A Productivity Analysis of the Clinical Dietitian as a Health Care Team Member in the Service Sector

by

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INTRODUCTION

In the United States today, the service sector has replaced the manufacturing sector as the dominant economic force, employing 69.6% of the work force and contributing 58% of the Gross National Product (Statistical Abstracts of the U.S., 1986). No longer are goods producing industries exhibiting the controlling force in our economy. Employment by industry for 1984 is presented in Table I.

Three major economic trends in the service sector have had a major impact on our present economic conditions (Sasser, 1978). They are:

* a rapid growth of expenditures for services
* a potential for and growth of employment in the service sector
* a pronounced lack of productivity growth in the service sector

Rapid Growth of Expenditures for Services

The public is spending a larger share of their disposable income for services than ever before. These services encompass a wide array, from fixing flat tires to arranging vacations, from locating the ideal employee to selecting a perfect gift for a loved one, from dental to

TABLE I

Employment By Industry

for 1984

	Workforce 1984 *	Percent
Goods Producing Industry		
Agriculture, Forestry, Fisheries	3,321	3.2
Mining	957	.9
Construction	6,665	6.3
Manufacturing	20,995	19.9
Subtotal	31,938	30.4
Service Sector		
Financial Services	13,502	12.9
Public Utilities, Communication, and Transportation	7,358	7.0
Wholesale/Retail Trade	21,979	20.9
Business Services	3,629	3.5
Automotive Services	1,186	1.1
Health Care	7,934	7.6
Education	7,554	7.2
Social Services	1,595	1.5
Hotel/Motel	1,347	1.3
Private Households	1,243	1.1
Entertainment and Recreation	1,260	1.2
Public Administration	4,766	4.5
Subtotal	73,352	69.6
Total	105,005	100

* In thousands of civilian persons 16 years and over.

hospital care.

Prices for services have escalated, from 1970 to 1975 prices increased 6.5%, from 1975 to 1980 10.2%, and from 1980 to 1983 8.5% (Statistical Abstracts of U.S., 1985). These changes have been attributed to the changes in sociocultural patterns in U.S. living and to inflated prices. More women are working outside the home than ever before, which creates the demand for a wide range of services. There is also a trend toward more frequent vacations, which accounts for larger spending for travel and recreational activities. An increased population shift to the suburbs has forced governments to increase spending for services such as highways, mass transit systems, and additional parks and schools.

Increase in Employment

Employment in the service sector has grown dramatically. Eight million people were hired in the sector from 1960 to 1975 or a 64% increase, and from 1975 to 1983 five million people were hired or a 73% increase (U.S. Statistical Abstracts, 1985). Nine out of every ten jobs created from 1967 to 1972 were service related (U.S.NEWS, 1972). The largest increase was in medical services with 9.2% annually. This has been attributed to the availability of Medicare, Medicaid, and private insurance. From 1970 to 1981, the

federal expenditure for Medicare increased 600%, Medicaid 500%, and all national health expenditures other than federal spending increased 300% (Haschke, 1983; Statistical Abstracts of the U.S., 1985).

The service industry is highly dependent upon labor for service delivery. The aforementioned increase in employment has had a direct effect on the price of services. Wages increased 40% between 1967 and 1972 in the service sector, but continue to lag behind their counterparts in manufacturing. In 1983 the average manufacturing wage was $22,170 and the average service wage was $17,220 (Statistical Abstracts of the U.S. 1986). Even though the service sector employs approximately 69.6% of the labor force, the percentage of total U.S. income attributed to services was approximately 14.5%, compared to 24.1% for manufacturing in 1981 (Statistical Abstracts of the U.S., 1986). As a result, there has been a clamor for increased wages in this sector resulting in higher prices for services.

Lack of Productivity Growth

Statistics published by the Bureau of Labor Statistics for 16 service industries show a decrease in productivity from 1973 to 1980 for 15 of the 16 industries studied (Mark, 1982). Hotels had a decrease of (0.5%), restaurants (2.1%),

retail food stores (3.4%), and air transportation (1%). The single increase (3%) was reported for telephone communications. Only recently has the study of insurance and hospital industries been initiated by the bureau.

Health Care as a Component of the Service Industry

The health care industry ranks fourth in the service sector as an employer, hiring 7.1% of the workforce. Health care, education, and restaurants contribute 14% of the GNP. Health care is a major contributor to this 14%. Health care operations are a vital part of our society, providing medical, dental, nursing and nutritional care. The impact of the economic trends of the service industry on the health care sector have been dramatic. Employment has increased 9.2% annually since 1960. From 1970 to 1981 the expenditure for Medicare and Medicaid was 3 times that of the increase of the Consumer Price Index (CPI). Between 1970 and 1983, the CPI increased at an average rate of 4.5%, while physicans' fees increased at an average annual rate of 11.3%, and hospital charges at 12.4%. In 1982 the increase in health expenditures was 15.4% (Haschke, 1983; Statistical Abstracts of the U.S., 1982.). In 1984 the increase in the cost of hospital care was 6.1% (Business Week, May 1986).

The rampant increase in health care costs has been attributed to:

The availability of money from Medicare and Medicaid Of the total $254,973 million spent on personal health care in 1981, 67.9% was paid by Medicare, Medicaid and private insurance. This accounts for approximately 36% of hospitals' operating revenue (Richards, 1983).

The increase in demand for services

The labor intensity of service industries

Service sector employees demanding salaries comparable to their manufacturing counterparts

Lack of cost control incentives in the retrospective cost-based systems

As a result, the federal government in October 1984 began the first phase of prospective payment to hospitals based on specified rates according to 470 Diagnostic Related Groups (DRG's). This program will be implemented over a four year period and presently applies only to medicare patients. No longer can hospitals be paid for providing services at excessive costs that cannot be justified. Each hospital will be paid on the basis of fixed rates depending on the DRG and case mix index determined for each hospital. This will force administrators to become cost conscious in order to provide the necessary services under the cost structure for reimbursement. Hospitals providing services at less than this designated rate will be eligible to retain a part of the difference of the fee. It is expected that these regulations will soon be enacted for Medicare and Medicaid paid to skilled nursing facilities, home health care and physicans

(Legislation, A.D.A. Courier, 1984). Private insurance agencies are expecting a shift of payment to reach $7.9 billion in 1983. More claims are expected to be processed for insurance money to pay health care costs than ever before. It is expected that insurance companies may adopt a similar payment plan.

The effect of these changes in health care costs will be felt in a variety of ways. Many companies have begun to shop locally for the lowest price for medical care, causing price wars among health care providers. Large companies have begun to hire Health Maintenance Organizations (HMO's) to contract with hospitals and physicans for fixed costs for the medical care of their employees. Other companies are building medical complexes and hiring medical staffs to care for the medical needs of their employees (Business Week, October 1984). It is predicted that more than 1,000 hospitals will be forced to close and others will be taken over by corporations. (American Dietetic Association, 1984). Consumers will become very cost conscious and an increase of alternative delivery systems will develop. This will further increase the pressure on hospitals to become cost conscious. Because of the labor intensity within the health care division of the service sector, labor will become a vital area for cost containment. Priority will be given to the study of

productivity of employees in order to justify the positions and attributing costs.

The Dietitian as a Health Care Professional in the Service Industry

As of May 1984 there were 40,928 Registered Dietitians in the United States (Study Commission on Dietetics, 1984). This figure is double that recorded in 1971. The majority of these are employed in the health care industry. They account for approximately 8% of those employed as health care professionals (Statistical Abstracts of the U.S., 1984).

The value of nutrition for the hospitalized patient has been well documented (Butterworth and Blackburn, 1975; Jackbson, 1975; Weisner and Butterworth, 1979). These researchers have emphasized the need for appropriate nutritional support during periods of hospitalization and recovery from illness. The dietitian has long been identified as the 'nutrition expert'. Wilder emphasized this point in a key note address at the first American Dietetic Association Convention in 1925 (Study Commission on Dietetics, 1984). The dietitian is recognized as a vital member of the health care team serving on cardiac rehabilitation, renal dialysis, hyperalimentation, oncology, diabetic and weight control teams in major hospitals (Barnes, 1979; Easton, 1979; Groziak and Kaud, 1983; Kahn,

1983; Krehl, 1969; Ponder and Slyke, 1979). They provide such services as nutritional assessment evaluation and recomendation for nutritional support and nutrition counseling.

Impact of DRG's on the Dietitian

Even though the value of the dietitian is well documented, dietitians are subject to the cost pressures being felt by our health care industry, a result of the new prospective payment system adopted by Medicare. Traditionally fees for nutrition services have not been distinguished from fees for meals. Of the 10 most common among the 470 DRG's, six are nutrition related (American Dietetic Association, 1983). Table 2 identifies these six. Because the dietitian is in contact with a high percentage of the DRG related cases and Medicare contributes 36% of the hospital's income, efforts are being made to determine the nutrition related medical costs separate from meal costs (American Dietetic Association, 1984).

Productivity Measurement

One way of looking at nutrition related medical costs is to measure the productivity of the health care team, which includes the clinical dietitian. Productivity has been defined as the measure of the relationship between the

TABLE 2

Nutrition Related DRG's

of the Top Ten Most Used DRG's

DRG	Definition
DRG 127	Heart failure plus shock
DRG 182	Esophagitis, gastroenteritis plus miscellaneous digestive disease, patient older than 69, and/or complicating condition
DRG 132	Atherosclerosis, older than age 69, and/or complicating condition
DRG 88	Chronic obstructive pulmonary disease
DRG 14	Specific cerebrovascular disorders, except transplant ischemic attacks
DRG 294	Diabetes, aged 36 or older

quantity of resources used and the quantity or value of output produced (Greenberg, 1973). The measure should present a reasonably accurate picture of what is taking place in the work setting. This is represented mathematically as the ratio of output to input (Greenberg, 1973; Ross, 1979). The most commonly used input measures are labor, capital, and materials. Man hours are the most useful since this information is often readily available, relates wage and labor costs, estimates future labor requirements, and are more easily understood and accepted (Greenberg, 1973). Output measures most often used are products produced (Greenberg, 1973).

There are several difficulties in measuring productivity. First, outputs are diverse and complex. When old products are modified or when new products are produced the previously measured productivity may need to be modified to reflect new technology and the use of different materials. Measurement of productivity in services is further compounded by the heterogenity of service transactions and the information processing transaction (Greenberg, 1973; Sasser, 1978).

Measuring Productivity of the Clinical Dietitian

Numerous studies have been performed on the productivity of production and service employees in the dietary department, however, little emphasis has been placed on the

dietitian (Beach, 1964; David, 1978; Holloway, 1976; Kroner and Beatrice, 1958; Montag, 1964; Ruf and Matthews, 1973; Tuthil, 1956; Waldvogel, 1977, and Zemel, 1982). Baker (1984), McManners (1984), De Hoog (1985) and Gobberdiel (1986) have analyzed productivity of the clinical dietitian on a limited scale in individual hospitals in which they were employed.

