of emergency hospital encounters for residents of nursing homes (Ebersole, 1985). A 1975 study comparing care provided by nurse practitioners to that of resident physicians concluded that the geriatric nurse practitioners "can be as adept as some physicians in identifying patients' medical problems" (Lowenthal, Breitenbucher, 1975).

### Teaching Nursing Homes

With the increased interest in geriatrics training, teaching nursing homes have become important sites for health professions education. Teaching nursing homes are being established in both public and private, for-profit and not-for-profit facilities, with a similar diversity of funding sources (Williams, 1985).

The Robert Wood Johnson Foundation funded affiliations between 11 schools of nursing and nursing homes in 1982. Recently affiliations between medical schools and nursing homes have been funded by the National Institute on Aging, and some programs have been developed by the Veterans Administration (Jahnigen et al, 1985).

The development of teaching affiliations between nursing homes and health professions schools is seen by some as a positive move toward redress of the historical paucity of medical care available to nursing home residents. Only 8.3 percent of physicians make nursing home visits and even those spend 1½ hours per month or less with their nursing home patients (Aiken et al, 1985). Smits (1975) found that only 17 percent of physicians participate in nursing home care at all. However, growing market pressures on the so-called surplus of physicians may result in an increase in physicians' activities in nursing homes and with the elderly.

### Teamwork in the Provision of Medical Care

The concept of team care, care involving multiple providers of health and social services in optimal functional relationships that simultaneously provide quality and cost effective care, is not new. Historically geriatrics has been based on the need for a multidisciplinary holistic approach to the care of the elderly. Team care has evolved particularly well in three types of medical care: health maintenance organizations, certain high technology, critical care or life-sustaining techniques like transplant or nutrition support teams, and areas where medical and social services intersect like long-term nursing home or home care. However, in practice, "team care" has often been used in an ad hoc rather than a conscious manner. Team care has been implemented in instances where "many hands" were necessary or in instances where cost reduction or shortages of personnel forced the care issue. The team concept has been the exception rather than the rule in geriatric manpower training. An experiment in interdisciplinary geriatrics training of nursing and medical students at Albert Einstein College of Medicine established teams of one medical and two nursing students in order to conduct patient work-ups. While medical students' perceptions of the nurses' role in caring for the elderly were significantly increased, medical and nursing students' perceptions of the importance of the nurse in caring for the elderly varied substantially (Croen et al, 1984)

The needs of the elderly are quite complex and extend far beyond the purely medical. Advancing age may bring inactivity, immobility, and impaired social, environmental or mental health. Health problems of the elderly tend to be chronic, require frequent intervention and may call for types of care not effectively or desirably provided by physicians. In terms of care for the elderly it is generally recognized that traditionally, daily care of the elderly

has been provided by the patients themselves, nurses, aides, therapists, social workers and family members.

In terms of care for the terminally ill elderly, the technologic advances since World War II have served as a stimulus to spin off delivery of certain services to manpower other than physicians and nurses trained in specific technical skills. In addition, the relatively recent shift to health care delivery in out-of-hospital settings has placed new emphasis on the increasing need for coordination of care. Traditionally, the physician delegated a care plan to nurses and family members. More and more the gatekeeper concept has been used by health maintenance organizations and alternative care settings such as the home. While the physician continues to serve as the focus or gatekeeper of the initiation of the pattern of care, and the nurse serves as general supervisor of the day-to-day care, a series of new professions has evolved to deliver specific treatments or technologies, such as the dialysis technician, or respiratory technician. As the use of new technologies has increased, so has the importance and responsibilities of these specially-trained health care personnel who have become integral parts of the team. Examples of the team concept of care in respiratory care and in nutrition support follow:

#### Respiratory Therapy

Respiratory therapy or mechanical ventilation has as its major goal the rehabilitation and restoration of the patient to his "fullest potential" (Hodgkin, 1983), and exemplifies the interaction of technology development, cost containment and training of specific personnel to use the technology and the interaction among different combinations of manpower in various sites of care.

Dr. Alvan L. Barach was a pioneer in the use of respiratory therapy in hospitals for treatment of lobar pneumonia in the 1930s and 1940s. He developed the use of portable oxygen bottles in the 1950s for relief of dyspnea during activity which led to studies in the United States and the United Kingdom on the "effectiveness of long-term oxygen in reversing pulmonary hypertension and secondary polycythemia." (Petty, Nett, 1983). Positive results from these studies encouraged investigations in the 1960s and 1970s into the value of oxygen therapy for patients with chronic obstructive pulmonary disorders (COPD), again with positive results. At the same time, development of more convenient and efficient methods of obtaining and storing oxygen continued, thus expanding home use capabilities (Petty, Nett, 1983).

As with many technologies, their general availability and that of trained manpower utilizing the technology are considered stimuli to utilization, particularly where third-party payments reduce the immediate costs to the consumer (Weimer, 1983). The role of respiratory therapists, a relatively new type of health manpower, has expanded during the past 10 years, especially because of lack of other appropriately trained medical personnel in small hospitals (Gracey, 1982).

In health care, many associations with interest in specific professions seek to develop standards. While these standards are not always subsumed by institutions such as hospitals, they do influence use of services and personnel. The standards developed by the American Association for Respiratory Therapy (AART) are not necessarily accepted by hospitals.

In accordance with the Administrative Standards for Respiratory Care Services and Personnel promulgated by AART, the majority of respiratory care

services in hospitals operate under the medical direction of a pulmonary physician or an anesthesiologist (AART, 1983). However, the day-to-day responsibility for treatment lies with the non-physician director who is ideally required to be a Registered Respiratory Therapist under the standards set by AART; although provision is made for individuals with lesser credentials in respiratory therapy to serve in this capacity where circumstances warrant and where appropriate additional training and experience can be demonstrated. Directors of respiratory care services are "responsible for the establishment of standards, and...the quality, quantity, and efficacy of care provided..." In addition, the standards require that job-related continuing education opportunities be offered and documented for all personnel employed by the service (AART, 1983).

It should be reiterated that these recommendations and standards come from the association of personnel providing the services rather than from an independent body with no proprietary interest.

The health costs of chronic bronchitis and emphysema in 1977 were an estimated \$1 billion in direct costs, \$3.8 billion for morbidity, and \$900 million in costs associated with mortality (Hodgkin, 1983). Add to these costs associated with asthma and other respiratory obstructive and restrictive disorders, and it is obvious why efforts to decrease the burden of health care costs are being encouraged. While there is no evidence that participation in a pulmonary rehabilitation program will extend life expectancy, restoration of the ability to function in the activities of daily living could decrease hospital and other medical costs (Hodgkin, 1983).



An estimated three million Americans suffer severe physical impairment due to restrictive or pulmonary processes or chronic obstructive pulmonary disease (COPD). Between 50,000 and 100,000 experience severe lack of oxygen at rest which is exacerbated by exercise. This is the potential population for use of oxygen therapy, although the benefits-cost ratio is by no means the same for all persons (Luce, 1983).

Respiratory therapy was mostly provided in the institutional setting until the early seventies when development of more portable equipment, together with reimbursement incentives, made home care a more feasible alternative. Respiratory care in the home is a team effort in which the patient or his family play major roles. As in all home medical care, the original prescription comes from a physician, but it is the home health or visiting nurse who coordinates the contributions of each member of the team (Make et al, 1984) (Weimer, 1983), which generally include, in addition to the physician and nurse, a respiratory therapist, physical therapist, occupational therapist, and a social worker (Make et al, 1984) (Petty, 1982) (Malkus, 1976).\* Before home therapy is instituted, consultations may be held with physicians and other personnel trained in rehabilitation, clinical nutrition and psychiatry or psychology.

The majority of patients with chronic obstructive pulmonary disease are elderly (Weimer, 1983) (Roselle et al, 1982). They may have poor eyesight, be hard of hearing or suffer other infirmities that may impede the success of a home ventilator care program. However, advance planning that includes both the patient and family may lead to successful rehabilitation. Home care has been shown to improve the quality of life for the patient (Malkus, 1976) (Gilmartin, 1983), while reducing hospital stays (Fischer, 1982) and readmission rates--and hospital respiratory therapy costs of care (Weimer, 1983)(Fischer, 1982).

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\* Interestingly, Medicare does not cover the services of a respiratory therapist under the home health benefit, although 80 percent of the cost of oxygen equipment is covered under Part B.

### Nutrition Support

Some degree of malnutrition is estimated to affect 30 to 50 percent of all hospital patients (Nathanson, 1984). Nutritional deficiencies may be present before the patient enters the hospital or may be a consequence of procedures performed during the hospital stay. Other patients may be unable to ingest or digest food through the mouth. In 1982, two million persons or five percent of all hospital admissions received enteral nutrition and 200,000 or .05 percent underwent parenteral nutrition (Nathanson, 1984). In one hospital, whereas 30 percent of admissions were 60 years or older, 50 percent of those receiving intensive nutritional support were 60 years or older (Steffee, 1980). In nursing homes, the use of tube enteral nutrition is quite common whereas parenteral nutrition is rare.

The health professionals involved in assessment and treatment of malnutrition in patients form an interdisciplinary team that includes physicians, nurses, pharmacists, and dietitians. The standards for nutritional support of hospitalized patients recently promulgated by the American Society for Parenteral and Enteral Nutrition (ASPEN) require that a nutrition support service be directed by a physician with appropriate training or experiential knowledge in the area of nutritional support, and should include "a registered nurse, a registered dietitian and a registered pharmacist each also having qualifications in the area of specialized nutrition support" (ASPEN, 1984). Like respiratory therapy, nutrition support personnel standards are not the work of an independent body with no proprietary interest in the technology.

While nutritional support is provided by multidisciplinary teams with training in nutrition, little formal training in nutrition has been provided to some of the professionals on the team except for nursing personnel. A 1983 survey of nutrition education in 264 baccalaureate nursing schools showed that

nutrition is an integral part of the curriculum. Time spent on nutrition education averaged 32 hours. About half of the baccalaureate programs had required courses, the remainder integrating the material into other courses or offering elective courses within the nursing program or in other disciplines.

Most of the teaching is conducted by dietitians or nurses. "The nutrition content of basic nursing education includes: normal nutrition for the infant, child, adult and aged client; the iatrogenic effects of malnutrition; therapeutic diets used with disease; and the therapeutic effects of enteral and parenteral nutrition (Crocker, 1985)." Nutritional assessment is stressed in most of the programs surveyed, but the author found that there is insufficient emphasis on the need for interdisciplinary cooperation and understanding of the roles of other health professionals on the nutritional support services team.

A previous survey of nurse members of ASPEN showed that the majority acquired their specialized knowledge through "informal means," rather than through graduate training programs (ASPEN, 1985). In 1984 the National Board of Nutrition Support Certification was created. This organization developed a certification program for nurses; the first examination was given in June 1985 to 100 applicants. Other continuing education opportunities are offered through ASPEN and through courses at Harvard University, the University of Pennsylvania and other universities.

ASPEN has developed general minimum standards for practice in nutritional support in the hospital, for home care and for nurses. The Society is currently working with the American Society for Clinical Nutrition and the American Medical Association to develop an accreditation policy statement on nutritional support to be proposed for inclusion in the Hospital Accreditation Manual of the Joint Committee on Accreditation of Hospitals (ASPEN, 1985).

## Reimbursement and Health Benefits Coverage

Payment or reimbursement policies strongly influence the use and sites of health care services. Recent changes in public and private reimbursement policies, made in an attempt to contain rapidly rising medical costs, are having a profound impact on the use of life-sustaining technologies, where they are administered and by what types of health care personnel. Since most of the over 65 population are enrolled in Medicare, the federal government has the powerful ability, through its reimbursement mechanism, to advance or inhibit the use of technologies and to control the types of manpower that administer them.