Several problems are inherent in the effort to analyze the productivity of the clinical dietitian. The measure of input and output must first be defined (Mark, 1982). The traditional measure of input is that of labor or hours worked. This is the most extensively developed and used productivity measure because of its relevance to economic analysis and ease of measure (Greenberg, 1973).

Output, however, is not as easily defined due to the nature of the work analyzed. For the clinical dietitian this would involve patient care and administrative activities as identified by Hernandez and Shanklin (1985). Baker (1984) used direct and indirect patient care. Factors which affect the productivity of the clinical dietitian would include experience, patient load, extent of services rendered, additional administrative duties performed, average patient stay, number of dietary technicians, hospital size, administrative structure , bed capacity, and the mission and

goals of the hospital. Hernandez and Schanklin (1985) hypothesized the level of care, diet order, major diagnostic group and location of the hospital would also affect time spent in various activities. Baker (1984) identified the level of care of the patient as affecting time spent in activities. These levels of care were identified as basic, intermediate, advanced intermediate and indepth care.

Quality of services rendered are often considered in the analysis of productivity. Marimont (1969) stated that the failure to adjust for changes in quality leads to biases in conventional measures of productivity. In order to develop universal productivity standards, the quality of services should be homogeneous. This is appropriate in the manufacturing sector where production can be standardized; however, in the service sector (according to the definition of service) the customer is involved in the production and delivery of the service. Based on this definition, the patient with whom the clinical dietitian works influences the quality of the services rendered. For example, if the patient is not receptive to the diet instruction and refuses to follow the prescribed dietary pattern, the quality of the productivity is affected. Shaw and Capoor (1979) call for the quality measurement in productivity measurement in the service sector to be related to how the customers evaluate the quality of services. Because customers evaluate service

based on personal experiences, background and perceptions, quality measures in the service sector are subjective, and therefore extremely difficult to measure.

Theoretical Basis

This study of productivity was based on the ratio of outputs to inputs (Greenberg, 1973). These measures (dependent variables) are influenced by various factors in the work setting (independent variables). The dependent variables used in this study were based on the concepts developed by Baker (1984) and Hallings (1984). The independent variables used in this study were based on those tasks performed by the clinical dietitian as identified by Hernandez and Shanklin (1985), plus others identified by the researcher.

The statistical technique of multiple linear regression, through mathematical computations, determines the effect of each independent variable upon the dependent variable or measure of productivity. Models can then be developed for measuring productivity using the independent variables. This technique was recommended by Mundel (1975) as appropriate for the service related industry and used by Mayo (1985) and Young (1981) to develop models for measuring productivity in food services. Therefore multiple regression will be the

method used for data analysis in this study.

Definitions

Terms which have specific reference to this study are defined in Appendix A.

Purpose of the Study

The major purpose of this study was to develop a model by which the productivity of the clinical dietitian in a hospital could be analyzed. It is hoped that this model will provide a basis for the development of fair and equitable standards for productivity of the clinical dietitian.

Objectives of the Study

Objectives of the study were:

To develop an appropriate input measure of productivity for the clinical dietitian

To develop appropriate output measures of productivity for the clinical dietitian

To identify the independent variables which affect the productivity level of the dietitian

To develop a model by which the productivity of the dietitian can be measured

Independent Variables

The researcher identified independent variables hypothesized as affecting productivity include:

Patient load of the clinical dietitian

Experience of the clinical dietitian

Allocation of time to tasks performed by the clinical dietitian (Hernandez and Shanklin, 1985)

Type of consultation methods used by the clinical dietitian

Size of the hospital

Employment status of the clinical dietitian

Mission of the hospital

Occupancy rate

Percent of budget generated by Medicare Patients

Dependent Variable

The researcher identified major dependent variables used in this study as time spent in:

Hours in direct care of patients in the basic care level

Hours in direct care of patients in the intermediate care level

Hours in direct care of patients in the advanced intermediate care level

Hours in direct care of patients in the indepth care level

Hours in indirect care of patients in the basic care level

Hours in indirect care of patients in the intermediate care level

Hours in indirect care of patients in the advanced intermediate care level

Hours in indirect care of patients in the indepth care level

Hours in nonpatient care activities

Hypotheses

The hypotheses studied in this investigation were:

Productivity is not affected by the patient load of the clinical dietitian

Productivity is not affected by the experience of the clinical dietitian

Productivity is not affected by the allocation of time to tasks performed by the clinical dietitian

Productivity is not affected by the type of consultation methods used by the clinical dietitian

Productivity is not affected by the size of the hospital

Productivity is not affected by the employment status of the clinical dietitian

Productivity is not affected by the mission of the hospital

Productivity is not affected by the occupancy rate of the hospital

Productivity is not affected by the percent of budget generated by Medicare patients

Need and Significance of the Study

Spiraling health care costs, increased employment in the health care division of the service sector, competition between health care providers, and a recent decrease in funds available for Medicare, Medicaid, and insurance payments have forced hospital administrators to analyze present costs, determine actual costs, and reduce the variation between the two. Because of a hospitals' labor intensity, the use of this labor has drawn much attention. In order for each department in the health care operation to determine the actual cost of delivery of their services, they must first know what services are being deliverd to each catagory of patient and resources utilized.

For many years the focus of the dietary department's productivity analysis has been toward production and service personnel. However, with the increased attention of hospitals to DGR's, the high contact of clinical dietitians with DRG related cases, and cost analysis of medical care, information is needed on the productivity of the clinical dietitian as a health care team member.

Chapter 2

REVIEW OF LITERATURE

This review has been organized into the following areas:

(1)concept of productivity
(2)work measurement in the service industry
(3)productivity measurement in the service sector
(4)productivity measurement in the food service sector
(5)productivity measure in the health care industry
(6)summary of related literature

Concept of Productivity

Productivity is defined as a measurement of production, with the ratio of output to input as the numerical measurement (Greenberg, 1973; Ross, 1979). There are three components which comprise this ratio: inputs, processing, and outputs (Ross, 1979). The purpose for productivity measure in a department or unit is to: assess the operation, set reference points to use as a basis for change, and to evaluate functions.

Inputs

The input variable in the measurement ratio has classically been defined as the quantity of labor utilized (Dogramaci, 1981; Greenberg, 1973; Whitmore, 1975; Ross, 1979). Labor may be measured by either man hours worked, or man hours paid (Greenberg, 1973). Man hours paid is often

used because such figures are readily available through payroll departments. However, this figure often does not reflect the accurate number of hours worked, particularly when staff positions are analyzed. For this reason hours worked is the preferred measure.

A second method is to develop an integrated system, in which all resources of management are combined to form the input measure. Adam and Drogramaci (1981) suggest that energy, capital or materials, if they are in short supply, are appropriate. They recommend that the most valuable resource and the one with the most meaning be used. Ruch (1982) recommends that labor, capital, materials, and energy be combined in a productivity measurement system. The measurement selected should fit the job being analyzed. It may be more appropriate in some situations to use material produced per man hour while in others revenue generated per man hour would be more appropriate. Separate measures should be developed for each job according to its nature. When capital is being used as measure, it should be adjusted for its time value.

Process

Process involves the activities of the organization. This is the basis for one of the problems encountered in measuring productivity in the service sector. Tasks performed

are of a nonrepetitive, unpredictable, and information processing nature, which depend on the customer to be completed (Mills, 1983). Because employees in the service sector are involved in a variety of tasks with intangible outcomes, it is very difficult to assess the process.

Output

Output is defined as the product, goods or services produced as a result of the input measure (Greenberg, 1973; Mark, 1982). In the manufacturing sector of our economy this is easily measured by products produced. However, in the service sector, output is not as easily defined due to: the intangible and inseparable nature, consumption at the time of production and production of more than one type of service (Ruch 1982; Sasser, 1978). The production of pure service does not produce a tangible product which can be physically counted. Pure services represent an information processing transaction between a customer and employee. These services are produced and consumed in the same service transaction. Service transactions differ in each occurance due to the individuality, background, and experiences of the customer. For this reason indicators of output are used and should be independent and quantitative (Mark, 1982). The number of customers served is the most frequently used in the service industry (Mark, 1982; Ruch, 1982).

In the health care industry a variety of output measures have been used. Each department within the hospital has recommended measures (American Hospital Association, 1973). Meals served are the only measure listed for the dietary department. This does not represent services rendered by the clinical dietitian.

Eberhard (1976) contend that present statistical units for measuring hospital productivity are inadequate. Ratios such as x-rays per hours or meals per man hour are misleading, noncomparable, and subject to misinterpretation by other industry groups. The Southern California Hospital Council developed a measurement to overcome these inadequacies. The model developed measured the relative degree of resources delivered to a patient in the hospital. Labor, supplies, equipment, and other categories were utilized. A cross departmental measurement index was developed.

Work Measurement Techniques Used in the Service Sector

A variety of work measurement techniques have been identified to measure work performed in the service sector (Mundel,1975). Each will be presented with a brief explanation.

Simple mathematical computations are an easy method in which readily available data concerning the production of

outputs and the allocation of manpower resources to each kind of output are analyzed mathematically. These mathematical equations are used to determine the relationship between outputs and required manpower. This data is most frequently compiled from historical information. The most difficult problem encountered with this method, and all others used in the service sector, is the delineation of work units and the determination of how to count them (Mundel, 1975).

Mathematical computations such as linear programming and multiple regression involve a statistical technique to analyze outputs to determine the time spent on each. They are based on the concept that total time spent is a linear combination of the time spent on each task. These tasks are identified as independent variables which affect the dependent variable, the total time spent on a job. The independent variables are weighted according to their effect on the dependent variable. The statistical equation represents these times (Mundel, 1975).

Professional estimates are a widely used method of work measurement. Knowledgeable individuals in the subject matter list components of the job and then assign reasonable times for their performance (Mundel, 1975).

Direct time study is a procedure in which direct observation of the job is made at random or continuous

intervals. Data recorded is the work time associated with work counts. These times are calculated by stop watch study or sampling techniques (Mundel, 1975).

Predetermined time system is a term used to refer to a table of work units and their corresponding work time according to previously performed and verified time studies. Each movement of a task has been analyzed and a standard time assigned. Total times for tasks can be calculated by the combination of the times for individual movements involved in the task (Mundel, 1975).

The nominal group technique is recommended by Gregerman (1981). This method involves gathering employees' opinions about tasks performed and times required in discussion groups. Trained group leaders are used to gather the data.