### Medicare Reimbursement

#### Hospital Care

Hospital care is the most thoroughly financed of all health services with more than 90 percent of the reimbursement made by public and private third-party payments. (HCFA, Fall 1984). However, recent changes in public and private reimbursement policies are changing incentives for use of hospitals as sites of care and services used within them. Three changes have occurred:

- A shift in Medicare reimbursement from a retrospective reasonable cost basis to a prospective payment system (PPS) based on diagnostic related groups (DRGs);
- ~~A detachment of Medicaid hospital payment from Medicare methods and increased flexibility by the states to determine payment methodologies;~~
- In 1981 Congress changed the requirement that states had to follow the Medicare method of paying for hospital costs on a retroactive reasonable cost basis. States were able to determine their own payment methodologies with much greater flexibility than previously. The majority of states now pay for hospital care prospectively either on a per diem or per case basis;
- An increase in negotiated rates and discounts by private payment programs.

For the elderly population the Medicare changes will have the greatest impact. Since the DRG reimbursement method has been in effect for only two years there are few data on the impact of DRGs on hospital care. However, emerging anecdotal evidence indicates:

- Patients are released sooner and sicker (Hughes, 1982);
- Admissions to nursing homes may increase;
- Patient care settings are shifting from acute to less-acute and non-acute settings;
- Diagnostic in-hospital workups may become more limited (Maples, 1985);
- Hospital readmissions are encouraged (Champlin, 1985).

The prospective payment system reflects the state of medical technology practiced in 1983, the year PPS was implemented. While an update of DRGs is required at four-year intervals, the result may be a slowing of the introduction of new technology and a slowing of the use of technologies that were just beginning to expand when DRGs were introduced.

Some critics of PPS believe the system will provide a disincentive to hospitals to provide certain high technology services to Medicare patients, thus rationing certain types of care to elderly patients. One study found that for patients in diagnostic categories such as circulatory, respiratory and digestive diseases, the hospital may profit when treatment occurs in non-intensive care units and suffer losses for days spent in intensive care units (Bone et al, 1985).

A strong financial disincentive exists, then, for hospitals to care for patients who require the use of extended intensive care. This presents a dilemma for hospitals: as pressure mounts to release patients quickly and to provide services in non-hospital settings, the inpatient population becomes more acutely ill. An acutely ill population probably requires increased nursing staff ratios,

more technology utilization and more physician services (Bone et al, 1985). The effect on the use of allied health manpower is unknown and will depend in part on the services needed. Critics also claim that DRGs don't account for psychosocial aspects of hospitalization and will affect staffing patterns for these services (Champlin, 1985).

On the other hand, there could be mixed effects on technologies for the terminally ill elderly, such as respiratory therapy and parenteral nutrition, if provision of these services in the hospital pushes the cost above the prospective rate for the diagnostic category. The favorable consequences could include reduction in the inappropriate and unnecessary use of these technologies; the unfavorable influence may be withholding the technology when there may be benefits.

#### Nursing Homes

Medicare was designed for acute care, not for long-term care. By law Medicare pays for 100 days of skilled nursing services per illness episode, but users of benefits average about 27 days of covered care per year, and only a portion of nursing home beds are Medicare-certified (Kuntz, 1984).

Medicare criteria for payment are complex, restrictive and subject to variation in interpretation by claims reviewers (Kuntz, 1984). For example, while IV therapy and tube feedings are covered, coverage of other technologies is unclear (Fackelmann, 1985). Furthermore, the level of reimbursement to SNFs may not be sufficient to provide incentives to these facilities to perform technology-intensive procedures. As hospitals feel pressure to discharge patients to non-acute care settings and transfer patients who require these technologies and long stays to SNFs, the probability increases that patients will not meet the

criteria for Medicare payment and will spend down into Medicaid eligibility. Often Medicaid payment is too low to cover the care of patients requiring support technologies such as TPN (Champlin, 1985).

#### Home Health Care

Home health care is an excellent example of how the Medicare reimbursement policies of the federal government can affect the use of technologies and health professions manpower. Medicare coverage of home health services is restricted to homebound persons under the care of a physician and who require "intermittent" skilled nursing, physical or speech therapy (Coleman, June 1985). The definitions and restrictions limit the use of therapies such as IV antibiotics and respiratory therapy in some settings.

Under the home health benefit, Medicare covers:

- o Occupational therapy;
- o Part-time intermittent services of home health aides and nursing care;
- o Medical supplies and equipment provided by a home health agency including 80 percent of the cost of medical equipment such as oxygen equipment under Part B insurance.

Medicare does not cover:

- o Homemaker services;
- o Full-time nursing care;
- o Drugs;
- o Blood transfusions and other biologicals;
- o Respiratory therapists (nursing services for oxygen therapy are reimbursed);
- o Nutritional/dietary professional services and dietary supplements.

On a number of issues the federal government has not issued or clarified Medicare regulations or it has changed regulations frequently to meet technology changes. The home health care field has been unstable. Examples of different

treatment of home delivery of high technology services for the terminally ill elderly are IV antibiotics and total parenteral nutrition and enteral nutrition (TPN/EN).

IV antibiotic therapy is covered by Medicare in hospitals and in nursing homes, but not in the home. The Medicare home health benefit specifically excludes antibiotics as drugs/biologicals and in addition, IV antibiotics patients may be ambulatory. Nursing services could be covered for IV antibiotic treatment, but often this technology requires more frequent medical supervision than intermittent care (HCFA, personal communication).

Coverage of total parenteral and enteral nutrition is quite complex.

Total parenteral nutrition and enteral nutrition can be covered in the home under the prosthetic device benefit, but not under the residence home health benefit. In the case of TPN, the pump, tube and nutrients may be provided on an outpatient basis under Part B; for enteral nutrition, tubing and nutrients are covered under the prosthetic device benefit.

The home health benefit does not provide coverage for prosthetic devices. Almost all home health services are provided under Part A. An approved home health agency can offer TPN/EN, but then the organization ceases to function as a home health agency, becoming a prosthesis supplier. Coverage may include the infusion pump (as durable medical equipment), and tubing (as home health medical supplies). The home health benefit does not include coverage for the costly nutrient solutions nor are solutions covered as durable medical equipment (HCFA, personal communication).



## Hospice

Hospice benefits are relatively new in the United States, and provision of hospice benefits by public and private third-party payors is even more recent. The concept of hospice is basically antithetical to the use of technology-intensive services for the terminally ill.

The concept of hospice is to provide maintenance care, counselling, social support and pain relief for the terminally ill, rather than active treatment. Life-sustaining measures such as mechanical ventilation, or resuscitation, will usually only be initiated at the request of the patient or family.

For the elderly covered by Medicare, the patient must make a choice between hospice and regular Medicare benefits. If hospice is chosen, all care is provided by hospice.

## Durable Medical Equipment (DME)

Durable medical equipment is needed for dialysis, mechanical ventilation and nutrition support. Until recently, 90 percent of DME was rented. On February 1, 1985, Medicare regulations were revised and all equipment with a cost of less than \$120 must now be purchased. ~~More expensive equipment must be purchased-~~ In addition, if expected rental use over time of more expensive equipment will cost more than it would to purchase, the equipment must be purchased. Medicare and private insurance reimbursement is generally at the 80 percent level of reasonable costs with the balance paid by the patient (Evashwick, 1985).

Approximately half of Medicare's DME costs are for oxygen and equipment. As in other parts of the health industry mergers and acquisitions are favoring large national companies that provide DME.

## Health Benefits Coverage

### Private Insurance

Most of the over-65 population is eligible for Medicare, but policy changes implemented by the federal government in recent years are shifting more of the burden of health care costs to the private sector.\* Two changes--the gradual rise in the minimum age for Social Security eligibility and the requirement that employer-sponsored health insurance plans of the working aged be the first payor--mean that a greater number of elderly will depend on private health insurance (Stein, 1984) (Changing Times, 1983).

Employer-sponsored plans are an important source of medical care protection for retirees and like Medicare, the cost of employer-sponsored plans has been increasing rapidly. The number of retirees eligible for supplemental employer-sponsored benefits is growing and is contributing to employers' rising costs for health insurance benefits (Mercer Public Sector Report, 1984). Most companies pay premiums for retirees' health insurance out of current income instead of funding the program for the future. Some believe that the unfunded liabilities of these plans are a time bomb, particularly in mature, basic industries (Business Week, 1984).

The design of health insurance benefits and payment policies (i.e., the use of deductibles and coinsurance) obviously influence the use of services and the sites of service delivery. As distinguished from general benefit design (e.g. hospitalization, home care) specific service use is also influenced by coverage

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\* Currently, about one-half of the elderly population covered by Medicare have supplemental benefits through their employer or through purchase from groups like the American Association of Retired Persons (AARP). These policies vary widely in scope.

policies. If a public or private plan determines that a specific service or procedure or device is not safe and effective or medically necessary or experimental, the insurance plan will not reimburse. Conversely, benefits and payment policies can encourage certain types of behavior. Employers have been redesigning benefits to control cost increases, including shifting care out of hospitals, encouraging enrollment in health maintenance organizations and actively using various utilization review mechanisms, such as preadmission certification (Work in America, 1985).

#### Public Insurance

During the last five years Medicare reimbursement policy has influenced sites of care and service delivery. The shift from retrospective reasonable cost reimbursement of hospitals to prospective DRG reimbursement has stimulated early discharges from the hospital to alternate sites of care, outpatient as well as more extensive pre-hospitalization. use diagnostic testing and-use-of-different types-of-health-care-personnel-as-caregivers. Changes in sites of care have shifted the use of different types of personnel. For example, nurses and aides provide the bulk of home health services with lesser physician contact with the patient than in hospital settings.

Deductibles and coinsurance also influence use. The classic example cited is full payment for lab and X-ray in the hospital, but coinsurance if the service is rendered out of the hospital. Medicare has deductible and coinsurance provisions, duration limits and does not cover certain types of service or products such as drugs out of the hospital. Deductibles and coinsurance payments by beneficiaries for hospitalization have been increased over time, as have premiums. Home health benefits have been liberalized.

### Long Term Care

Payments for long-term care, particularly for nursing home care, now represent the largest uninsured or out-of-pocket expenditure for the aged (Meiners, 1982). Significant funding for long-term care is available under Medicaid, but unless the elderly are already eligible they must spend down virtually all their assets to qualify.

The private insurance sector provides only limited coverage for nursing home and other long-term care services, but insurance companies are showing an interest in further developing such coverage. Although a minority of elderly are poor and most will not require nursing home care for protracted periods, a significant minority, particularly those requiring dialysis, respiratory therapy, TPN, or ventilation could benefit from such coverage (Meiners, 1982).

Until recently, private insurance has not moved to fill the long-term care gap for the following reasons:

- Some public coverage is available;
- There is danger of adverse selection: only the sick or those who anticipate needs for long-term care will purchase insurance;
- Lack of clear distinctions among skilled, intermediate and custodial care exist and there is overlap between medical and social needs;
- Discrepancies exist between the cost of coverage and income of the elderly (Meiners, 1982).

### Manpower Training

The technologies discussed in this paper utilize the services of physicians, nurses, pharmacists, dietitians, respiratory therapists, and various technician personnel associated with the specific technology. Each of these professions has its own requirements for training, certification, and licensure, but all have in common the requirement for clinical training for the personnel involved in patient care. The following discussion briefly describes the training requirements for each type of personnel involved in the technologies, and then explores the impact that prospective reimbursement may be expected to have on the supply of these personnel.

#### Training

Two of the technologies (dialysis and mechanical ventilation) are treatments for specific disorders of discrete organ systems, and the training for the physicians involved is relatively uniform, differing only in the area of subspecialty training. In dialysis, the supervising physician is a nephrologist, a physician who has completed two years of residency training in the treatment of renal disorders, beyond the required four years of medical school and three years of general internal medicine training. The supervising physician in the respiratory therapy unit is most often a specialist in pulmonary diseases, another subspecialty of general internal medicine requiring two additional years of residency training. Thoracic surgeons or anesthesiologists may also act as medical directors of respiratory therapy units.

Patients who receive antibiotic therapy, nutrition support, or who may require resuscitation have many different diagnoses, and may be under the care of virtually any type of physician. However, where resuscitation measures are

required, personnel specifically trained for such situations form a team to respond to the immediate emergency.

Nursing personnel associated with each of the technologies may be graduates of four-year baccalaureate programs, three-year hospital diploma programs, or two-year associate degree programs, and some may have master's degrees. Before specializing in a specific area of nursing, such as dialysis or critical care, most nurses gain one or two years' experience on the general medical and surgical floors of a hospital. To become certified in nephrology, a nurse must demonstrate at least one year's experience in the field of nephrology, in addition to passing an examination. Certification for critical care nurses requires at least one year's experience in a critical care unit. Preparation for certification examinations may be obtained through in-service, on-the-job training, or through special hospital-sponsored seminars, or programs provided by the professional associations, or schools of nursing.

Licensed practical nurses most often obtain their training through one-year programs at trade, technical or vocational schools, although about one-quarter of the programs in 1980 were located in junior and community colleges (Institute of Medicine, 1983). Specialization on their part comes from on-the-job training.

Nurses' aides may attend six-month to one-year programs offered by community colleges, but the majority receive on-the-job training from the institution of employment (Institute of Medicine, 1983).

Respiratory therapists may take one of two routes to becoming qualified in their profession. The respiratory therapy technician is required to take a one-year course of training which focuses mainly on the use and maintenance of the equipment necessary to respiratory therapy, whereas the respiratory therapist takes a two-year course which incorporates many aspects of patient care monitoring

and diagnosis related to respiratory diseases. The respiratory therapist is expected to have a much wider range of responsibility than the technician, although in 1978 a Bureau of Health Manpower study found little difference in the tasks performed by each of these practitioners and recommended a single-entry-level generalist position for the profession (Galambos, 1979). Baccalaureate programs, with a major in respiratory therapy, have also been developed, although the four-year degree has not yet become a requisite for certification or registration as a respiratory therapist or a respiratory therapy technician. Although a high school education is the only prerequisite for entry into RT programs, many enrollees come from other health fields, such as nursing or paramedic.

Pharmacy training may lead either to a baccalaureate degree in pharmacy after five years of training or the Pharm.D. after six years which includes a year of clinical residency training. Both degrees are considered entry-level degrees, although the Pharm.D. program was developed to give pharmacists more involvement with physicians in the administration of drugs (Galambos, 1979).

Dietitians may take one of two routes to obtaining recognition by the American Dietetic Association as a Registered Dietitian. They may either follow a university course of study that integrates clinical training throughout four years of academic course work, or they may first obtain a baccalaureate degree in a related field, such as nutrition, and follow this experience with the requisite clinical training.

Technicians are an important part of the health team in dialysis units, with responsibilities ranging from technical procedures and direct patient care to biochemical analyses, observation, and research. The range of responsibilities varies from unit to unit, although the work is always performed under the supervision of a physician or professional nurses. There are few formal training

programs for dialysis technicians, and no accrediting agency or requirements. Acquisition of the skills and knowledge necessary takes place through on-the-job training in the dialysis units themselves. Dialysis technicians are not required to be licensed, registered, or certified, although a voluntary certification program is offered by the Board of Nephrology Examiners (Hopke, 1984).

#### Trends in Hospital Staffing under Prospective Payment.

It has been expected that the change to prospective payment under Medicare would lead to cutbacks in numbers of personnel employed in hospitals, and that these cutbacks would occur mainly among the less highly-trained personnel. The reasons for this include the fact that patients are being discharged earlier in their course of treatment to reduce lengths of stay, so that patients retained in the hospital tend to be sicker, and require higher levels of care. The fact that there is overlap in the training of personnel at different levels means that more highly-trained personnel are able to perform many of the tasks of lower level personnel, whereas the reverse is not true. Thus, hospitals may seek to contain costs by reducing the number of lower-level personnel and requiring the more highly-trained personnel to be more productive. The following statistics suggest that in some areas, particularly nursing and dietetics, hospitals are acting in this manner. These changes in personnel also affect hospital training programs.

In 1983, U.S. hospitals employed 3.7 million people in all categories of health care, a one percent increase from the total employed in 1981, but a decrease of one percent from the total in 1982. There was a ten percent decrease in the number of physicians employed by hospitals from 1981 to 1983. The number of registered nurses increased ten percent, but licensed practical nurses decreased two percent. Although the number of other nursing service personnel was not available for 1983, from 1980 to 1982 there was a 22 percent decrease in their numbers (HRSA, 1985).



The number of pharmacists and pharmacy technicians increased each year from 1980 to 1983, but the rate of increase for each category shows a decreasing trend. The number of employed dietitians decreased each year from 1981 to 1983, resulting in a one percent decline in numbers during the period. The number of dietetic technicians (who provide much of the nutritional counseling to patients) decreased 14 percent from 1981 to 1983, following a single year decrease of 12.7 percent from 1980 to 1981.

The number of respiratory therapists employed by U.S. hospitals has been increasing steadily since 1980 at an average rate of about 7.5 percent per year. The number of respiratory therapy technicians has also been increasing, but at a much slower rate (HRSA, 1985).

Overall, the number of hospital personnel has increased since 1980, but the rate of increase has been declining each year. For example, from 1980 to 1981 there was an overall increase of 3.4 percent in the number of personnel employed; from 1981 to 1982, the increase was 2.2 percent, but from 1982-83, the number decreased by 1.0 percent. The number of personnel employed per admission declined sharply from 1982 to 1983 (American Hospital Association, 1985). The large numerical decrease in nursing service personnel except for registered nurses accounted for most of the overall percentage decrease in employed personnel.

## Effects of Reimbursement Policy on Health Manpower Training

### Introduction

Support of training of health manpower comes from numerous revenue streams. These revenue sources vary by type of training program and site of training. Sources include state and county support for colleges and universities, tuition, biomedical research and patient care funds. Hospitals have been the traditional training

sites for much of the clinical training for medicine, nursing and allied health professions, although to differing degrees among and within each of the professions. This training has been financed primarily from patient care funds. Financing of health professions education in non-hospital training sites has been far less generous and has been based traditionally on a quid pro quo of service, with faculty supervision support provided by the educational institution.

From its inception Medicare has provided direct identifiable support for graduate medical education for physicians, for diploma nursing schools operated by hospitals and certain allied health programs operated by hospitals. There is no national information on the extent of these costs or financing of these costs. Furthermore, support of clinical training may not be separately identified in hospital financial statements and has been subsumed in the basic cost or charge structure of the hospital.

#### Changes in Reimbursement

Recent changes in reimbursement will have a profound effect on support of clinical training. While Medicare pays for direct education costs, the program also reimburses for indirect medical education costs, i.e., the additional costs incurred in training such as the ordering of additional tests for the more severely ill patients generally found at teaching institutions. However, reductions are expected in terms of explicit direct support and indirect support.

In the first instance, proposed changes in Medicare direct support for residency training will reduce the total amount of future support and limit the ability of hospitals to maintain levels of training. Furthermore, indirect support now provided for residencies may have been used by hospitals to cross-subsidize certain underfinanced specialties in primary care and nonphysician training programs. Reductions in this support are proposed in the pending budget reconciliation legislation.

Hospitals have provided education support for a number of reasons including recruitment and on-the-job orientation. Other factors that influenced the support of these programs were quality of care, the institutions' overall education mission, prestige, community orientation related to local college programs and substitution for staff slots or additional services. Prior to DRG reimbursement and the changes occurring in Medicaid and private health plans, costs associated with such program support could be met.

The HRSA report indicates that hospitals are now actively reviewing the training programs in relation to productivity and efficiency of operations.

DRG payments provide incentives to reduce costs by diagnosis, affecting those training programs in which costs are not separately identified for direct support. Often, the hospital central administration has not been aware of the number of clinical affiliations and the actual costs of programs because of the decentralization of program decisions to department levels, and cost accounting practices which do not identify the education costs and because costs were not a primary concern.

A recent survey by the Committee on Allied Health Education and Accreditation of the American Medical Association showed that 44 percent of the more than 2,000 allied health education programs surveyed had experienced a negative effect from the prospective payment system. Many programs had been terminated or had plans to terminate, while others reported changes in the patterns of clinical affiliations (Ginsburg, 1985).

The Bureau of Health Professions of the Health Resources and Services Administration recently conducted site visits to programs in Baltimore, southeastern Florida, Chicago, and northern California to assess the impact of the prospective reimbursement payment system on clinical affiliates and the

training programs in medicine, nursing, social work, pharmacy, and allied health fields including dietetics, and respiratory therapy. The BHP site visits found that changes in Medicare reimbursement have led to "decreased patient census, shorter lengths of stay, sicker patient populations, increased emphasis on staff productivity resulting in changes in both the number and mix of staff, and changes in the services offered by the hospital, including contracting out of certain ancillary changes."

As a result, clinical programs in all professions are reporting problems in providing the appropriate number and mix of patients for students to obtain the necessary clinical experiences for completion of training. Additionally, staff employed by the hospitals have less time to spend in teaching or supervising students (of particular concern in the allied health fields where much of the clinical training and supervision has traditionally been provided by hospital staff, usually at no charge to the training program), and hospitals are beginning to require payment for staff time spent in educating students, or are reducing their involvement in teaching programs. As a result, "students are graduating without the necessary hands-on experience expected" (Ginsburg, 1985).

While educational programs are attempting to expand their clinical sites, the financing of education in alternative sites is difficult because patient financing mechanisms have not traditionally paid for training in non-hospital sites. The growth of competition has also constrained the willingness of organized outpatient systems like HMOs and home care agencies to incur education costs.

The HRSA study indicates that growing competition among professions for clinical access in hospitals is particularly affecting clinical dietetics, and respiratory therapy (Ginsburg, 1985).

### Shift in Settings of Care of the Elderly

Two factors are contributing to the growing movement to shift care from hospital to non-hospital settings: the growth of the elderly population and cost containment measures for health care in the private and public sectors. A recent report by the Population Reference Bureau states that about one in four elderly persons now needs nursing home care or special care at home (Fackelmann, 1985). By the year 2020 the number of elderly people needing nursing home care or home health services is expected to double largely because of the rapid growth of the over 85 population segment.

The advent of DRGs and prospective reimbursement has forced hospitals to explore opportunities for out-of-hospital treatment and care. The federal government, through reimbursement changes under Medicare, has encouraged the development and growth of alternative sites of care. For example, a relaxation of some of the criteria for the home health benefit has stimulated growth in that industry. The health benefits insurance sector has also affected, through its payment mechanism, the use of non-hospital health care settings.

The interest in out-of-hospital care for the terminally ill has some historical basis (dialysis) but other technologies that formerly were used exclusively in the acute care hospital, such as respiratory therapy and ventilation and parenteral nutrition therapy are now moving into nursing homes and the home. A nurse for a home care nutrition company states, "Procedures once performed only in hospitals now are taught to patients and their families...Lay people can learn to manage central line catheters including the operation of any type of infusion pump, intravenous feedings, except for changing the peripheral catheter,..." (Geriatric Nursing, 1985).

As care moves out of the hospital, the nursing home and home care industries have been growing rapidly and are characterized by:

- o Future strong growth potential, with the possible exception of dialysis centers;
- o Increased competition and the entry and expansion of for-profit companies serving these markets;
- o Shifts from highly fragmented, local entities to national chain organizations and reorganization by hospitals to extend their business opportunities to out-of-hospital care.

Manpower use and needs will be strongly influenced by these developments and by the introduction of new technologies and new and varied sites of care.

#### Home Care

The home care market is varied, encompassing three types of services: durable medical equipment, routine home care (primarily nursing and physiotherapy) and high technology therapy (Evashwick, 1985). The entire home care market has grown rapidly since 1980 and growth will continue. Estimates are that market volume will increase from \$2.7 - 5.2 billion in 1980 to \$8 - 19 billion in 1980 1990 (Fackelmann, 1985).

Much of the growth has been a result of several changes made by Medicare in 1981. These changes included the removal of the requirement that a person be hospitalized for at least three days before becoming eligible for home care benefits. Home health services could be reimbursed without satisfying a deductible and limits on the number of all medically necessary home visits were lifted (Coleman, 1985).

With the pressures to restrain hospital admissions and encourage early discharge, home care industry experts predict the high technology segment of home care will grow rapidly (Fackelmann, 1985). Estimates include:

- o Home IV antibiotic therapy will become the most lucrative area for home care providers in the next few years, growing from \$15 million in 1983 to \$400 million in 1988 (Kuntz, 1984);
- o Total parenteral nutrition (TPN) is expected to grow at a slower but still substantial rate, increasing from \$170 million in 1983 to \$400 million in 1988 (Kuntz, 1984).