Productivity Measurement in the Service Sector

Professional Services

Mundel (1975) discusses several productivity studies in service and government organizations using a variety of the previously discussed techniques. One study Mundel (1975) reported analyzed the productivity of 200 lawyers employed by the U.S. Department of Interior in order to determine staffing adequacy. The independent variables evaluated were: provide legal guidance to branch offices, prepare briefs for litigation, study new legisulation affecting the department,

and assist in drafting litigations which affect the department. Two factors which affect the output were identified as the mix of work and the difference in time required by various tasks. Mathematical computations were performed on historical data of work counts and payroll time reports in order to measure the independent variables. Weights were assigned to tasks according to their importance. Ratios were calculated using the weighted times as the output and available work hours as the input. No results or conclusion were identified.

In a similar study at the National Institute of Allergy and Disease, (Mundel, 1975) professional opinion was used to set time standards as a basis for analysis. Seven functional tasks were identified as independent variables from analysis of the job by the project staff with the assistance of the institute staff. Professional estimates of the time required were then made for the tasks by the same staff members. An estimated percentage of time spent on each of the seven functional areas was then reported. Ratios were developed using the weighted task times as the output and man hours available per year as the input. No results or conclusions were identified.

News reporting for the Department of Agriculture was another study reported by Mundel (1975). In this study four

dependent variables (tasks) and twenty-one independent variables (factors affecting tasks) were reported. Employees were surveyed to determine the weights assigned to the four identified tasks. Historical data were used to determine work counts. Analysis of data, to determine the appropriate time for each task, was performed by using linear programming. No results or conclusions were reported.

Direct time study was used to analyze the productivity of analytical chemists in the Meat Inspection Division of the U.S.D.A. (Mundel, 1975). Thirteen tasks were identified as dependent variables such as a cured product sample tested and reported on. A work sampling technique with random observations was used to identify the time spent on each of the variables. A standard time per work count was then calculated. This information was used for a manpower analysis.

A similar technique was used to determine the productivity of surveillance inspectors employed by the government (Mundel, 1975). Eighteen independent variables and seven dependent variables were identified. Because of the unpredictability of the location of an individual at random times, sampling was performed at specified times. Standard times were calculated using linear programming.

Productivity of the slaughter inspectors of the Meat Inspection Division of the U.S.D.A. was studied by stop

watch studies from video tapes of actual work tasks (Mundel, 1975). In the study six dependent variables (type of animal inspected) and one independent variable (the removal of unacceptable organs from the surface area) were identified. From the stop watch study a predetermined time system was developed for subsequent studies. Standard times were then used to compare present practices and evaluate staffing.

Airco Industrial Gases (Modern Office Procedures, 1980) developed a measure of white collar productivity in which managers were interviewed to ascertain how they determined if their department was functioning well. Responses were tabulated and departments were compared. From the responses, 89 indices were developed as performance measures and departments categorized into ten work groups for comparison. Reports were generated monthly on performance, and categories flagged which fluctuated more than 10%. Managers used this to monitor their performance.

Food Service

Tuthill and Donaldson (1956) measured the productivity of hospital foodservice workers in 10 Wisconsin hospitals. Hospitals were grouped according to the number of beds based on the hypothesis that hospital foodservices of similar size would experience similar problems. A combination of survey and indepth analysis was used. Tasks performed by the

employees were classified as either production, service, cleaning or miscellaneous. A percentage of time spent in each type task was calculated. A study of the factors affecting these percentages was then conducted. No analysis was conducted on these factors.

Halter and Donaldson (1957) analyzed per meal labor time in 838 short term care hospitals in the East North Central region of the United States. Hospitals were classified either according to six bed capacity groups, or four type of ownerships. A survey was used to gather the necessary data. Total labor time (labor time scheduled for all professional, clerical and nonprofessional personnel) and direct labor time (labor time of only the hours scheduled for the nonprofessional dietary personnel directly concerned with food production and service of food) were calculated. This represented the input measurement. Daily average meal count was used for the output measure. Ratios of labor time per meal and direct labor time per meal were calculated. The average direct labor time per meal ranged from 3.5 to 29.6 minutes per meal. Analysis of variance procedures showed no significant differences in the groups at the 5% probability level.

Kroener and Donaldson (1958) analyzed the labor time per meal of Type A school lunch programs in Wisconsin. Schools

were divided into four categories and six groups within these categories, according to the number of meals produced daily. A survey was used to gather data of the number of hours worked by each employee in any phase of school lunch production. Hours worked by related employees such as managers and janitors was gathered. The input measure used was the number of minutes worked per day and the output measure was the number of meals produced per day. Results showed 2.69 to 16.52 with a mean of 7.16 minutes per meal. The researchers recommended the mean per group plus or minus the standard deviation be used as a standard measure of productivity for school lunch programs. Any school above or below this figure was considered as having extremely high or low productivity. Thirty percent were below this figure and 16.4% were above. One factor attributed to influencing this factor was the use of student labor during peak production.

Productivity of hospital food service employees was measured by Kent and Ostenso (1965). The hypothesis used stated that hospitals with homogeneous characteristics have similar productivity. Ten Wisconsin hospitals ranging from 750 to 1350 beds were used. Data were gathered by a worksampling technique during a seven day period. One thousand samples were gathered, representative of the work function categories. Weekly meal counts were calculated to determine equivalencies which accounted for meals served in

the coffee shops. Input measure was labor minutes and output measure was meals served. Correlation studies showed a linear relationship between bed capacity and adjusted meals served per week. Results supported the hypothesis.

Williams and Donaldson (1969) developed a management evaluation system to determine how well the resources of the department were being utilized. Work sampling was conducted to determine the percentage of time that dietary employees were involved in direct, indirect, and nonproductive activities. Performance ratings were then used in combination with the work sampling data to produce a performance index. Employees were rated in work groups for speed, tempo, and pace. Individual and group scores were calculated. Performance was expressed as a percentage of standard of expectancy. Work sampling and performance rating data were correlated with number of meals served, hours worked per day, labor and food costs, and food quality factors found in nine Wisconsin nursing homes. The factors of work function categories, scheduled personnel hours, and number of meals served daily were determined to be statistically significant. The study also showed that as the number of meals served increased, the percentage of time devoted to direct labor increased and time spent in other categories decreased.

Beach (1969) used Methods Time Management and stop watch studies to determine normal performance times for the service of entrees in a cafeteria line. All tasks involved in the service were measured with a stop watch and MTM coding used. A computer simulation was then developed to vary the entrees according to the service steps to analyze the difference in the number of people who could be served in the cafeteria line depending upon the entree served.

A staffing guide was developed by Holloway (1972) for a combined A La Carte and Type A school lunch food service in two high schools in Virginia. Work sampling was used to determine labor time of employees per menu item. The percentage of time was calculated which was spent in production, service, dish washing, clean up, delay, clerical, and personal activities. Man minutes per item was used to determine the total productivity and nonproductive time required for each type of menu pattern. Staffing guidelines were then developed.

Young (1981) conducted a study in 14 nursing homes in Wisconsin to measure and correlate variables identified as affecting the minutes per meal in food service systems of nursing homes. Activity sampling was used to collect data on minutes per meal equivalent served. Sixteen independent variables were identified, such as age, tenure of employee, absenteeism, food and supply cost and wage. Results in the

study showed positive correlated factors such as the total number of labor hours with the total minutes per meal. Negatively correlated factors were also identified such as labor turnover with total minutes per meal.

Zemel (1982) utilized Master Standard Data times which had been developed over a period of fifteen years by Montag, Waldvogel, Ostenso, Ruff, and Matthews for foodservice operations to produce a simulation which showed the effect of increase in volume produced on the labor time required for production.

Mayo (1984) used a regression analysis to analyze the productivity of school foodservice employees in forty-four public schools in the Richmond, Virginia School district. Six dependent variables or measures of productivity and 12 independent variables or predictor variables were used. Through stepwise multiple regression several models were developed for assessing productivity.

Health Care

Ferderber (1981) recommends a system of productivity analysis for hospitals which includes:

Identifying the units of work performed

Determining the manpower to complete the work

Determining adequate allowances for employee work breaks

Comparing the required earned manpower with the actual

worked manpower to develop the productivity index

Development of a quality control system according to Joint Commission on Accreditation Standards

The American Hospital Association (1974) recommends three methods for determining productivity. They are by: past records and experience, which includes historical or statistical data, expert opinion, or activity analysis; direct observation and analysis which includes stop watch studies, continuous time studies, work sampling, and standard data. Productivity measurements, once established by one of these methods, should be monitored for change or compared with nationally accepted averages to determine variability. It is recommended in hospitals to weight tasks according to their importance when determining the productivity of particular categories of employees.

Woodlawn Hospital, a 146-bed institution with 80% occupancy rate initiated a productivity study of its nursing staff, in response to increased costs. The director of nursing, in cooperation with the nursing supervisors, began by developing criteria for staffing needs. Patient days, for a given period, was identified as the dependent variable, and hours worked as the independent variable. Information was obtained from medical records and payroll department for the calculations. Once the ratio of hours of nursing per patient day had been calculated the figure was compared to the

national average for that size facility (Jacobs, 1967).

The Chicago Hospital Council conducted a systematic analysis of laboratory procedures in order to provide standard times for procedures. From this information each laboratory department could develop productivity measures. Seventy clinical tests were selected which represented 85% of the average laboratory work load. Each test was broken into tasks and analyzed for movements. Standard times were then assigned. Times were combined to develop times for each test, with the included time for administrative paperwork associated with each test, and 15% for preparation of reagents and quality control tests (Foster, 1966). From this information each laboratory could develop productivity measures, analyze present practices and develop staffing needs.

The Radiology Department of LDS Hospital, Salt Lake City, Utah, a 570 bed tertiary care hospital, measured productivity by a combination technique of expert opinion and time measurement (McGuire, 1980). Three hundred independent variables were identified such as the procedures performed, delay due to equipment downtime, waiting for radiologist, condition of the patient, and fatigue. All procedures were categorized according to the estimated time for performance. Time studies were performed for the eight most common

procedures. The eight measured procedures were used for reference points in assigning standard times. This was considered accurate, due to the large number of tests performed and variability in procedures due to the independent variables. A team of chief technicians and other technologists involved in the department reviewed the estimates and adjustments were made based on expert opinion. Accuracy was not measured because it was felt that productivity measurement was a tool for budget and control systems, and each year a slightly higher level is expected. The productivity was reported at 85%, but the output measure used was not reported.