At the end of 1984, there were about 5,337 home health agencies and that number is expected to grow about 80 percent to 8,000 by 1990 (Punch, 1985).

There has been a shift from not-for-profit agencies to investor-owned home care companies with much of the growth in the home health care market coming from the for-profit agencies whose numbers increased fivefold from 1980 to 1984 (Punch, 1985).

The number of not-for-profit visiting nurse associations (VNA), historically the caregivers to individuals at home, has remained unchanged for several years. VNAs have tended to remain in traditional nursing services and have generally not expanded into the high technology areas (Punch, 1985).

The number of hospital-based home health agencies has also grown very rapidly, reaching more than 800 in 1984 (Punch, 1985). Hospitals, in response to changes in reimbursement and health insurance benefits, are examining business opportunities to extend their influence beyond their walls. Most hospitals develop Medicare-certified home health agencies. Generally, fifty to ninety percent of a Medicare-certified home health agency's clients are over age 65 (Punch, 1985).

Both for-profit and not-for-profit hospitals are forming home care departments in several ways, including:

- o Establishing a home care department within the individual hospital;
- o Forming a subsidiary or acquiring existing home care agencies;

- o Establishing joint ventures with existing agencies or geographically proximate hospitals (Kuntz, 1984).

In addition, some proprietary home care companies, e.g., Abbott, may act as consultants to hospitals that want to develop their own home care companies (Fackelmann, 1985).

As hospitals expand into the home care market in response to shorter lengths of stay and profit-oriented, investor-owned companies stimulate the growth of the home care market, there will be a significant impact on the use of and need for health manpower in the home setting. Historically, nurses, LPNs and home health aides through their participation in public health agencies and visiting nurse associations, were the focal point of home health care programs. Today nurses are still crucial, but other professionals, trained more narrowly in specific techniques such as respiratory therapy, have been added to the health care team.\*

At the same time nurses are being asked to administer and monitor more high technology types of services, such as IV therapy. While the physician actually prescribes home health services (or a nurse practitioner can recommend treatment), the physician is not very involved in patient care (Coleman, June 1985).

However, the growth and use of high technology are partially dependent on physician education and practice patterns. For example, if IV antibiotic therapy is commonly used in the hospital and the physician received extensive training in the use of this therapy (perhaps during residency), the physician will be more likely to prescribe it for home use (Evashwick, 1985). The fact that home infusion therapy is the fastest growing segment in the home care market indicates the increasing acceptance of the therapy by physicians.

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\* The training of these personnel varies widely by technology in length, skills and knowledge of geriatrics.



With shorter hospital stays, demand for health care manpower trained in home services is likely to increase, but there may be problems in shifting existing trained manpower to the new environment. Clinical knowledge generally transfers well from a hospital to a home setting, but a barrier to easy manpower transfer may exist:

- o Lack of interaction with colleagues and advisers may make home care a lonely job;
- o Supplies and equipment may not be readily available in the home setting;
- o Documentation requirements are unique in a home care setting, requiring the nurse or caregiver to clearly document the need for each service, or risk losing third-party reimbursement (O'Donnell and Church, 1985);
- o Lack of uniform payment policies reduce the flexibility of transferring personnel from large institutions to smaller units;
- o Difficulty in assuming adequate physician supervision out of the hospital.

#### Dialysis Centers

Dialysis centers are a classic example of the movement of services from a hospital to a non-hospital setting and the effect of reimbursement policy on the use of technology. The dialysis industry is thought to be "mature" and is also characterized by the increasing dominance of investor-owned chains.

In the late 1960s and early 1970s dialysis was an experimental, hospital-based therapy with no third-party financing. In 1972 Medicare benefits were extended to patients with end stage renal disease (ESRD). Because the payment structure allowed for reimbursement in out-of-hospital centers, free-standing dialysis centers were opened. Later home dialysis was allowed; many commentators have noted that Medicare payment practices actually impeded the development of home dialysis. Almost all dialysis centers have been offering home care since 1983 when Medicare began reimbursing home care at the same rate as dialysis center treatment.

Unlike hospital-operated dialysis centers, dialysis chains have grown steadily in the past decade (Richman, 1985). Nine chains treated 29 percent of the nation's hemodialysis patients in 1984, up from 26 percent in 1983. While the number of dialysis patients is expected to grow 5 - 11 percent from 1985-86, dialysis is not a big growth business (Richman, 1985). Reimbursement is considered by the providers to be relatively low and so has held competition in check. The chains are expected to grow by enlarging existing centers or through acquisitions (Richman, 1985).

Pressures to contain rising health care costs are expected to make dialysis centers less profitable and probably more competitive. Centers may increase reuse of supplies or alter patient-staffing ratios. Some centers may replace registered nurses with less expensive technicians where state law permits it. (Ruhe, 1984).

#### Nursing Homes

The growth of the very old, over 85, population and pressures for early hospital discharge have had dramatic effects on the nursing home industry. Reimbursement pressures, particularly Medicaid limits and restrictions on new construction of nursing homes imposed by state certificate of need (CON) programs have also had a significant impact on the industry. Like the home health care and dialysis industries, large proprietary companies are increasing their influence in the marketplace, primarily through the acquisition of smaller chains and individual homes (Punch, 1985).

The nursing home industry is experiencing a severe shortage of beds due not only to CON barriers, but also to construction costs. The number of beds being built declined 9.8 percent between 1983 and 1984, from 2045 to 2007 (Punch, 1985). The bed shortage will continue to stimulate the further growth of the home health market as nursing homes expand to provide additional services such as durable

medical equipment and respiratory therapy to meet outpatient needs (Punch, 1985). Nursing homes, especially the chains, are beginning to develop lifecare centers, retirement centers and other congregate living arrangements in an attempt to diversify their business (Punch, 1985).

At the same time nursing homes are beginning to provide a higher level of care than in the past. Nursing homes will offer more ancillary services such as respiratory therapy and may or may not provide them at lower cost than hospitals. Some nursing homes are establishing sub-acute units which will offer a middle level of care between acute and long-term care. Sub-acute units will give more skilled nursing care than nursing homes offer now. At least one nationally known proprietary chain is increasing the size of its nursing home staff and is training employees to provide higher levels of patient care (Punch, 1984).

Medicare prospective payment has forced a closer relationship between nursing homes and hospitals. Like nursing homes, hospitals are exploring the development of sub-acute units, but unlike nursing homes, as a way of filling excess beds (Punch, 1985). It is generally acknowledged that many nursing homes are not adequately staffed currently to provide more acute services. For nursing homes to admit greater numbers of patients who need these services would require increased staffing ratios, staff training and more sophisticated equipment (Braunstein and Schlenker, 1985). The amount of movement of existing personnel at each occupational level from hospitals to other care settings is unknown.

### Licensure and Standards

While virtually all commentators agree that some degree of standard setting licensure and certification is needed in health care to protect the life and safety of patients, there are continuing controversies over the degree of regulation, what should be regulated and the frequency of licensure and certification review. One of the greatest controversies revolves around licensure and certification of health manpower. By and large, state by state policies govern licensure, private agencies govern accreditation and certification but frequently public programs like Medicare subsume these programs, as a basis for reimbursement services.

Medicare from its inception has had standards of participation for institutional providers of care like hospitals, home health agencies, dialysis centers, extended care facilities and hospitals. However, except for hospitals and dialysis centers, not all institutional providers seek Medicare certification.

#### Manpower

All fifty states license physicians, registered nurses, licensed practical nurses and physical therapists. Some states also license nurse practitioners, social workers, and occupational, speech and respiratory therapists. Homemakers and home health aides are not generally licensed. Dietitians and most therapists are certified by passing a national test sponsored by the particular occupational group (Coleman, 1985).

Frequently the manpower specialty itself seeks certification and licensure to "professionalize" the occupation and set entry barriers to maintain and enhance income and prestige. While there is little disagreement about the need for licensure of certain personnel such as physicians and/or nurses where certain

levels of competence are required to protect the life and safety of individuals, certification and licensure of a number of entry-level allied health occupations are questionable.

### Hospitals and Nursing Homes

Hospitals have had a voluntary accreditation process since the beginning of this century. Medicare incorporated the standards and accreditation process of the Joint Commission on Accreditation of Hospitals (JCAH). While some nursing homes are subject to JCAH accreditation, they are generally certified by states.

### Home Care

Thirty states require home health agency licensure. However, standards vary widely. To qualify as a Medicare provider, agencies must be certified. Certification means the agency must offer at least two services, one of which must be skilled nursing care. Agency staff must meet state requirements for their respective occupations (Coleman, June 1985).

Accreditation of home health agencies is a voluntary process with the following organizations accrediting these agencies:

- o Joint Commission on the Accreditation of Hospitals (reviews number of staff, existence of professional nursing and one therapeutic service);
- o National League for Nursing/American Public Health Association;
- o National Home Caring Council.

### Hospice

As of January 1985, 18 states and the District of Columbia had hospice licensing laws. Hospices which operate as part of a home health agency, long-term care facility or hospital are regulated as part of those institutions. JCAH also has a hospice accreditation program, and the National Hospice Organization has set voluntary standards. Medicare certifies hospice. However,

many hospices don't seek certification primarily because of the Medicare reimbursement policy. This policy limits payment for the service to 210 days. When the days are exceeded Medicare requires the hospice to continue care without payment (Coleman, February 1985). Some private insurance carriers require that hospice meets JCAH or NHO standards, and all carriers require compliance with state and local laws.

#### Manpower for the Five Technologies

Four of the five life-sustaining technologies are not subject to any specific federal or state standards other than those imposed on the agencies providing the services, or on personnel, depending on specific state law. Many of the personnel providing these services are entry-level allied health personnel who are not normally subject to certification or licensure. However, there are standards for end stage renal disease centers, although not for home dialysis.

While there may be standards for manpower occupations that deliver certain technologies frequently, the efficacy of some technologies or procedures has not been adequately assessed. For example, dialysis is a proven life-saving and life-extending technology, but CAPD is still surrounded by some controversy. The widespread availability of dialysis and its profitability may have been a disincentive to increased use of transplantation. Respiratory therapy can improve the quality of life for many patients but has been found to be an overutilized technology with no proven benefits for a large number of patients (Gracey, 1982). There has been no systematic assessment of the efficacy of EN/TPN for different diagnoses.

### Technology Assessment

During the last 40 years remarkable advances in technology have extended life and reduced disability. Changes in technology have occurred so rapidly that many new procedures are introduced and diffused without systematic evaluation of safety, efficacy, appropriate indications for use and social and ethical issues related to use of the technology.

While the United States was theoretically able to finance the use of all of these technologies, patterns of reimbursement and insurance coverage influenced dispersion, but in an ad hoc rather than a planned fashion. Despite the rising costs of care and the efforts of the public and private sectors to constrain these increases, the search for further advances continues. In addition to public interest in ameliorating or curing disease, corporate interests seek innovation and profits; scientists seek solutions to problems (Bayer, 1984).

Recently public awareness has grown that our society cannot afford the use of all technologies by all people. However, unlike England, we have not had policies to restrict technology by factors of age or diagnosis. Our system of financing and delivery of care and the sociopolitical ethos lead to pressures to make technologies available to all once the technology is diffused (Bayer, 1984).

In the late seventies and early eighties public attention began to focus on the risks associated with technology, the factors affecting adoption of technology and the factors affecting its use. Congress, the Medicare program and the newly developed Center for Health Care Technology recognized the need to develop a systematic approach to the evaluation of technology. Medicare is often the pacesetter for other payers on the adoption of technology (Burns, 1984).

Among the factors that influence the adoption of technology are:

- o The complexity of the device or procedure;
- o Characteristics of institutions and practitioners, particularly skill levels;
- o Characteristics of the environment, financing, market conditions, payment policies (Burns, 1984).

In addition, a number of factors influence patterns of use:

- o Training of physicians and their knowledge of specific technologies;
- o Increased specialization of physicians and allied health manpower;
- o Organization of service;
- o Concerns about malpractice;
- o Payment policies of public and private insurance programs;
- o Industry promotion of products;
- o Depth and scope of insurance coverage (Burns, 1984).