The Indian Health Services, in cooperation with other Health Service Organizations (Mundel, 1975), studied the productivity of a variety of health professionals in San Carlos Hospital. The dependent variable identified was one patient of a kind restored to a state of normal health. Fifty-two independent variables were identified as groups in the hospital affecting output. Because of this large number, ten separate groups of labor were identified and studied independently. In the study performed on the nursing staff, nurses were asked to estimate the time per day on each type of patient. From medical records, a count of the number of discharges for the base period was obtained for each patient category. This was weighted for length of patient stay by

type. The sum was divided by the total time of nurses worked per year, which was obtained from payroll. This figure was then adjusted for skill level. The final calculation represented the hours spent by nursing per patient of a particular disease from admission to discharge.

York Hospital, a 570 bed teaching community and general hospital, conducted a productivity study in order to establish a computerized control system for productivity (Mazolla, 1978). Measures of performance were first determined by the departments. Specific measures used were not reported. A work measurement analysis was then conducted to determine a normal time value for each activity. The tasks were then weighted according to frequency performed. These figures were adjusted following discussions with employees and supervisors and analysis of historical hospital records. The ratio of weighted units per direct manhour were then calculated.

Hanson (1985) reported a Productivity Management System that was developed for the Oregon Association of Hospitals which used standard units of output recorded by the hospital, such as patient days per nursing unit and hours worked per unit as input. This system also considered all factors which affect the quantity of output per unit of manpower, such as condition of the patient. The ratios were then plotted to

analyze trends over time rather than measure performance of individual employees.

Kulanda (1981) in a study of medical record specialists used Methods Time Management (MTM), a standard time method, to determine productivity. Jobs were analyzed and MTM applied. A sampling technique was used to determine the tasks involved in the job and the frequency. The sample involved five medical records and was repeated for validity. Work content was calculated per 1000 records. Sampling was considered accurate if a standard deviation was less that 10%. Standard times were then applied to the tasks to determine the number of records which could be processed per work period.

Productivity of ward secretaries in a V.A. Hospital were studied using a predetermined time study (Mundel, 1975). This methodology showed secretaries were productive only four hours of the day. This was due to the omission of the independent variable direct observation of the ward, which consumes a large proportion of the secretaries time and is an important task in this facility.

A survey of Health Service Laboratories in West Wales by the Health Services Branch of the Association of Scientific Workers used a combination of job content analysis, activity sampling, and discussion with staff to analyze productivity (Bennett, 1967). Exact measures used nor results of the

survey were given. The author did report a high percentage of time of professional staff was being spent in nontechnical activities.

The Sinai Hospital in Detroit, Michigan developed a Productivity Monitoring System for the Medical Records Department (Kelm, 1983.) The purpose was to provide an objective means of monitoring department productivity by reporting the ratio of standard hours and hours worked. Each department was divided into functional areas. A combination of time and motion studies, time sheet analysis, and expert opinion were used to determine standards of performance. The productivity ratio used was earned hours per hours worked. The earned hours represented the volume of tasks performed multiplied by the standard time.

A model for the measurement of productivity of nursing personnel in acute care hospitals has been developed by Benson (1981). The objective of the model was to measure the input, output, and quality of output, and to identify variables which could affect productivity. Benson defined output as the quantity of nursing service required on a unit. Four levels of patient care were identified. A ratio of time per category was developed. This was used as a weighting factor to develop the nursing hours required per unit. Nursing input was measured as an equivalent number of

registered nurse hours available on the unit. Nursing efficiency was measured as the ratio of units of nursing service output per unit of nursing service input. The quality score was used to determine a standard or expected efficiency. The quality of nursing care was measured using the Process-Oriented Methodology developed by Rush-Presbyterian St. Lukes Medical Center. This system involves the assessment of six factors pertaining to the specific objectives of the nursing function. A regression function was used to calculate the units expected efficiency. Productivity was calculated as the ratio of actual efficiency to the expected efficiency which was derived from the quality adjustment mechanism. Following an application of this system on 33 nursing units, nine independent variables were identified as affecting the productivity of nurses: quality of care, staffing level, unit characteristics, number of beds in the unit, staffs' educational preparation, nursing unit organization, staff's satisfaction, teaching environment, and head nurse characteristics.

Dietetics

Hallings (1984), in a speech delivered at the American Dietetic Association National Convention, stated that a productivity management system should be composed of the

following steps:

Establishment of goals and standards

Identification of outputs or units of service

Identification of inputs or resources

Definition of measurement

Measurement and documentation of actual operational activity

Comparison of actual operational ratios to standards

Evaluation of the results

Implementation of change based on findings

He identified time, materials in dollars, nutrients, and the cost of a facility in dollars as possible input measures. Three categories of output measures which he felt to be appropriate for measuring productivity of the dietitian were kind of customer, complexity of care, and kind of products, The kind of customer was defined as inpatients, outpatients, and nonpatients. The complexity of care was divided into levels of service rendered the patients. Kinds of products were defined as inpatient days, admissions, DRG's, outpatient visits, and meals served.

Five productivity studies for Clinical Dietetics have been identified. St. Luke's Hospital, a 450 bed community hospital with 71% occupancy rate, measured productivity of the dietitian in order to determine the percentage of patients for whom acceptable performance standards were met

(McManners, 1984). Four clinical dietitians, with an average patient load of 80 to 90 patients per day, were studied. JCAH (Joint Commission on Accreditation for Hospitals) performance criteria were identifid as the dependent variable. They were:

> All modified diet orders will be confirmed in the medical record within 24 hours of receipt of the diet order
>
> All nonmodified diet orders will be confirmed in the medical records within 48 hours of receipt of the diet order
>
> All patients on oral alimentation will be visited by a dietitian within 48 hours of receipt of the diet order
>
> Each diet will be individualized for the patient and documented in the patient dietary kardex
>
> Instructions will be given to patients on modified diets and documented in the medical record and dietary kardex
>
> The dietitians will assess the understanding of the patient instructed on the modified diet and document such information in the medical record and dietary kardex

Initially 100% compliance was set as the standard and later revised to 75%. The productivity was calculated by dividing the number of performance standard functions completed by the total patient admissions. A twelve month average was calculated. The results showed a productivity level of 42.5% and 42% respectively for 1981 and 1982. From analysis of the results, five independent and controllable variables were identified as actual responsibilities of the dietitian, amount and kind of clerical duties performed, specific floor

assignments of the dietitian, patient accessibility due to scheduling, and additional staff support. Additional variables identified included time requirements, differences in patients' nutritional needs, and priorities.

Time standards were then set using the ADA staffing guidelines and adjusted according to variables identified and opinions of the dietitians. The ADA Time Standards were developed through a survey of 300 dietitians and were intended to be used solely as a guide (Journal of the American Dietetic Association, 1981). Standards were multiplied by projected census for the following year to determine adequacy of staffing. In an effort to increase productivity, adjustments in workload were made according to the number of hours required per patient category, rather than floor assignments.

Baker (1984) at the annual convention of the American Dietetic Association reported a productivity study conducted at the Miami Valley Hospital, Dayton, Ohio. They identified the indepedent variable, nutritional needs of the patient, by categorizing the patients according to levels of care rendered by the dietitian. Four levels were identified: basic, intermediate, advanced intermediate, and indepth. Basic was defined as the patient who was determined not to be at nutritional risk. This was determined through analysis

of the patient's medical admission record. The patient received basic meal service. The intermediate care patient was the patient who required counseling on a single nutrient restricted diet plus basic care. Advanced intermediate patients were those who required counseling on multiple nutrient restricted diets plus basic care. The indepth category patient was one who required intensive nutritional support. The process used to develop these categories involved the analysis of 198 patients by the staff dietitians and the researcher. They were able to reach an 85% agreement on patient classification. Average times were then determined for each category of patient, using the ADA staffing guidelines and expert opinion of the dietitians. Direct and nondirect patient contact times were determined. Nondirect patient contact times were identified as times involved with such activities as tray tasting and attending physician rounds. Average noncontact times were found to be 2.23 hours and contact time 5.77 hours per day. These calculations were then used to adjust the work load of the staff dietitians.

Hernandez and Shanklin (1985) analyzed productivity of 127 dietitians in Texas. The utilization of time according to clinically related activities and administratively related activities and the relationship to four independent variables were analyzed. The four variables were level of care, diet

order, major diagnostic group, and location of the hospital.

De Hoog (1985) conducted productivity analysis of the dietitians employeed at University Hospital in Seattle, Washington. The purpose of the study was to identify patients at nutritional risk, determine diagnostic related groups, and measure the productivity of the dietitians on staff. Two studies were conducted to determine patients at nutritional risk, a one day survey of the medical and surgical units and a retrospective chart study. Productivity of the dietitians was measured during a four week time study in which the activities of the dietitian were recorded on fifteen minute intervals. Activities were coded according to a system developed for the study which identified tasks normally performed by the dietitian. The productivity measure used in this study was not reported. The study did report that the results of the productivity measure were used to reorganize the clinical nutritional staff to provide better nutritional care to the patients. Dietary technicians were assigned patients who were identified at low or moderate nutritional risk and clinical dietitians were responsible for those patients who were identified as high risk. The clinical dietitians would also be available for assisting the dietary technicians in cases which involved more indept assessment than anticipated.

Gobberdiel (1986) developed a staffing model for the clinical dietetics staff at Barnes Hospital, St. Louis, Missouri. Tasks performed by the clinical staff were divided in basic care activities (clerical) and indepth activities (clinically oriented). Time studies were conducted to determine the time spent in each of the activities by clinical dietitians, dietary technicians, and clerks. Tasks performed on patients and total time per patient were also recorded. The average time required per patient on a specified type of diet order was calculated. The average number of patients on each type of diet was calculated. This information was used to determine the staffing needs of the department.

Summary of Related Literature

The service industry, due to its nature, presents several problems for productivity analysis. A variety of indicators have been developed to overcome these problems. Many of the identified indicators, however, are not indicative of the tasks performed. Also, a variety of methods have been used to measure work and set time standards. Professional estimation of time standards was most commonly used in the professional service sector. Linear programming was used in two studies to establish standard times. The use of standard times was used most frequently to analyze the staffing needs,

rather than measuring the actual productivity of groups of employees.

Productivity in the food service sector has classically been measured by minutes per meal produced. Numerous studies have been conducted to establish standards for various types and sizes of facilities. Work sampling was most frequently used in the establishment of these standards. These standards do not, however, reflect the variables which affect the productivity levels. Several studies did identify these factors, but did not adjust standards for them. Beach (1969) and Zemel (1982) used simulation to show the effect of independent variables, factors affecting productivity, on production time. Mayo (1984) and Young (1981) used multiple regression to analyze the effect of independent variables on productivity. In the health care sector work sampling and professional opinion were used most frequently to establish standard times for the performance of identified tasks.

Benson (1981) presented the most comprehensive study by identifying specific input, output, and quality of performance and by defining productivity as a ratio of efficiency. The multiple regression technique was used to calculate the expected efficiency measure. This incorporated the variables of quality which affected the productivity of

the nurse.

In the profession of dietetics, little reaserch has been conducted on productivity analysis. Only one study included dietitians in a variety of hospitals. In this one study the sample was limited to dietitians in Texas. None of the studies differentiated between inpatient dietitians and outpatient dietitians nor clinical from administrative.

McManners (1984) used an efficiency ratio as the measure of productivity with input as the total number of patients and outputs as the number of standard performance functions completed. Independent variables affecting the performance were not considered in the analysis, but discussed as factors affecting the results. Quality of care rendered was not assessed. Baker (1984) in this study simply determined a classification of patients and was then able to develop time standards for these groups. An analysis of how much time was spent by each dietitian with each patient group was then conducted to assess how they were spending their work hours.

Hernandez and Shanklin (1985) analyzed productivity using time as the input measure and tasks performed as output. The affect of four independent variables on this measure was then determined.

De Hoog (1985) utilized time studies to measure the productivity of the dietitian. Inadequate information was provided by the author both in the printed article and phone

conversation to determine what input and output measures were used. The information gathered was used to develop a comprehensive approach to appropriately utilize the time and expertise of the clinical dietitian.

A comprehensive model, such as that presented by Benson (1981) for the nursing profession, is needed for the field of dietetics. This would involve the development of appropriate input, output, and quality assessment measures since the research conducted in this field is minimal.

Due to the variety of tasks performed by the dietitian, it would be necessary to identify the factors which affect the productivity level, such as those presented in the hypotheses. It is realized that due to this great diversity and nature of information processing which occurs in nutrition counseling, that standard measures of productivity would be difficult to develop. However, models for assessing productivity could be developed to aid with the administrative justification for staffing levels and the development of fair and equitable standards of productivity for the clinical dietitian.

Chapter 3

METHODOLOGY

Objectives

The methodology was designed to fulfill the established objectives:

To develop an appropriate input measure of productivity for the clinical dietitian

To determine appropriate output measures of productivity for clinical dietitians

To identify the independent variables which affect the productivity of the clinical dietitian

To develop a model by which the productivity of the clinical dietitian can be measured

Methodology

Research necessary to fully investigate the productivity of the clinical dietitian involved the development of appropriate input and output measures. Because the published data on the analysis of this research is limited a two phase research project was used.

Phase One

Phase one was used to ascertain which parameters were the most appropriate measures of input and output for the clinical dietitian. A modified Delphi technique composed

of three steps was used with a group of twelve professionals familiar with issues of productivity within the dietetic and health care field. Those participating included four authors of published articles on the productivity of the clinical dietitian, four members of the American Dietetic Association's Task Force on Productivity, and four Executive Dietitians representing the two corporations who supported this research.

Delphi Technique

The Delphi technique is a method for structuring a group communication process so that the process is effective in allowing a group of individuals as a whole to deal with a complex problem. It can be conducted by a written questionnaire or verbally. It provides feedback of individual contributions of information and knowledge, some assessment of the group judgment or view, an opportunity for individuals to revise views, and some degree of anonymity for the individual participant (Linstone, 1977).

The process is generally composed of a four phase process. The first phase is characterized by exploration of the subject under discussion where each individual contributes additional information he feels is pertinent to the issue. The second phase involves the process of reaching

an understanding of how the group views the issue or where the members agree or disagree and what they mean by specific terms. Phase three involves bringing out the underlying reason for the differences and possibly the evaluation of them. The final phase occurs when all previously gathered information has been analyzed and the evaluations have been fed back to the participants for consideration.

The Delphi Technique as a Means of Eliciting Professional Opinion

The Delphi Technique will be used as a technique for obtaining professional opinions on the appropriate measures of input, output, and quality of service rendered by the dietitian.

The American Hospital Association (1974) recommended professional opinion as one means of determining measures of productivity. The Radiology Department of LDS Hospital in Salt Lake City, Utah (McGuire, 1980) used professional opinion in combination with time measurement to set time standards for measurement of productivity. The Sinai Hospital in Detroit, Michigan used expert opinion combined with time and motion studies and time sheets to set time standards to be used in productivity measurement (Kelm, 1983). Mundel (1975) reported that time standards were set using professional opinion for productivity studies conducted at the National Institute of Allergy. Airco Industrial Gases

(1980) used professional opinion to determine measures of performance. In the field of dietetics Baker (1984) used professional opinion to develop time standards.

Modified Delphi

The modified Delphi Technique used in this study involved three phases. The first phase was used to present the currently identified measures of input, output, and quality as found in the service and nutrition related literature. These are presented in Appendix B. Each participant was asked to add any additional measures they felt would be appropriate. The second phase reflected these additions and requested that the participants choose which measure they felt would be best and state why. This is shown in Appendix B. The final phase reflected the data from the second phase and attempted to gain a consensus of the best measure of input and output of the clinical dietitian. The quality measure was deleted from the third delphi because of the difficulty in the measurement of quality as discussed earlier.

Phase one was exploratory in nature and was used solely to guide further research. It was not intended for the use of calculating definitive measures.

Time Frame

Three mailings were used. The first was mailed January 13 and requested return by January 21. The second was mailed January 21 and requested return by January 31. The third mailing was mailed February 4 and requested return by February 14.

Phase Two

The general measures of productivity of the clinical dietitian, the dependent variable gathered in phase one, and independent variables, identified as affecting the productivity of the clinical dietitian, were tested. The population was composed of 903 dietitians employed in general, medical centers, community, psychiatric, pediatric and other specialized hospitals with contract food service operations. The sample included administrative, clinical, inpatient, and outpatient dietitians employed in hospitals, nursing homes, and life centers. This sampling was due to the nature of the computer files of names and addresses of the dietitians employed by the contract food service companies supporting this research. The sample used for analysis was clinical dietitians employed in hospitals. This sample was selected based on the concept that tasks performed in the clinical setting of the hospital would be different from

those performed in nursing homes, life centers and by administrative dietitians.

The productivity of the clinical dietitian was measured by hours per week spent in direct and indirect patient care according to the levels of patient care, as identified by Baker (1984), divided by the total hours worked per week. And the hours spent in nonpatient care divided by the total hours worked.

The output measure used divided activities of the clinical dietitian into direct, indirect and nonpatient care activities. Direct patient care activities were defined as those activities directly related to patient care such as collecting preferences, conducting diet histories, counseling, performing anthropometric measures, and giving diet instructions. Indirect patient care activities were defined as those activities which do not directly involve the patient, but affect their care such as recording in medical charts, writing menus for modified diets, analysis of nutrient intake, calculating diets, tray sampling or tray line checking, conducting inservice classes for support personnel, and participating in medical rounds and patient care conferences. Nonpatient care activities or administrative functions, as defined by Herndzez and Shanklin (1985), were those activities that the dietitian performs which are not directly related to patient care such as

serving on hospital and professional organization committees, conducting conferences for other health care professionals, participating in hospital or departmental committee meetings, participating in professional improvement activities, instructing interns, performing administrative record keeping, procurement of nutritional supplements or specialized products, writing cycle menus, developing nutritional care standards, and supervising support personnel. This breakdown of output is more specific than that used by Baker (1984), time spent in direct and non-direct patient care, or Hernandez and Shanklin (1985), patient care and administrative activities. The breakdown of output into levels of care was done to determine the time spent on the various categories of patients. This would provide more specific information on how the work week of the clinical dietitian was spent, thus providing a basis for a model for the development of productivity standards for the clinical dietitian. The tasks utilized were those developed by Hernandez and Shanklin (1985). Categorization of the variables as to direct, indirect, and nonpatient activities was completed based on expert opinion of practicing dietitians who participated in the pretest, nutrition faculty at Virginia Polytechnic Institute and State University, and experience of the researcher. The input measure used was

hours worked per week as recommended by Greenberg (1973).

A survey methodology was used to gather the data on the dependent and independent variables. A list of definitions of terms was included in the survey to ensure some degree of internal validity.

Time Frame

The survey instrument was pretested in mid February using a subsample of 10 participants employeed in a hospital with the food service contracted by one of the companies supporting the research. The instrument was revised according to their reaction to questions and suggestions.

The survey was then mailed to the entire population in early March. One week later a postcard reminder was sent to all participants. This served as a reminder for those who had not returned the survey and a thank you for those who had returned the survey. Three weeks following the original mailing, a letter and replacement questionnaire was sent to nonrespondents (Dillman, 1978). Phone calls were used to clarify questions on returned surveys.

Variables

Dependent

The major dependent variables were developed through the Delphi Technique. They were hours spent in :

Direct care of patients in the basic care level

Direct care of patients in the intermediate care level

Direct care of patients in the advanced intermediate care level

Direct care of patients in the indepth care level

Indirect care of patients in the basic care level

Indirect care of patients in the intermediate care level

Indirect care of patients in the advanced intermediate care level

Indirect care of patients in the indepth care level

Nonpatient care activities

Independent

The independent variables used were researcher developed with the exception of the allocation of time to the tasks performed by the clinical dietitian. The allocation of time to the tasks performed was measured by the level of activity performed in direct, indirect and nonpatient care activities. These activities were adapted from those used by Hernandez and Shanklin (1985). The independent variables used were:

Patient load of the clinical dietitian

Years of experience of the clinical dietitian

The allocation of time to tasks performed by the clinical dietitian

Consultation methods used by the clinical dietitian

Size of the hospital

Employment status of the clinical dietitian

Mission of the hospital

Percent occupancy of the hospital

Percent of budget generated by Medicare patients

Hypotheses

The hypotheses studied in this investigation were:

Productivity is not affected by the patient load of the clinical dietitian

Productivity is not affected by the experience of the clinical dietitian

Productivity is not affected by the allocation of time to tasks performed by the clinical dietitian

Productivity is not affected by the type of consultation methods used by the clinical dietitian

Productivity is not affected by the size of the hospital

Productivity is not affected by the employment status of the clinical dietitian

Productivity is not affected by the mission of the hospital

Productivity is not affected by the percent occupancy of the hospital

Productivity is not affected by the percent of budget generated by Medicare patients

Measurement

The measurement of the input, hours worked per week, was meaasured using the following survey question:

> During the last month on the average, how many hours a week did you work?_____

The measurement of the output was measured by the following survey question:

> During the last month on the average, how many hours a week did you spend in each of the following categories of activities?
>
> ____Direct care of patients in the basic care level
> ____Direct care of patients in the intermediate care level
> ____Direct care of patients in the advanced intermediate care level
> ____Direct care of patients in the indepth care level
>
> ____Indirect care of patients in the basic care level
> ____Indirect care of patients in the intermediate care level
> ____Indirect care of patients in the advanced intermediate care level
> ____Indirect care of patients in the indepth care level
>
> ____Nonpatient care activities

The measurement of the independent variables patient load of the clinical dietitian, experience of the clinical dietitian, size of the hospital, employment status of the clinical dietitian, mission of the hospital, occupancy rate, and percent of budget generated by Medicare patients were measured by the following questions:

How many beds does your hospital presently have available for patient use?_____

For the last month, what has been the average percentage occupancy for your hospital?_____

For the last month, what has been the average number of patients per week you have seen professionally?_____

Is your hospital:

____ Profit
____ Nonprofit

In what classification is your hospital :

____General Hospital
____Medical Center
____Community Hospital
____Psychiatric Hosptial
____Pediatric Hospital
____Other Specialized

By whom are you employed?