Payment policies have been critical in the diffusion and use of technology.

Physician fee payments reward practitioners who are in procedure-oriented specialties and who use sophisticated technology. Charges for a technology are generally established at an early stage of diffusion and remain at those levels or rise even when use is simplified and skill levels increase (Burns, 1984).

The effects of hospital payment methods on technology utilization are changing. Under retrospective cost and charge reimbursement there are incentives to expand technology. Without limits on capital investment, diffusion of technology is rapid. The change to DRG reimbursement provides incentives to adopt cost-saving technologies and may impede the adoption of new technologies that are cost-additive within a DRG. Although DRGs are to be recalibrated every four years, the new system can slow the introduction of technology. Also



important is the method that will be adopted to incorporate capital costs into DRGs (Burns, 1984).

The physician remains the key determinant in the diffusion of technology. However, payment mechanisms and insurance benefits are constraints at least in the short run. The physician influences amount of care, type of care and sites of care (Burns, 1984).

Most diagnostic technologies, with exceptions such as imaging and skilled procedural technologies such as angiography, are available to all physicians. Therapeutic technologies tend to have use rates directly related to the number of medical and surgical specialists in the population (Schroeder, 1984).

Public demand also influences the diffusion and use of technology. Liver transplant is an example of public pressure that changed coverage/reimbursement policies. Demography also influences use rates. Those over 65 require more care. Increased success in prolonging life leads to more opportunities for additional care.

Supply of health manpower also affects technology use since the number of providers can stimulate demand. Unlike other nations, there has been no gate-keeper concept in the United States. Patients who are not members of HMOs can self-refer to specialists and even those within HMOs can seek alternative arrangements. Since consumers rarely have adequate technical knowledge about risks/benefits/costs, they must rely on the recommendations of health professionals. The distribution of health professionals, particularly physicians, between primary care and specialties, and the extensive development of sub-specialties encourages the use of sophisticated technologies, particularly in the absence of rigorous assessment of the value of specified technologies. The reimbursement levels further encourage the selection of sophisticated procedures even where the value in terms of health status may be marginal (Schroeder, 1984).

The United States has unprecedented capacity in both institutional settings, dispersion of technology and skilled manpower that, combined with the incentives and disincentives in health insurance and payment systems, lead to increased use of certain technologies. Changes occurring in hospital patterns of care without concomitant changes in other delivery systems may merely transfer the problems of appropriate use and volume of technology to other settings.

Regarding the five technologies, systematic assessments and analysis of appropriate use have not been undertaken for respiratory therapy, ventilation, TPN/EN, or IV antibiotics. The rapid growth of technology-oriented home health services, the growth of technology-oriented services in nursing homes combined with the short training periods for allied health manpower who deliver these services can only lead to expanded use if payment for these services covers costs and if the individual physicians who order the specified services believe in the value of the technology and/or benefit economically.

#### Conclusion

Projecting manpower needs is difficult for these technologies given the rapid changes in organization and delivery of services, health benefits and reimbursement. Since actual provision of the service is provided by lower skilled personnel who are supervised by, or work in teams, with nurses, physicians, and dietitians, the supply will probably respond to market forces. The issue is not availability of personnel but the efficacy of the technology and the content of training that places emphasis on the special aspects of care for the aging.

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### III. Nutrition Support and the Elderly

#### Introduction

Nutrition support broadly defined is both an old and a new technology. It is controversial in the sense that systematic assessment of the safety, efficacy, and cost effectiveness of different forms of the technology such as enteral and total parenteral nutrition for different clinical diagnoses has not been undertaken. As a technology, nutrition support is characterized by the issues of rapid growth, changes in sites of care, manpower and training requirements, and organization reimbursement policy/incentives and disincentives.

Nutrition support is not one technology. It ranges in complexity from special diets and oral nutritional substances to intravenous and tube feeding requiring a variety of devices and substances. Its administration can involve a range of health professional skills from physicians, pharmacists, nurses and dietitians to aides and lay family members. The services can be provided in homes, nursing homes and hospitals. Projections of manpower needs for this technology depend, of course, on numerous factors related to the efficacy of the technology, use rates, sites of care, payor coverage of the technology in different sites, reimbursement policies, and substitution of manpower who can deliver the technology.

The use of nutrition support services has grown rapidly during the past two decades despite continuing debate within the medical profession concerning its efficacy in many situations. Much of the growth is attributed to improved techniques and equipment which have reduced the incidence of complications,

together with recognition of the extent of malnutrition among hospitalized patients. In a review of surveys of malnutrition among hospitalized patients, Mullen found estimates of between 30 and 50 percent. A 1976 survey showed 50 percent of surgical patients and 44 percent of general medical patients suffering protein-calorie malnutrition (Mullen, 1981). Malnutrition as a condition is not clearly defined, however, nor is any one definition accepted.

The elderly are more prone to degenerative diseases such as cardiovascular and malignant diseases requiring hospitalization and/or surgery than are younger populations. Recent studies show these types of diseases to be among the most prevalent underlying diseases of persons receiving nutritional support (Seltzer et al, 1984; Nehme, 1980; Dalton et al, 1984; McShane and Fox, 1985). As the size of the elderly population continues to increase, the incidence of such diseases can be expected to show an increase. Additionally, nutritionists estimate that malnutrition can be found in 5 to 10 percent of the homebound elderly (Champlin, 1985), making them likely candidates for nutritional support in the event of hospitalization. Since nutritionists have made these estimates, they may be overestimates.

Most of the studies of nutritional support in hospitals have investigated and reported the incidence of complications, or patterns of care, with no indication of the age distribution of the patient population. A 1979 study at Boston University Hospital showed a disproportionate number of patients over 60 receiving nutritional support. Although 30 percent of admissions fell into this age group, 50 percent of those receiving intensive nutritional support were over 60. The most common diagnosis in this study was cancer (Steffee, 1980). In fact, nutritional support services, particularly enteral and parenteral nutrition, were pioneered with cancer patients.

In a more recent study of 1,072 patients given parenteral and/or tube enteral nutrition during 1981 and 1982 at the Saint Barnabas Medical Center, Livingston, New Jersey, it was found that 65 percent were 60 years of age or older (Seltzer, 1984). This group represented 59 percent of patients receiving parenteral nutrition support and 71.5 percent of those receiving tube enteral feeding. Overall, 38 percent of the 1,072 patients studied died while in the hospital: 23 percent of those who died had received parenteral nutrition, and 44 percent had received tube enteral nutrition. The age distribution of patients who died is not given, but the diagnostic categories recording the highest proportion of deaths were cancer (43 percent), cerebrovascular accidents (51 percent), cardiac (69 percent) and respiratory diseases (60 percent), all of which are more prevalent among the elderly (Seltzer, 1984).

Nationwide estimates of the relative percentages of persons receiving parenteral and tube enteral nutrition support do not differ markedly from those found in the Seltzer study. A 1984 survey conducted by C.H. Kline & Company estimated that 6.2 million persons were receiving nutritional support, including oral enteral support. Of the 1.3 million receiving either parenteral or tube enteral nutrition, 556,400, or 41 percent, were receiving parenteral support, while 848,100, or 59 percent, were receiving tube enteral feedings. Ninety-six percent of parenteral support patients were in the hospital, almost 3 percent in nursing homes and almost 1 percent were at home. Similarly, 92 percent of patients receiving tube enteral nutrition were in the hospital, 6 percent in nursing homes, and almost 2 percent were at home (ASPEN, 1985). Comparing these figures to those reported for 1982, the number of persons receiving parenteral nutrition in

hospitals has increased from 200,000, or about 168 percent, in two years. The number receiving either oral or tube enteral support increased during the same period from 2 million, or 173 percent (Grimaldi, 1984). No similar comparative data are available for nursing homes. In 1982, however, it was estimated that 2,712 patients were receiving total parenteral nutrition in the home (Kuntz, 1984) compared to 4,600 in the Kline study. This indicates a growth of 70 percent in one year. Clearly, utilization of nutritional support has been increasing rapidly in the past few years, and available data suggest that much of it is directed towards the elderly population.

### Technology Assessment

#### Nutritional Assessment

Any discussion of the assessment of the technology of nutritional support must also examine the associated technology of nutritional assessment. There is still debate as to which variables need to be measured to determine nutritional status, the extent of testing necessary to determine nutritional deficiencies, and the applicability of available norms to the elderly. This latter factor is of particular importance.

The purpose of nutritional assessment is to determine the nutritional requirements of the patient, not merely to determine current nutritional status. In addition to basal metabolic rate and other measures of energy expenditure, the degree and rate of weight loss must also be ascertained during the initial evaluation since weight losses of 10 percent or more of body mass may also be indicative of caloric or nutrient deficiencies in the diet, and can affect treatment outcomes (MacBurney and Wilmore, 1981).

Based on the results of the nutritional assessment, the physician decides on the need for nutritional support, the modality to be used and the nutrient mix to be administered, in consultation with others on the health team. However, the standards used in making these determinations are not necessarily applicable to the elderly patient, possibly resulting in the use of unnecessary, expensive therapy.

Seltzer et al noted the significance of the high proportion of elderly receiving nutritional support in light of "the ambiguity of nutritional assessment parameters and nutrient requirements in the geriatric patient" (Seltzer et al, 1984). Steffee notes the difficulty in separating out the natural loss of lean body mass associated with aging from that of weight loss associated with the "effects of malnutrition whether secondary to the anorexia of disease or the effects of therapy" (Steffee, 1980). The use of standards developed for children and young adults to assess the nutritional status and requirements of the elderly patient clearly warrants examination, if optimal outcomes are sought for the elderly patient, and inappropriate use of nutritional therapy is to be avoided.

#### Assessment of Efficacy

Nutritional support may be prescribed for patients for a number of reasons. It is a primary therapy for patients with severe, non-malignant intestinal disease or short bowel syndrome, permitting the "repair, restoration, and adaptation of the intestinal tract while supporting the normal growth and metabolism of the patient" (MacBurney and Wilmore, 1981). In other cases, it is adjunctive, serving to "maintain or restore normal nutrition and metabolism so that medical and surgical treatments can continue without the complications that may result from malnutrition" (MacBurney and Wilmore, 1981).

No large prospective, randomized clinical trials to assess the efficacy of parenteral and enteral nutrition had been conducted as of July 1985 (Koretz, 1985). Such studies "are difficult to conduct because of the heterogeneity of the clinical population, multiple disease and treatment variables, and strong impression among clinicians that nutritional support is a valuable form of treatment." The last factor limits the number of patients available for randomized, prospective clinical studies (Mullen, 1981). A 1981 study conducted at the Hospital of the University of Pennsylvania showed that pre-operative nutritional support of at least 7 days reduced the rate of complications and mortality in a group of patients identified as "high risk" according to a prognostic nutritional index. The index had been developed and previously used to predict degree of risk of complications in another group of patients who had received post-operative nutritional support (Mullen, 1981).

Other studies of intravenous feeding of surgical patients have not shown significant differences in patient outcome between those who received nutritional support and those who did not. However, post-operative feeding is advocated to prevent loss of weight and nutritional depletion due to the effects of injury or infection (MacBurney and Wilmore, 1981).

Nutrition support in cancer patients was first recommended by Dudrick as a way to restore body weight, thereby enhancing the patient's sense of well-being, and possibly increase tolerance to chemotherapy, decrease the toxic effects of chemotherapy, and increase tolerance to higher doses of the chemotherapeutic agent (Elliott, 1980). However, the conclusions reached from a set of 11 papers presented during a National Cancer Institute symposium in 1980 were that TPN would do little to improve the nutritional status of

cancer patients who had lost weight because of the nature of their disease. In addition, the studies did not support the suggestion that patients receiving TPN responded more positively to chemotherapy. Investigators also reported a high level of complications from the use of TPN. The studies presented were criticized by others in the medical community who pointed out that they were based on small numbers of patients, were conducted by physicians and other personnel not well-versed in the techniques of parenteral nutrition (thus accounting for the large number of complications reported), and the studies compared multiple types of cancers at different institutions. A spokesman for the Diet, Nutrition and Cancer Program which organized the symposium indicated that these studies represented preliminary investigations in the evaluation process of the role of TPN in the treatment of cancer. It was expected, he added, that future research would show that the use of TPN could be effective in improving the nutritional status of some cancer patients (Elliott, 1980).