____ The Hospital
____ The Food Service Contract Company

What percentage of the hospital revenue is generated by unsupplemented medicare or medicaid patients?

____20% and under
____21 To 40%
____41 To 60%
____61 To 80%
____81 To 100%

Unsupplemented excludes all other insurance coverage.

Of the total number of Dietitians employed in your hospital, how many full time equivalence are:

____Clinical
____Administrative

Full time equivalence is equal to working 40 hours per week.

How many full time equivalence Dietary Technicians are employed in your hospital?_____

In what year did you receive your registration with the American Dietetic Association?_____

The allocation of time to tasks performed by the clinical dietitian and consultation methods used by the clinical dietitian were measured using survey questions which asked the participants to assess their activity level in a variety of tasks. It was felt by the researcher that the participants would be more likely to return a survey with this type of question, rather than one with a question which asked them to identify the number of hours spent in a variety of tasks. To answer a survey which requests information on the hours spent in a variety of tasks requires data which dietitians do not normally keep. Additionally a large amount of time is required to complete a survey which requests such information. For these reasons the following survey questions were used.

What percentage of these patients are:

_____ Inpatients
_____ Outpatients

Of the time spent in direct, indirect, and nonpatient care activities, what percentage involves out patients and/or out patient activities? _____

For questions 8, 9, and 10 according to the scale below Please circle the category which best describes your activity

level, during the last month, in each of the following tasks.

0_____1_____2_____3_____4_____5
none little moderate high

Direct patient care:						
Collecting patient preferences	0	1	2	3	4	5
Conducting diet histories	0	1	2	3	4	5
Individual diet instructions	0	1	2	3	4	5
Group Diet Instructions	0	1	2	3	4	5
Diet instruction with film strips	0	1	2	3	4	5
Giving follow up diet instructions	0	1	2	3	4	5
Taking anthropometric measures	0	1	2	3	4	5
Indirect patient care:						
Intake nutrient analysis	0	1	2	3	4	5
Performing nutritional assessments	0	1	2	3	4	5
Calculating modified diets	0	1	2	3	4	5
Recording in medical records	0	1	2	3	4	5
Reviewing medical records	0	1	2	3	4	5
Medical rounds	0	1	2	3	4	5
Patient care conferences	0	1	2	3	4	5
Writing modified diet menus	0	1	2	3	4	5
Developing nutritional care plans	0	1	2	3	4	5
Nutritional care follow-up	0	1	2	3	4	5
Nonpatient care:						
Medical conferences	0	1	2	3	4	5

Hospital committee meetings	0	1	2	3	4	5
Department committee meetings	0	1	2	3	4	5
Departmental staff meetings	0	1	2	3	4	5
Marketing nutritional services	0	1	2	3	4	5
Procuring specialized products	0	1	2	3	4	5
Dispensing specialized products	0	1	2	3	4	5
Quality Assurance Programs	0	1	2	3	4	5
Setting nutritional care standards	0	1	2	3	4	5
Supervising support personnel	0	1	2	3	4	5
Instructing Interns/Technicians	0	1	2	3	4	5
Administrative record keeping	0	1	2	3	4	5
Document development/review	0	1	2	3	4	5
Food service responsibilities	0	1	2	3	4	5
Reading Professional Literature	0	1	2	3	4	5
Attending professional conferences	0	1	2	3	4	5

Additional Variables

Two new independent variables were created using the data gathered in the survey from phase two. These variables were used to further analyze the relationships of the variables. The ratios were :

Administrative/Clinical dietitians

Technicians/Clinical dietitians

Five new dependent variables were created from the data which were used as measures of productivity. They were created due to the lack of correlations found between the independent variables and dependent variables of time spent in the subcategories of dierct and indirect patient care. The variables created were:

The activity level in nonproductive activities

Hours spent in direct patient care/total hours worked

Hours spent in indirect patient care/total hours worked

Hours spent in nonpatient care/total hours worked

Hours spent in direct plus indirect patient care/ total hours worked (Productivity Ratio)

The nonproductive activity category was composed of five activities listed as affecting the productivity of the clinical dietitian that were identified by the researcher as activities which should be performed by technicians. They were:

Collecting patient preferences

Conducting diet histories

Dispensing specialized products

Administrative record keeping

Food service responsibilities

Analyses of Data

The SAS (Statistical Anaylsis System) statistical package was used for the analyses of data. Formulas for the calculations are presented in Appendix C.

Frequencies, means, and standard deviations were calculated for all variables. The dependent variables were correlated with the independent variables to determine the relationship between them. To further analyze the relationship of these variables with the productivity measures, a stepwise multiple linear regression statistical technique was used. The regression procedure added variables in order of importance according to statistical significance. Each successive variable added to the model accounted for the greatest amount of variance in conjunction with each previously added varibale to explain the variance in the dependent variable. This procedure yielded a weighting factor for each variable in each model. These models were used as measures of productivity.

Chapter 4

RESULTS

Response Rate

A total of 485 responses (53.5%) were received before the deadline date of April 28, 1986. Of these 283 (31.3%) were usable. Those classified as unusable were those received from administrative dietitians, food service supervisors, dietary technicians, or clinical dietitians who failed to complete the form properly.

Profile of Nonresponse

To ensure the study was not biased by the nonresponse of clinical dietitians representing one size or classification of hospital, a study of nonrespondents was conducted. Twenty-five nonrespondents were randomly selected representing both companies participating in the study. The information was gathered from the corporate office of one corporation and directly from respondents employed by the second corporation. Nonrespondents were contacted directly in this case due to the nonavailability of information from one of the corporations. The profile showed that a variety of hospitals were represented in the nonresponse. Thirty-three percent were community, general

and medical centers composed 27% each and 5% were categorized as other specialized. The number of clinical dietitians employed in these hospitals ranged from 0.5 to 20. The size ranged from 90 to 1200 beds. The profile of nonrespondents conformed to that of the respondents. It was determined from this that the study was not biased by nonresponse from any one type or size or hospital.

Means, Frequencies and Standard Deviations

Beds

The size of hospital, measured by the number of beds, sampled in this study ranged from 40 to 1200 with the mean of 377 and a standard deviation of 274. These values were widely distributed with 10% of the sample having 250 beds, 4.5% having 300 beds, and 5.2% having over 1,000 beds.

Occupancy

The percent occupancy of the hospitals participating in the study ranged from 36 to 101 with a mean of 74% and a standard deviation of 13.45%. The percent occupancy values were widely distributed with 11% having 70% and 11% having 80%. The hospital reporting 101% probably used a formula which incorporated outpatient equilivants.

Hours worked

The hours worked per week by the clinical dietitians participating in this study ranged from 10 to 60 with a mean of 42.7 and a standard deviation of 7.2. Forty hours a week were worked by 32%, 45 hours by 18% and 50 hours by 18%. The sample included part time as well as full time clinical dietitians with 6% working less than 30 hours per week.

Number of Patients Seen by the Clinical Dietitian

The number of patients seen by the clinical dietitian per week ranged from 4 to 700 with a mean of 58 and a standard deviation of 63. This wide range was probably due to the inclusion of patients seen during meal rounds. Nine percent of the respondents reported seeing 50 patients and 6% reported seeing 30 patients.

Percent of Inpatients

The percent of inpatients seen by the clinical dietitian ranged from 0 to 100 with a mean of 86% and a standard deviation of 24%. The sample included inpatient and outpatient clinical dietitians. Seventy-four percent of the sample reported that 90% of their patients were inpatients.

Percent of Outpatients

The percent of outpatients seen by the clinical dietitian ranged from 0 to 100 with a mean of 14.6% and a standard deviation of 25%. Eighty percent of the sample reported that only 20% of their patients were outpatients.

Percent of Time Spent in Outpatient Care

The percent of time spent in outpatient care ranged from 0 to 100 with the mean of 13.6% and a standard deviation of 22%. Eighty-four percent of the sample reported spending 20% or less of their time in outpatient care. The survey included inpatient and outpatient clinical dietitians.

Hours Spent in Direct Basic Patient Care

The hours spent in direct basic patient care reported by the sample ranged from 0 to 39 with the mean of 4.7 and a standard deviation of 5.3. Ninety-three percent of the sample reported spending 10 hours or less in this level of care. The dietary technician is adequately trained to perform nutritional care for this level of patient, thus allowing the clinical dietitian to devote more time to more critically ill patients. However, an average of two technicians per hosptial was reported.

Hours Spent In Direct Intermediate Care

The hours spent in direct intermediate care of patients ranged from 0 to 25 with a mean of 5.4 and a standard deviation of 4.3. Ninety-two percent reported spending 10 hours or less per week in this level of care. It is generally accepted by the dietetic profession that the technician is adequately trained to provide nutritional care for this level of patient.

Hours Spent in Direct Advanced Intermediate Care

The hours per week spent in direct care of the advanced intermediate level patient ranged from 0 to 35 with a mean of 6 and a standard deviation of 5.4. Eighty-eight percent reported spending 10 hours or less in the care of this level of patient. Twelve percent reported no time spent in this category, 17% reported spending 5 hours and 13% reported spending 10 hours. The patients in this category are at nutritional risk and should be monitored by the clinical dietitian.

Hours Spent in Direct Indepth Care

The hours spent in direct indepth care of patients ranged from 0 to 30 with the mean of 4 and standard deviation of 5. Ninety-four percent of the sample reported spending 10 hours or less in this care level. A fewer number of patients would be categorized as requiring indepth nutritional care as

compared to intermediate and advanced intermediated care. These patients require a large amount of individual attention and constant monitoring for nutritional adequacy.

Hours Spent in Indirect Basic Care

The hours spent by the clinical dietitian in the sample in this care level ranged from 0 to 25 with a mean of 3.8 and a standard deviation of 4. Eighty-six percent of the sample reported spending six or less hours. The activities associated with this category could be performed by the dietary technician and in many cases a less trained dietary assistant (Journal of the American Dietetic Association, 1974).