Detractors of the results of the studies presented at the symposium indicated that their own research on larger patient populations supported several of Dudrick's original claims (Elliott, 1980). Even with the controversy over the role of nutritional support in the treatment of the cancer patient, cancer continues to be among the leading diagnoses for patients receiving nutritional support in studies reported in the literature.

#### Cost-Effectiveness

The studies discussed represent a risk-benefit approach to technology assessment. The investigators have sought to measure the reduction in morbidity and mortality in patient outcomes attributable to the use of the



technology, implicitly or explicitly weighing such benefits against the attendant risk of morbidity or mortality inherent in the use of the technology itself.

Another important aspect of assessment is the determination of the cost-effectiveness of the technology, i.e., what are the dollar costs of using the technology, including costs associated with morbidity and mortality arising from the technology, versus the value of benefits derived from use of the technology.

Twomey has recently conducted such an analysis for the two nutritional support modalities of parenteral and enteral nutrition. Drawing data from many different sources to estimate costs, and using the findings from two large clinical studies conducted in West Germany and Wales, Twomey estimated that the use of TPN for pre-operative surgical patients could result in savings of \$1,720 per patient. Twomey cautions against using his data to support decisionmaking with respect to the advisability of use of TPN in specific cases. The author notes that a "lack of controlled trials of adequate size to rule in or out clinically important benefits from special support, especially TPN" is a major roadblock to producing reliable estimates of the cost-effectiveness of nutrition support (Twomey, 1985)

#### Manpower and Training Issues

Provision of nutrition support typically requires the cooperation and expertise of four health professions - medicine, nursing, dietetics, and pharmacy. The physician prescribes the particular regimen to be followed; the dietitian works out the appropriate solution mix to meet the assessed nutritional needs of the patient; the pharmacist mixes the solutions, or

selects the appropriate pre-mixed solutions; and the nurse, either an RN or LPN, administers the solution via the selected modality. The success of enteral or parenteral nutrition is dependent on such variables as accurate initial assessment of the patient's nutritional status and needs; the technical expertise of the personnel delivering the care, especially inserting the catheter or feeding tube, and timely recognition and treatment of complications relating to the therapy.

It is not at all clear from a review of the training received by individuals in each of the four health professions, particularly at the undergraduate level, that the highest standards of training and knowledge are available to all patients receiving nutritional support, nor that there is agreement on manpower or training needs. The following sections review the extent of formal or informal nutrition education generally found for personnel in each of the four health professions most closely involved in the provision of nutritional support services, and the usual patterns of care found in the hospital, the nursing home, and the home.

### Medicine

The paucity of curriculum content relating to nutrition in the undergraduate medical schools has been of concern to many health professionals, the American Medical Association and the Federal Government for several decades. Reports of meetings and conferences held during the 1960s and 1970s "document the astonishing lack of adequate nutrition instruction in health professions schools" (Nestle, 1982). Only about 20 percent of the medical schools in 1962 had required nutrition courses (Long, 1982). By the late seventies, this percentage had risen to 27 percent and continued to rise to

37 percent by 1981-82. By 1983-84, however, only 27 percent of the 127 medical schools had required nutrition courses in their curricula. Sixty-six percent of the schools in 1983-84 stated that nutrition was incorporated into other courses, and 64 percent had nutrition courses that could be taken as electives (National Academy of Sciences, 1985).

A review of 192 nutrition-related questions in Parts I and II of the National Board Examinations offered in 1980, 1982, and 1984 failed to identify any test questions on subjects of nutrition and the aged, nutrition and cancer, osteoporosis, or parenteral and enteral nutrition (National Academy of Sciences, 1985).

Several reasons are given for the lack of progress in providing effective nutritional education in medical schools. First, nutrition is a subject that spans several different fields, both within the basic sciences and the clinical sciences. Finding the appropriate place within the undergraduate curriculum to integrate such courses is difficult. While first-year students could certainly grasp the basic science content, introducing the clinical aspects at this point would be premature. On the other hand, third- and fourth-year students are usually on clinical rotations of 4 to 6 weeks, which would entail offering any new course year-round to ensure its availability to all students (Long, 1982).

Second, there is a shortage of faculty with the appropriate background for teaching nutrition. The NAS study found that "successful organization of nutrition teaching in medical schools depends on the leadership of faculty who are committed to nutrition education." In 12 schools surveyed, MDs and PhDs from a variety of clinical and basic sciences shared this responsibility about equally, and the faculty members interviewed felt it was important to have an MD involved to serve as a role model and emphasize the importance of nutrition education (National Academy of Sciences, 1985).

Among other reasons given for difficulty in developing nutrition programs is the lack of financial support from schools for such programs, the part-time nature of the teaching by the faculty who have patient care responsibilities in addition to the teaching load, and the difficulties inherent in attempting to coordinate multidisciplinary teaching with other health professions schools' schedules (Nestle, 1982). These are the same reasons given for absence of other inter-or multidisciplinary courses, such as health economics, bioethics, etc.

With so much evidence as to the lack of nutrition education received by the physician at the undergraduate level, it could be assumed such training is incorporated into residency programs. No national survey of residency programs has been identified to date that analyzes the extent of such training, particularly that which deals directly with the aging, the cancer patient, the surgical patient and others who may have need of enteral or parenteral nutritional support. In fact, there appears to be little effort to provide this training in graduate medical education programs. This may or may not be surprising given the fact that "any physician so desirous can declare himself suitable to oversee a very delicate and costly medical situation," (Seltzer, 1984) that of nutrition support. While it is clear that some nutrition teaching in medical schools does take place during postgraduate training, the effectiveness of such teaching will vary according to the commitment of the training program director at the medical school or hospital who oversees the postgraduate training, and the motivation and interest of the resident (Long, 1982).

Increasing the nutrition content of the undergraduate medical curriculum is considered to be the best way to ensure a lasting impact of the importance of nutrition in clinical practice (Long, 1982).

### Pharmacists

Nutrition is integrated throughout the pharmacy curriculum although it would be unusual to find separate required courses in the first-degree program. Although early pharmacy education in nutrition was related to the importance of vitamins in the diet, current interest focuses on the effects of malnutrition on drug therapy. It is known, for example, that malnutrition can affect the absorption of drugs and thereby, the effectiveness of drug therapy. Additionally, pharmacists are concerned with the unintended side effects of drugs due to malnutrition (personal communication, AACP).

No surveys have been found that examine the role of nutrition education in pharmacy; however, the American Association of Colleges of Pharmacy (AACP) has recently published a new curriculum guide that emphasizes education in pharmaceutical services directed to the geriatric patient. One area specifically noted in the new guide is nutrition (personal communication, AACP).

First-degree pharmacy students are introduced to the concepts of parenteral and enteral nutrition in courses related to the selection and mixing of nutrient solutions. After receiving the pharmacy degree, pharmacists may enter residencies in hospital pharmacy or nutrition that extend their knowledge in this area. Many hospital pharmacists, however, acquire their specialized knowledge of parenteral and enteral nutrition through in-service training or through participation in postgraduate courses and seminars offered through universities or through organizations such as the Association for Parenteral and Enteral Nutrition (ASPEN), (personal communication, Association of Hospital Pharmacists).

### Dietitians

There are two educational paths to training as a Registered Dietitian and for membership in the American Dietetic Association. The first comprises academic course work, with hospital/clinical/community experience interspersed throughout four years. There were 67 such programs in 1984. In the second type of program, the student first obtains a baccalaureate degree in either nutrition, food systems management, or dietetics and then follows one of several routes to obtain the required clinical experience, including internship. Most basic educational programs in dietetics include courses providing information specifically related to the nutritional needs of the elderly (Sims et al, 1984).

However, it is only recently that researchers in nutrition have recognized that findings applicable to young adults were not necessarily applicable to those 65 or older. This research has found that the nutrient requirements of the elderly are different from those of the younger person; that some of the effects of aging, for example on the immune system, mimic the effects of protein-calorie malnutrition (Steinbaugh, 1984).

In view of such findings, the profession of dietetics has been reviewing its curriculum with respect to aging to ascertain how best to communicate and incorporate ongoing research on the nutritional effects of aging into its programs.

### Nursing Nurses

Since the time of Florence Nightingale, the nursing profession has recognized the importance of nutrition in the care of the ill. Originally,

nurses were trained to prepare and serve special meals for the sick. As the profession of dietetics developed, however, many of the meal preparation duties of the nurse were taken over by dietitians, and the focus of nutrition training for nurses turned to the theory and principles of nutrition and diet therapy (Crocker, 1985).

During the decades of the 1950s and 1960s, major changes were introduced in the way nutrition was taught. The concept of an integrated curriculum was introduced, threading nutritional knowledge throughout the training program. Dietitians were often recruited as part-time faculty members to teach nutrition content. During these years, dietitians and nurses recognized that their roles with respect to patient education in dietary matters overlapped, often because the nurse typically spent far more time with the patient. The organization, Nutritionists in Nursing Education (NINE), a clinical practice group within the American Dietetic Association, was formed in 1972 to seek ways to improve inter-professional relationships and to improve nutrition education in nursing schools (Crocker, 1985).

A 1983 survey of baccalaureate nursing schools in the United States found that nutrition was integrated throughout the four year curriculum. About half of the 246 respondent programs had required nutrition courses, averaging about 32 hours of instruction over the four years of training. The programs emphasized nutritional assessment, treatment, and evaluation of therapy. Graduate programs appeared to have lesser commitment to nutrition education, although the author notes that this may be due to a definitional problem associated with the wording of the relevant questions. Although about half of the programs had access to the services of a

nutritional support nurse, few took advantage of the opportunity to use her as a preceptor in their teaching programs (Crocker, 1985).

The certification of subspecialists within all health professions has been a growing trend for several decades. The Association for Parenteral and Enteral Nutrition (ASPEN) has developed a certification program for nurses in parenteral and enteral nutrition (PEN). The first examination was given in June 1985. A certification program for dietitians has also been developed, and negotiations are currently in progress with the Boards of Pharmacy to develop a certification program for pharmacists in PEN.

#### Nutrition Support - Hospital Practice

Advocates of nutritional support believe the most successful patient outcomes will be achieved when the nutrition needs of the patient are totally managed by a team of health professionals including a physician, a pharmacist, a dietitian, and a nurse.

A 1983 survey of 1495 hospitals considered likely to have nutritional support teams (i.e. those with at least three dietitians, four pharmacists, and offering parenteral nutrition including admixture services) revealed that in fact only 521 actually had a nutritional support team (NST). (McShane and Fox, 1985). Although the provision of nutritional support does not require a formal team organization, there is evidence that the availability of a NST can lead to fewer complications, and a more satisfactory outcome.

Nehme, in 1980, reported on a two-year prospective study conducted in 1977-78 at a large city-county hospital. The study compared the complication



rates of two groups of patients - one group that received its total TPN care from members of the NST (Group A) and another within the same hospital whose care was managed by the patients' respective physicians. In addition to the regular members of the NST, surgical housestaff rotated on the team for a month as part of their training.

Patients in Group A received a complete nutritional assessment. TPN was only instituted for patients whose gastrointestinal tract was nonfunctional or who required a large calorie-protein supply. Strict standard techniques were followed for administration of TPN, and all catheters were inserted by NST physicians, again following strict guidelines to maintain sterility during the procedures. All the guidelines followed by the NST were available to other physicians within the hospital.

Patients not treated by the NST did not receive a complete nutritional assessment, and the decision to administer TPN was based on very general factors relating to the patient's general condition, ability to eat and body weight. Catheters were placed by various physicians with varying degrees of skill, who did not adhere to any one set of guidelines. Where a chest roentgenogram was obtained for all Group A patients within one hour of catheter placement, in 11 Group B patients there was no evidence of such a procedure having occurred, and in the remainder chest roentgenograms were obtained from one hour to three days after catheter placement. Care of dressings for Group A patients followed a very strict protocol, care for Group B patients followed the general IV therapy guidelines of the hospital, or depended on the instructions of the individual physicians or staff nurses.