Hours Spent in Indirect Intermediate Care

The hours spent in this category ranged from 0 to 24 with a mean of 3 and standard deviation of 2. Ninety-four percent of the respondents reported spending six or less hours in this category of activity. These tasks could also be handled by the dietary technician (Journal of the American Dietetic Association, 1974).

Hours Spent in Indirect Advanced Intermediate Care

The clinical dietitians sampled reported spending from 0 to 20 hours per week in this category of activity with a mean of 3.7 and a standard deviation of 3.6. Eighty-three

percent reported spending six or less hours in this category. This category would represent such activities as calculating individualized diets for multiple nutrient restrictions which requires a substantial amount of time. Based on the researchers experience, it can be noted that as experience increases, the speed at which this can be preformed increases. Also computerized programs have been developed for these calculations of certain modified diets which can decreased the time needed.

Hours Spent in Indirect Indepth Care

The hours spent in this category reported by the respondents ranged from 0 to 36 with a mean of 3.1 and a standard deviation of 4.1. Eighty-eight percent reported spending six hours or less in this category. Calculations of specialized diets for this level of patient are complicated and extremely time consuming.

Hours Spent in Nonpatient Care

The hours spent in this group of activities reported by the respondents ranged from 0 to 30 with a mean of 7.3 and a standard deviation of 6.6. No dietitians were included in the study who spent more than 30 hours a week in nonpatient care. These dietitians were considered by the researcher to be administrative dietitians and felt that their inclusion

would bias the study. The tasks performed by the administrative dietitian differ significantly from those performed by the clinical dietitian. Eighty percent of the sample reported spending 10 or less hours, 14% from 10 to 20 hours, and 6% from 20 to 30 hours.

Number of Clinical Dietitians

The number of full time equivalent (working 40 hours per week) clinical dietitians employed in the hospitals represented in the sample ranged from 0.5 to 26 with the mean of 5.8 and the standard deviation of 6.5. Eighteen percent reported one or less, 15% reported 2, 18% reported 3, 3% reported 5 and 6, 4% reported 17. and 5% reported 23. The larger hospitals employed the larger number of clinical dietitians. A 1200 bed hospital reported having 23 clinical dieitians.

Number of Administrative Dietitians

The number of full time equivalent administrative dietitians ranged from 0.25 to 13 with a mean of 2 and a standard deviation of 2.65. Sixty-five percent reported having less than one administrative dietitian. The hospitals that reported having 10, 11, and 13 administrative dietitians were those hospital with over 1,000 beds.

Number of Dietary Technicians

The number of full time equivalent dietary technicians employed in the hospitals represented by the sample ranged from 0 to 20 with a mean of 2 and a standard deviation of 3.7. Fourty-eight percent of the sample reported having no dietary technicians, 18% had one or less, 7% had 2, 6% had 6, and 5% had 7. A large portion of the sample reported having no dietary technicians which could relieve the clinical dietitian of the care of the patients in the basic and intermediate care levels and nonpatient care activities, such as tray line supervision.

Years of Experience

The years of experience of the clinical dietitians in the sample ranged from less than one to 32 with a mean of 5.5 and a standard deviation of 5.7. Twenty-one percent reported having one or less and 46% had from 1 to 5.

Type of Education

One hundred sixteen respondents or 40% completed a B.S. in nutrition with internship . Eighty-four or 29% completed a B.S. in nutrition in a coordinated undergraduate program in dietitics. Fourty-five or 15.9% completed a M.S. with approved work experience. The remainder were eligable for registration through B.S. degrees in nutrition with traineeships or 3 year work experiences or through the

grandfather clause of the Bylaws of the American Dietetic Association.

Mission of the Hospital

The mission of the hospital was defined as profit or nonprofit. The profit category was composed of 21.6% and the nonprofit 78.4 %

Type of Hospital

The hospitals were categorized as general, medical centers, community, psychiatric, pediatric, and other specialized. General hospitals represented 26% of the population, medical centers 38%, community hospitals 26.6% and the remainder accounted for 8.9%.

Employment

Employment was defined as being employed by the hospital or the foodservice company. Thirty-two percent were employed by the hospital and 67.9% by the food service company. Even though the surveys were mailed to employees of the food service company, they were completed by the clinical dietitian who was employed by the hospital. This occured because the employee of the food service company to whom the survey was mailed was an administrative dietitian or foodervice director and instructions on the survey requested

that the survey be completed by clinical dietitians.

Medicare or Medicaid

The percentage of the budget that was generated by unsupplemented medicare or medicaid patients in the hospitals in which respondents were employeed was widely distributed among the categories. This is shown in Table 3. One hundred respondents did not answer the question. Several noted on the survey that this information was not available.

Activities Performed by the Clinical Dietitian

The activity level of the clinical dietitian in 33 activities categorized as direct, indirect, and nonpatient care were measured using the following scale:

0_____1_____2_____3_____4_____5
none little moderate high

The frequencies represent the number of responses for each of the six points on the scale.
response level.

Direct Patient Care

Collecting Patient Preferences

The activity level in collecting patient preferences by

TABLE 3

Percentage of Hospital Revenue Generated by Medicare or Medicaid Patients

Category	Number	Percent
20% or under	41	22
21 to 40%	62	33.3
41 to 60%	58	31
61 to 80	21	11.3
81 to 100%	4	2.1
no response	100	---

clinical dietitians was considered to be less than moderate by 48% of the respondents. This task is more appropriately completed by the dietary technician . It is often unnecessary to perform this task when selective menus are used. However, not all hospitals use selective menus and those that use selective menus for regular and soft diets may not use them for nutrient modified diets. Table 4 shows the complete results.

Conducting Diet Histories

The activity level in conducting diet histories was considered moderate or above by 70% of the respondents. This task can be performed by the dietary technician (Journal of the American Dietetic Association, 1974). Table 5 presents complete results.

Individual Diet Instructions

The activity level in giving individual diet instructions was considered moderate or above by 86% of the respondents. Table 6 shows complete results. The dietary technician can perform this task for basic and intermediate care levels of patients.

Group Diet Instructions

The activity level for performing group diet instruction was considered to be none by 49.6% and little by

TABLE 4

Responses for the Activity Level in Collecting Patient Preferences by the Cinical Dieitian

Activity level	Number	Percentage
0	17	6
1	59	20.8
2	60	21.2
3	80	28.2
4	33	11.7
5	34	12

TABLE 5

Responses for the Activity Level in Conducting Diet Histories by the Clinical Dietitian

Activity level	Number	Percentage
0	6	2.1
1	31	10.9
2	45	15.9
3	97	34.4
4	59	20.9
5	44	15.6

TABLE 6

Responses for the Activity Level in Individual Diet Instructions by the Clinical Dietitian

Activity level	Number	Percentage
0	0	0
1	10	3.53
2	32	11.3
3	70	24.7
4	78	27.5
5	93	32.8

21.2% of the respondents. Table 7 shows complete results. It is the experience of the researcher that group diet instructions work very well for weight loss and diabetic patients. Thus allowing the clinical dietitian to counsel a larger amount of patients in a given period of time.

Diet Instructions With Film Strips

The activity level of giving diet instructions with film strips was considered to be none by 72.0% and little by 14.9% of the respondents. Table 8 shows complete results. Film strips serve to reinforce the principles discussed in the diet instruction and in many cases decrease the direct contact time with the patient by the clinical dietitian. However, these are not appropriate for all care levels of patients.

Follow-Up Diet Instructions

The activity level of giving follow-up diet instructions was diverse among respondents. Table 9 shows complete results.

Taking Anthopometric Measures

The activity level of taking anthopometric measurements was reported by the respondents to be little or none by 82.6%. Table 10 shows complete results.

TABLE 7

Responses for the Activity Level in Group Diet Instructions by the Clinical Dietitian

Activity level	Number	Percentage
0	140	49.6
1	60	21.2
2	28	9.9
3	32	11.3
4	14	4.9
5	8	2.8

TABLE 8

Responses for the Activity Level in Diet Instructions with Film Strips by the Clinical Dietitian

Activity level	Number	Percentage
0	203	72.0
1	42	14.9
2	13	4.6
3	16	5.6
4	7	2.5
5	1	.36

TABLE 9

Responses for the Activity Level in Giving Follow-Up Diet Instructions by the Clinical Dietitian

Activity level	Number	Percentage
0	24	8.5
1	62	22.1
2	69	24.6
3	73	26.0
4	38	13.6
5	14	5.0

TABLE 10

Responses for the Activity Level in Taking Anthopometric Measures by the Clinical Dietitian

Activity level	Number	Percentage
0	166	58.6
1	68	24.0
2	14	4.9
3	16	5.7
4	14	4.9
5	5	1.7

Indirect Patient Care

Nutrient Intake Analysis

The activity level of performing nutrient intake analysis was reported to be diverse by the respondents. Slightly over 30% responded that it was performed moderately. Table 11 shows complete results. Computer programs have been developed which aid in this task. Foods and quantities consumed are entered and a complete nutrient analysis can be obtained which speeds this task.

Performing Nutritional Assessments

The activity level of performing nutritional assessments was reported by 22.5% to be moderate, 24.3% as above moderate and 32.1% as high. This task represents one of the most appropriate activities for the clinical dietitian to perform. It requires the synthesis of a variety of information. Table 12 shows complete results.

Calculating Modified Diets

The activity level of calculating modified diets was diverse as reported by the sample. Twenty-nine percent responded moderate. Table 13 shows complete results. Calculating modified diets can be performed by the technician for patients in the basic and intermediate care level (Journal of the American Dietetic Association, 1974).

TABLE 11

Responses for the Activity Level in Nutrient Intake Analysis by the Clinical Dietitian

Activity level	Number	Percentage
0	18	6.4
1	52	18.5
2	62	22.0
3	86	30.6
4	33	11.7
5	30	10.7

TABLE 12

Responses for the Activity Level in Performing Nutritional Assessments by the Clinical Dietitian

Activity level	Number	Percentage
0	11	3.9
1	18	6.4
2	30	10.7
3	63	22.5
4	68	24.3
5	90	32.1

TABLE 13

Responses for the Activity Level in Calculating Modified Diets by the Clinical Dietitian

Activity level	Number	Percentage
0	4	1.4
1	36	12.8
2	55	19.6
3	82	29.0
4	53	18.8
5	51	18.1

Recording In Medical Records

The activity level of recording in medical records was considered high by 54% of the respondents and moderate or above by 43.4%. It is the experience of the researcher that clerical assistance can aid in this task by generating computer charting sheets which meet the criteria of quality assurance programs. The clinical dietitian can then fill in pertinent information for the patient. Use of such computer generated charting sheets could speed considerably the charting process. Table 14 shows complete results.

Reviewing Medical Records

Reviewing medical records was reported by the participants to be a high activity level task by 51.6% and 42.9% moderate and slightly above. Table 15 presents results. This is an important task for properly assessing the nutritional status of patients.