Comparisons between the groups of incidence of catheter insertion complications showed an overall 3.7 percent rate for Group A versus a 33.5 percent rate for Group B. Similar differences were found in the rates of catheter sepsis, thrombosis, and metabolic complications. The authors attribute the differences to "poor technique" on the part of non-team physicians in inserting catheters, and the lack of strict protocol for care and monitoring patients for complications (Nehme, 1980).

Other studies have reported a reduction in catheter-related sepsis through adherence to strict infection control protocols. In response to these findings, many institutions have developed multi-disciplinary TPN teams to take primary responsibility for administration of TPN therapy (Dalton et al, 1984).

The development of consultative TPN teams has been an alternative approach to the team concept in management of TPN patients which allows the utilization of existing manpower and financial resources. In 1979, the Ann Arbor Veterans Administration Medical Center established a consultative TPN team which included a physician, several pharmacists, a nurse and a dietitian. In a two-part prospective study they compared the rate of complications among three groups of patients -- those whose primary physician provided the care, utilizing the TPN team on a consultant basis only; those whose primary physician worked closely with the TPN team in a joint capacity; and patients at another institution where the TPN team took total responsibility for management of the patients' care. The study showed that increased involvement of the consultative TPN team significantly improved several aspects

of TPN care, especially patient monitoring. However, the rate of complications was still considered to be excessive when compared to patients whose care was totally managed by a TPN team at another institution (Dalton et al).

The findings from these two studies indicate inadequate training of the primary physicians in the necessary procedures of catheter insertion and follow-up care. The 1983 survey of hospitals with nutritional support teams indicates that a minimum of 900 hospitals offering parenteral nutrition services do not have nutritional support teams as such. This poses the question of the quality of such care being offered to patients in those hospitals, and others with smaller numbers of health professionals that would not have been included in the Directory of Nutrition Support Teams.

#### Patterns of Nutritional Support Team Care

Of the 246 respondents to the 1983 survey (McShane and Fox, 1985), 51.4 percent were nutritional support teams in 200 to 500-bed private, non-profit hospitals. Another 35 percent were in 500 to 1,000-bed hospitals. Ninety-five percent of the teams were established after 1975, and 60 percent were set up after 1980, documenting the increased interest in clinical nutrition during the period. Respondents noted that increased awareness of hospital malnutrition was a motivating factor in the establishment of the teams.

The team physician was reported as the team leader by 61 percent of the NSTs. Team physicians were most likely to be surgeons, followed by gastroenterologists. Thirteen percent of respondents classified team physicians as specialists in clinical nutrition.

Over 90 percent of the respondents indicated that their teams included at least one member from each of the professions of dietetics, pharmacy, nursing and medicine. Other members of the teams included medical, surgical, and pharmacy residents and fellows, home care directors, physicians' assistants, Ph.D. nutritionists, clinical RN specialists, and LPNs.

The review of educational backgrounds of the team members provides insight into the source of training of health professionals in this field. Fifty-two percent of the nurse team members held B.S. degrees, of which 75 percent were in nursing. Seventeen percent held master's degrees of which 7 percent were in nutrition. A hospital medical/surgical background was noted for 71 percent of the nurses, although many indicated previous experience on such specialty teams as intensive care, infection control or IV therapy.

Almost all team dietitians were Registered Dietitians. In 66 percent of cases, team dietitians held a baccalaureate degree, followed by a general clinical internship; 35 percent of team dietitians held an M.S. degree, the majority in nutrition. The majority of dietitians had begun NST following general clinical practice.

Among team pharmacists, 41.5 percent had a graduate degree. Subject majors mentioned included hospital pharmacy, nutrition support and business. Only 4.5 percent of pharmacists indicated training in a pharmacy residency specific to nutrition (McShane and Fox, 1985).

About 39 percent of the NST reported supervising home TPN/EN. The majority of respondents - 61 percent - reported a negative attitude towards

the team from attending physicians, either because they were not convinced of the team's value, or because they felt the team was duplicating services they already provided.

One finding from this study, noted by the authors as an indication of genuine teamwork, but perhaps of more importance because of the patterns of care in nursing homes and the home, is the fact that some non-physician members of the NST had limited authority to write orders. (McShane and Fox, 1985)

An earlier study describes a situation where a pharmacist acted as team leader in a 635-bed private, nonteaching hospital. The pharmacist in this case, in response to a request from the attending physician, reviewed the patient's chart, conducted a physical assessment, and ordered lab tests. According to the results of these procedures the pharmacist wrote the assessment on the patient's chart, together with the goals for therapy. He then wrote all TPN orders, which were co-signed by the physician within 24 hours. The pharmacist conducted rounds with other TPN members who included a staff pharmacist, a pharmacy resident, IV therapy nurse, floor nurse and therapeutic dietitian. The authors of this study note that the typical physician member of the hospital staff was one who had been in practice for more than 20 years, and who was unlikely to have received any formal training in TPN. With the introduction of this new clinical service, physicians who may have been reluctant to use TPN in the past because of their lack of knowledge had come to rely on the pharmacist for his expertise in this area. The number of patients receiving TPN therapy at the hospital increased from 6 in 1976 to 54 in 1978 (Greenlaw, 1979).

The foregoing studies suggest that:

- o The presence of a nutritional support team in a hospital can reduce the number of complications associated with TPN, especially if the team is given total patient management responsibility;
- o In the absence of a NST, adherence to strict protocols in all areas of TPN can significantly reduce associated complications;
- o Many physicians do not have adequate training in the techniques and procedures necessary to ensure optimum outcomes with TPN therapy;
- o Many physicians may be reluctant to institute TPN because of their own lack of knowledge, or because of their lack of conviction of the efficacy of the treatment.
- o The existence of an NST can generate new demand for the service.

#### Nutrition Support in the Home

Most of the literature concerning home nutrition support relates to parenteral nutrition, and this emphasis is reflected in the following discussion.

In 1970, Scribner et al described the use of an "artificial gut" system to provide "long-term total parenteral nutrition...in patients unable to take enteric nourishment." During the following ten years, the new system suffered some setbacks, but eventually many of the technical problems, especially those associated with catheter insertion, were overcome, and a portable infusion system was devised which greatly enhanced patient mobility, and therefore, quality of life (Scribner and Cole, 1979).

Central to the success of these discoveries was the ability of the patient to participate in his or her own care. Most patients on HPN either prepare the solutions themselves, or obtain pre-mixed solutions through a pharmacy. A 1980 survey of 51 hospitals with HPN programs showed that in 25 percent of programs the solution was prepared at home by the patient or family member,

and in 57 percent of cases, the hospital pharmacy provided the parenteral solutions. A few programs had both types of patients in their programs. The majority of programs were located in large (greater than 400 beds) university-affiliated, teaching hospitals, and had been in existence an average of three years. Although 34 of the hospitals had two or fewer HPN patients, the remaining 17 hospitals accounted for about 150 patients or an average of about 9 patients each. Patient education and training were conducted most often by the pharmacist, the TPN nurse, and the physician. For the most part the teaching was informal and included such educational aids as patient instruction manuals, slides, and other audio-visual materials. Patient monitoring was usually conducted on an outpatient basis by the physician (usually a surgeon), the pharmacist and other members of a nutritional support team (Karnack et al, 1981).

Other descriptions in the literature of individual HPN programs confirm this pattern of patient education and monitoring (Grundfest, 1980; Ivey et al, 1985). In some programs, dietitians play a greater role in the training of the patient (Bloch, 1977).

In recent years, home care agencies have been moving into the field of home parenteral nutrition. This trend has provoked concern within the medical community relating to the quality of care that will be provided. When nutritional support is provided through a home health agency, agency employees, such as clinical nurse specialists, are responsible for monitoring patients and responding to clinical emergencies. There is concern regarding the possible lack of physician supervision of the patient care rendered, or inaccessibility of the physician in the case of an emergency requiring immediate attention. In

the latter situation, the concern is that the home care nurse might be required or tempted to make clinical judgments for which, in the opinion of some physicians, she is not trained. This could prove to be a particular problem where patients are located away from urban centers (Copeland, 1985).

Other concerns relate to the motivations of the home care industry, and its need to balance the provision of quality patient care against its desire to make a profit. One example is cited of patients being accepted for care even though they had received no training in use of the infusion pump or in catheter care, and of other patients who almost failed to receive their solutions because of company financial problems (Rosenkranz, 1985).

High technology home therapy, including parenteral nutrition, is one of the fastest growing segments of the industry. However, many organizations are seeking to collaborate with hospitals in developing such programs because of the relatively small number of patients, the complexity of the programs, and uncertainties related to reimbursement. This trend may help to alleviate the fears of increased complications and lack of supervision by the requisite health personnel.

#### Nursing Homes

According to the C.H. Kline and Company survey, there were 69,000 people receiving either parenteral or enteral nutrition support in nursing homes in 1984. Of these, 15,600 or 22.6 percent were receiving parenteral support, a much larger percentage than had been previously believed to be the case (ASPEN, 1985). In the nursing home, most of the daily care is given by either a Licensed Practical Nurse (LPN) or a nursing assistant, under the supervision of a Registered Nurse (RN). The RN is charged with the responsibility of



instructing the LPN in the procedures for providing parenteral and enteral nutrition. The RN has the responsibility to "hang the prescribed parenteral nutrition support, to make clinical adjustments in the rate of flow, and to verify and make clinical judgments based upon reported observations of the patient" (Kittelberger et al, 1984). The RN may delegate to the LPN responsibility for monitoring delivery of the solution to the patient, and for checking the infusion site and adjacent areas. With enteral nutrition, the RN inserts the nasogastric tube, but may "delegate the actual administration of the feeding to the LPN." The nursing assistant may not take part in the actual feeding procedures. The RN is expected to make "clinical judgments and decisions" based on the observations of the LPN or the nursing assistant.

It is not clear who performs the initial nutritional assessment in the nursing home. It is suggested that this be performed by the in-house dietitian (Kittelberger et al, 1984). However, many nursing homes do not employ their own dietitians, utilizing their services on a consultative basis only. In such cases, the nutritional assessment "may become the responsibility of other trained health care professionals" (Kittelberger et al, 1984), presumably the RN, in the absence of a staff physician.

The number of people receiving parenteral and enteral nutrition in nursing homes is expected to continue to increase as hospitals begin to respond to the full impact of prospective payment reimbursement. As a result, several large nursing home chains are developing "sub-acute" care beds to provide services for patients who require a higher intensity of nursing care than is now generally available. In anticipation of increased demand for such beds, larger nursing staffs are being hired, and the level of training of current personnel is being upgraded to provide the necessary level of care (Punch, 1984).

On the other side of the coin, hospitals are beginning to designate some of their beds as "subacute" care beds to provide this level of care to patients not requiring full, inpatient levels of care. Additionally, hospitals are contracting with nursing homes to hold places for their patients to ensure they can be discharged to the less expensive mode of care at the appropriate time, thus shortening length of stay in the hospital while preserving a higher level of care than discharge to home might bring (Braunstein, 1985).

Based on available research and literature, it would appear that as the setting shifts from the hospital to other sites, the level of involvement of the four relevant health professions changes. In the hospital, the professions work as a team--even where not formally organized as such--each sharing the responsibility for care of the patient. In the home, the patient or near relative takes most of the daily responsibility for care, monitored by the visiting nurse and distantly supervised by a physician. After the patient is discharged from the hospital, the dietitian virtually drops out of the picture, and the pharmacist becomes mostly a supplier of nutrient solutions. In the nursing home, based on studies of nursing home staffing patterns, the most likely provider of daily care is the LPN, supervised by an RN, who appears to have broad latitude in making clinical decisions.

### Reimbursement Changes-Impact on Delivery of Nutrition Support

As noted in Section II of this report, reimbursement changes strongly influence the use and sites of health care services. Changes in Medicare, which covers most of the over-65 population and which pays for over one-third of all hospital care in the nation, strongly influence the policies of other third-party payers, and have the power to affect the use of technologies not only for the elderly but for all hospitalized patients (Burns, 1984).

Prior to the implementation of the prospective payment system based on diagnosis-related groups, nutritional support was included in hospital charges, much as housekeeping and dietary services are, and all costs were reimbursed on a retrospective cost basis. It has been observed that this situation may have led to inappropriate use of the technology, especially in the case of the "truly aged and infirm" who have little prospect for recovery, marginal quality of life, and for whom the instituting of nutritional support represents mostly a prolonging of the act of dying (Kaminski, 1984).

With the changeover to DRG reimbursement, hospitals are exploring ways in which to trim lengths of stay in order to stay within the reimbursement parameters for each of the DRGs. Nutritional support is already included within DRGs for specific diagnoses; only in a very few cases, where malnutrition is the primary diagnosis, is it reimbursed separately.

Proponents of nutritional support believe that it can reduce lengths of stay by reducing the number of complications of treatment to which the malnourished patient is particularly prone, thereby reducing days of hospitalization and additional costs to treat the complications. It is estimated that in the United States, infectious complications cost about \$2,000 per incident, whereas major complications may reach as high as \$50,000 (Nathanson, 1984).

Opponents point out that the use of parenteral nutrition itself causes complications in 5 to 10 percent of patients who receive it, and that the majority of prospective studies that have been undertaken do not show any evidence to support the thesis that parenteral nutrition lowers length of stay, morbidity, or mortality (Nathanson, 1984).

There is concern that hospitals will begin to "scrutinize the very sick patients who are being kept alive by parenteral nutrition. Hospitals could reduce length of stay by removing the tubes and letting the patients die" (Nathanson, 1984), although potential litigation may act as a barrier to this actually occurring.

Advocates of the nutritional support team concept state that such a team reduces hospital costs for nutritional therapy by preventing many of the complications resulting from parenteral nutrition, and by monitoring the patient's nutritional support requirements closely to ensure that he or she is moved to less costly enteral therapy, if possible, or arranging for home care where feasible (Nathanson, 1984).

The literature indicates that hospitals are reacting to DRG reimbursement by sending patients home earlier, sometimes in "weaker and more serious conditions" (Krup, 1985; Fackelmann, 1985; Punch, 1984). This appears to be borne out by the dramatic growth in the number of patients in nursing homes and at home who are receiving parenteral nutrition support. However, once the patient leaves the hospital, reimbursement policies change, and it is these changes that affect the types of health personnel who will be involved in the non-hospital patient care.

In the hospital, pharmacist and dietitian services are included in the hospital charges to the patient, which facilitates the inclusion of such health personnel on the nutritional support team. In the home, Medicare only reimburses for skilled nursing services provided either by an RN or an LPN, and on a fee-for-service basis for the physician. Although some home care agencies may employ a dietitian and absorb the costs themselves, this does not appear to be an industry-wide policy (American Dietetic Association, 1985). There is no reimbursement for the services of a pharmacist, or even for the costly nutrient solutions. Thus, the lack of reimbursement for dietiticians and pharmacists is of concern to advocates of the team approach to nutritional therapy, who consider that all four health professions need to be involved to ensure proper monitoring of care, and prevention of complications. The lack of reimbursement for the nutrient solutions is an additional disincentive.

In the nursing home, the level of Medicare reimbursement serves as a disincentive to provide high-technology services. As hospitals feel pressure to discharge patients to non-acute care settings and transfer patients requiring nutritional support to skilled nursing facilities (SNF), the probability increases that patients will not meet the criteria for Medicare payment and will spend down into Medicaid eligibility. Often Medicaid payment is too low to cover the care of patients requiring support technologies such as TPN (Champlin, 1985). In addition, many nursing homes do not have adequate staffing or equipment to care for "subacute" patients, although at least one nursing home care organization is reported to be increasing the size of its staff and upgrading the level of training to meet the expected increase in demand for high-technology services (Punch, 1984).

Clearly, as reimbursement changes put pressure on the hospitals to move patients out of the hospital to nursing homes or discharge them to home, the brunt of the responsibility for provision of high-technology care in these settings is placed on the shoulders of the nursing profession. While some observers view this trend with concern, others believe that the time has come for physicians to recognize this de facto expansion of responsibilities of the nursing profession, and to "strengthen the role of nurses as primary providers, with physicians in consultative roles" (Mechanic, 1984).

### Conclusion

The impact of changes in the way hospitals are reimbursed on the provision of nutritional support services is documented in Section II of this report. Of primary importance is the movement of patients from the relatively high intensity of care in the hospital to nursing homes or to their homes.

Nutritional support, whether expensive parenteral therapy or the relatively less expensive tube enteral therapy, carries with it the risk of major complications requiring timely recognition and treatment. The benefits of the therapy are not clearly documented, and are still subject to considerable debate within the medical community.

Assessment of candidates for nutritional support is also subject to controversy, particularly since current standards against which to measure nutritional status are not necessarily applicable to the elderly population to whom much of nutritional therapy is directed.

Since nutritional therapy is initially prescribed by the physician, it is imperative that more attention be given to assure that the education and training of the physician allows him/her to make an informed judgment as to the need for and the efficacy of nutritional support. As more patients are moved out of the hospital, and receive much of their daily care away from the immediate supervision of a physician medical staff, it may be that the scope of practice and responsibility for clinical decisions by the nurse should be reviewed and perhaps expanded to permit the making of such decisions. Concomitant education and continuing education might be required. The current role of LPNs and aides also raises concern as to their training and ability to recognize complications and seek appropriate assistance.

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## Appendix I

## List of Professional Associations

Dietitians/Nutritional Support Professionals

## American Dietetic Association (ADA)

430 N. Michigan Ave.

Chicago, IL 60611

312-280-5000

James L. Breeling, Exec. Dir.

Members: 45,000

Dietetic practice group: Dietitians in Critical Care  
713-626-5059

## American Society for Parenteral and Enteral Nutrition (ASPEN)

8605 Cameron St., Suite 500

Silver Spring, MD 20910

301-587-6315

Barney Sellers, Exec. Dir.

Members: 3,500

Includes physicians, dietitians, pharmacists, nurses, social workers

Emergency Medical Technicians

## National Association of Emergency Medical Technicians (NAEMT)

P.O. Box 627

102 W. Centennial

Boulder, MT 59632

614-261-4428

John Sigafoos, Pres.

Members: 20,000

## National Registry of Emergency Medical Technicians (NREMT)

P.O. Box 29233

Columbus, OH 43229

614-888-4484

Rocco V. Morando, Exec. Dir.

Members: 200,000

Nurses

## American Nurses' Association (ANA)

2420 Pershing Road

Kansas City, MO 64108

816-474-5720

Judith A. Yates, R.N., Exec. Dir.

Members: 180,000

## National IV Therapy Association

Cambridge, MA

617-576-1282

Nurses (continued)

## National League for Nursing (NLN)

Ten Columbus Circle

New York, NY 10019

212-582-1022

Margaret E. Walsh, CAE, Exec.Dir.-Sec.

Members: 17,800

Nationally accredits nursing education programs

## American Association of Critical Care Nurses (AACCN)

One Civic Plaza

Newport Beach, CA 92660

714-644-9310

Edward A. Shaw, Ph.D., Exec. Dir.

Members: 44,000

## American Association of Nephrology Nurses and Technicians (AANNT)

Box 56, North Woodbury Rd.

Pitman, NJ 08071

609-589-2187

Dawn T. Brennan, R.N., Pres.

Members: 5,129

## American Association of Nurse Anesthetists (AANA)

216 W. Higgins Rd.

Park Ridge, IL 60068

312-692-7050

Nancy A. Fevold, Exec. Dir.

Members: 22,000

## Emergency Department Nurses Association (EDNA)

666 N. Lake Shore Dr.

Chicago, IL 60611

312-649-0297

Torry Mark Sansone, Exec. Dir.

Members: 12,000

Pharmacists

## American Pharmaceutical Association (APhA)

2215 Constitution Avenue, N.W.

Washington, D.C. 20037

202-628-4410

Dr. William S. Apple, Pres.

Members: 56,000

## National Association of Boards of Pharmacy (NABP)

One E. Wacker Drive, Suite 2210

Chicago, IL 60601

312-467-6220

Fred T. Mahaffey, Exec. Dir.

Members: 57

Boards of pharmacy of 50 states

Pharmacists (continued)

American Society of Consultant Pharmacists (ASCP)  
 2300 Ninth St. S., Suite 503  
 Arlington, VA 22204  
 703-920-8492  
 R. Timothy Webster, Exec. Dir.  
 Members: 1,700  
 Concerned with nursing homes and long-term-care facilities

American Society of Hospital Pharmacists (ASHP)  
 4630 Montgomery Ave.  
 Bethesda, MD 20814  
 301-657-3000  
 Joseph A. Oddis, Exec. V.P.  
 Members: 21,000  
 Pharmacists employed by hospitals and related institutions

Association of Practitioners in Infection Control (APIC)  
 23341 N. Milwaukee Ave.  
 Half Day, IL 60069  
 312-634-1403  
 Members: 5,800  
 Includes physicians, microbiologists, epidemiologists, pharmacists,  
 medical technicians and sanitarians

Physicians

American Medical Association (AMA)  
 535 N. Dearborn St.  
 Chicago, IL 60610  
 312-751-6000  
 James H. Sammons, M.D., Exec. V.P.  
 Members: 241,700

American Society of Anesthesiologists (ASA)  
 515 Busse Highway  
 Park Ridge, IL 60068  
 312-825-5586  
 John W. Andes, Exec. Sec.  
 Members: 18,500  
 Separate section: American College of  
 Anesthesiologists

American Board of Anesthesiologists  
 100 Constitution Plaza  
 Hartford, CT 06103  
 203-522-9857  
 Members: 12  
 Certification board

American College of Emergency  
 Physicians (ACEP)  
 P.O. Box 61911  
 Dallas, TX 75261  
 214-659-0911  
 Dr. Colin C. Rorrie, Jr., Exec. Dir.  
 Members: 10,900

American Board of Emergency Medicine  
 1305 Abbott Road, Suite 101  
 East Lansing, MI 48823  
 517-332-4800  
 Members: 6  
 Certification board

Physicians (continued)

American Academy of Family  
Physicians (AAFP)  
1740 W. 92nd St.  
Kansas City, MO 64114  
816-333-9700  
Roger Tusken, Exec. V.P.  
Members: 50,000

American Board of Family Practice  
2228 Young Drive  
Lexington, KY 40505  
Members: 19  
Certification board

American College of Physicians (Internal  
Medicine) (ACP)  
4200 Pine St.  
Philadelphia, PA 19104  
215-243-1200  
Robert H. Moser, Exec. V.P.  
Members: 57,000

American Board of Internal Medicine (ABIM)  
3624 Market St.  
Philadelphia, PA 19104  
215-243-1500  
John A. Benson, Jr., M.D., Pres.  
Members: 40  
Certification board for specialists in  
internal medicine including cardiovascular  
disease, medical oncology, nephrology,  
pulmonary disease and other subspecialties

American College of Surgeons (ACS)  
55 E. Erie St.  
Chicago, IL 60611  
312-664-4050  
C. Rollins Hanlon, M.D., Dir.  
Fellows: 46,000

American Board of Surgery (ABS)  
1617 John F. Kennedy Blvd.  
Philadelphia, PA 19103  
215-568-4000  
Members: 44  
Certification board

American Board of Thoracic Surgery  
14640 East Seven Mile Road  
Detroit, MI 48205  
Members: 14  
Certification board

Respiratory Therapists/Technicians

American Association for Respiratory Therapy (AART)  
1720 Regal Row  
Dallas, TX 75235  
214-630-3540  
Sam P. Giordano, R.R.T., Exec. Dir.  
Members: 20,700

National Board for Respiratory Therapy (NBRT)  
11015 W. 75th Terrace  
Shawnee Mission, KS 66214  
913-268-4050  
Steven K. Bryant, Exec. Dir.  
Members: 46,000

Offers credentialing examinations for respiratory therapists and technicians

Respiratory Therapists/Technicians (continued)

Joint Review Committee for Respiratory Therapy Education (JRCRTE)

1700 W. Euless Blvd., Suite 200

Euless, TX 76039

817-283-2835

Philip A. VonDerHeydt, Exec. Dir.

Members: 13

Develops standards for accredited education programs