Medical Rounds

The activity level for participating in medical rounds was none by 39.9%. The remainer reported diverse levels. Table 16 shows complete results. Medical rounds are more frequently conducted on medical surgical, cardiac and oncology wards in larger hospitals.

TABLE 14

Responses for the Activity Level in Recording in Medical Records by the Clinical Dietitian

Activity level	Number	Percentage
0	1	.36
1	3	1.0
2	3	1.0
3	40	14.1
4	83	29.3
5	153	54.0

TABLE 15

Responses for the Activity Level in Reviewing Medical Records by the Clinical Dietitian

Activity level	Number	Percentage
0	4	1.4
1	5	1.8
2	6	2.1
3	50	17.7
4	71	25.3
5	145	51.6

TABLE 16

Responses for the Activity Level in Medical Rounds by the Clinical Dietitian

Activity level	Number	Percentage
0	113	39.9
1	52	18.3
2	26	9.2
3	36	12.7
4	20	7.1
5	36	12.7

Patient Care Conferences

The activity level of patient care conferences reported was diverse. Table 17 shows complete results. These types of meetings are usually associated with critically ill or long term patients.

Writing Modified Diet Menus

Writing modified diet menus was reported to be a lower activity level task with 22.7% reporting none, 28.7% little and 17% less than moderate. Once modified diet menus have been written for the hospital, they are adjusted or changed infrequently. This task should be completed by the dietary technician for the less complicated level of care patients. Table 18 shows complete results.

Developing Nutritional Care Plans

The activity level of developing nutritional care plans was reported as moderate or above by 77.4% of the participants. Table 19 shows complete results. This task is an appropriate use of the clinical dietitians time.

Nutritional Care Follow-up

Nutritional care follow-up was reported to be a moderate level activity by 32.3%, above moderate by 31.6% and high by 23.8%. Table 20 shows complete results. This task is very important to the nutritional care of the patient and

TABLE 17

Responses for the Activity Level in Patient Care Conferences

Activity level	Number	Percentage
0	57	20.2
1	50	17.8
2	54	19.2
3	56	19.9
4	36	12.8
5	28	9.9

TABLE 18

Responses for the Activity Level in Writing Modified Diet Menus

Activity level	Number	Percentage
0	64	22.7
1	81	28.7
2	48	17.0
3	56	19.8
4	15	5.3
5	18	6.4

TABLE 19

Responses for the Activity Level in Developing Nutritional Care Plans by the Clinical Dietitian

Activity level	Number	Percentage
0	20	7.1
1	18	6.3
2	26	9.2
3	75	26.5
4	72	25.4
5	72	25.4

TABLE 20

Responses for the Activity Level in Nutritional Care Follow-Up by the Clinical Dietitian

Activity level	Number	Percentage
0	4	1.4
1	10	3.5
2	20	7.1
3	91	32.3
4	89	31.6
5	67	23.8

should be performed on a routine basis.

Nonpatient Care

Medical Conferences

Attending medical conferences was considered to be a low activity level task by 61.6% of the respondents. Complete results are show in Table 21.

Hospital Committee Meetings

The activity level of the respondents for attending hospital committee meetings ranged from none for 28.1%, little for 31.6% and moderate for 16.3%. Table 22 shows complete results. The nutritional care team in a hospital should be visable and participate in hospital administrative functions, however, this is more appropriately handled by the administrative dietitian.

Department Committee Meetings

The activity level of attending department committee meetings was reported by the respondents to be evenly distributed between none and moderate. Table 23 shows complete results. These meetings are important for a department to function well, however, they should not represent a large portion of the clinical dietitians work time.

TABLE 21

Responses for the Activity Level in Attending Medical Conferences by the Clinical Dietitian

Activity level	Number	Percentage
0	83	29.5
1	89	31.6
2	56	19.9
3	30	10.6
4	12	4.3
5	11	3.9

Table 22

Responses for the Activity Level in Attending Hospital Committee Meetings by the Clinical Dietitian

Activity level	Number	Percentage
0	79	28.1
1	89	31.6
2	46	16.3
3	48	17.0
4	13	4.6
5	6	2.1

TABLE 23

Responses for the Activity Level in Attending Department Committee Meetings by the Clinical Dietitian

Activity level	Number	Percentage
0	64	22.8
1	63	22.5
2	65	23.2
3	58	20.7
4	18	6.4
5	12	4.2

Departmental Staff Meetings

Departmental staff meetings represented a low to moderate activity level category with 83.9% of the respondents falling in this range. Table 24 shows complete results. Department staff meetings are important for a well functioning department, but should not dominate the time of any departmental personnel.

Marketing Nutritional Services

Marketing nutritional services is becoming a more emphasized activity for the nutritional staff as the patient load shifts from inpatient to outpatient. The activity level for this task was reported as none for 28.9%, little for 22.96%, and moderate by 15%. Only a small portion 6.3% reported it as a high activity level task. Table 25 shows complete results.

Procuring Specialized Products

Procuring specialized products was a low activity level task for 42.9% of the respondents and little for 29.8%. Table 26 shows complete results. Procuring specialized products should be performed by the administrative dietitian with the assistance of the clinical dietitians requesting the products which meet the needs for their patients.

TABLE 24

Responses for the Activity Level in Attending Departmental Staff Meetings by the Clinical Dietitian

Activity level	Number	Percentage
0	19	6.7
1	61	21.5
2	76	26.8
4	28	9.9
5	17	6.0

TABLE 25

Responses for the Activity Level in Marketing Nutritional Services by the Clinical Dietitian

Activity level	Number	Percentage
0	82	28.9
1	65	22.9
2	50	17.7
3	43	15.1
4	25	8.8
5	18	6.4

TABLE 26

Responses for the Activity Level in Procuring Specialized Products by the Clinical Dietitian

Activity level	Number	Percentage
0	121	42.9
1	84	29.8
2	39	13.8
3	26	9.2
4	6	2.1
5	6	2.1

Dispensing Specialized Products

The activity level of dispensing specialized products was reported as none or little by 67% of the respondents. These products can be dispensed as a food product by the kitchen staff. Often due to the cost of these products, tighter control is desired and the task of dispensing then is assigned to the clinical dietitians. Table 27 shows complete results.

Quality Assurance Programs

The activity level for quality assurance programs varied from none for 19.4% to moderate for 25.4% and above moderate for 12.7%. Table 28 shows complete results. The quality assurance programs are important to maintaining quality patient care. Larger hospitals have well established programs and many small hospitals are working to establish such programs.

Setting Nutritional Care Standards

The activity level of setting nutritional care standards was similar to that of quality assurance programs. Table 29 shows the diverse results. Setting nutritional care standards is important for quality nutritional care of the ill. These standards have been emphasized in large hospitals for a number of years.

TABLE 27

Responses for the Activity Level in Dispensing Specialized Products by the Clinical Dietitian

Activity level	Number	Percentage
0	114	40.3
1	76	26.9
2	44	15.5
3	34	12.0
4	9	3.18
5	6	2.12

TABLE 28

Responses for the Activity Level in Quality Assurance Programs by the Clinical Dietitian

Activity level	Number	Percentage
0	55	19.4
1	59	20.8
2	42	14.8
3	72	25.4
4	36	12.7
5	19	6.7

TABLE 29

Responses for the Activity Level in Setting Nutritional Care Standards by the Clinical Dietitian

Activity level	Number	Percentage
0	54	19.2
1	72	25.7
2	51	18.2
3	68	24.2
4	22	7.9
5	13	4.6

Supervising Support Personnel

The activity level of participants for supervising support personnel covered a wide range with no category having more that 26.5%. Table 30 shows the complete results. Supervising food service support personnel can be done by the dietary technician, such as the trayline or workers who deliver tray to the floors. The clinical dietitian should, however, supervise the nutritional care activities of the dietary technician.

Instructing Interns and Technicians

Instructing interns or technicians was considered a low activity task by 64% of the respondents. Of these 37.1% reported no activity in this area. Table 31 shows the results. Interns and technicians would most probably be working in larger hospitals where a larger number of dietitians could divide the task, thus reducing the activity level for any one dietitian for this task.

Administrative Record Keeping

The activity level of the respondents for administrative record keeping was widely distributed from 16.2% for none, 24% moderately and 11.7% high. Table 32 shows complete results. Administrative record keeping could be performed by clerks and secretarial assistance and does not require the expertise of the clinical dietitian.

TABLE 30

Responses for the Activity Level in Supervising Support Personnel by the Clinical Dietitian

Activity level	Number	Percentage
0	35	12.4
1	39	13.8
2	58	20.5
3	75	26.5
4	40	14.1
5	36	12.7

TABLE 31

Responses for the Activity Level in Instructing Interns/Technicians by the Clinical Dietitian

Activity level	Number	Percentage
0	105	37.1
1	35	12.4
2	43	15.1
3	44	15.5
4	35	12.4
5	21	7.4

TABLE 32

Responses for the Activity Level in Administrative Record Keeping by the Clinical Dietitian

Activity level	Number	Percentage
0	46	16.2
1	61	21.5
2	48	16.9
3	68	24.0
4	27	9.5
5	33	11.7

Document Development and Review

The activity level for document development and review was diverse ranging from 25.1% little to 22.2% above moderate. Table 33 shows complete results. Development and review of documents is necessary for the department to operate efficiently. Clinical dietitians should be involved with those documents which directly affect the nutritional care of the patient. However, this should not dominate the work time.

Food Service Responsibilities

Food service responsibilities such as supervising the tray line, checking trays and monitoring food quality was reported to be little or none by 41.6% of the respondents. Table 34 shows complete results. These responsibilities should be performed by the dietary supervisors, dietary assistants and if necessary the dietary technicians.

Reading Professional Literature

Reading professional literature is important for updating the clinical dietitian to the latest medical knowledge which affects the nutritional care of the patients. Activity level in this category was reported to be little

TABLE 33

Responses for the Activity Level in Document Development and Review by the Clinical Dietitian

Activity level	Number	Percentage
0	49	17.5
1	70	25.1
2	57	20.4
3	62	22.2
4	29	10.4
5	12	4.3

TABLE 34

Responses for the Activity Level in Food Service Responsibilities by the Clinical Dietitian

Activity level	Number	Percentage
0	50	17.7
1	68	24.0
2	60	21.2
3	52	18.4
4	30	10.6
5	23	8.1

by 24.7%, moderate by 30.7% and above moderate by 10.2%. Several respondents noted on the survey that this was not done at all on the job, but on a moderate basis off the job. Table 35 shows complete results.

Attending Professional Conferences

The clinical dietitian is required to obtain 75 hours of continuing education credits every 5 years to retain registration. Accumulation of these credits may be accomplished through professional conferences, journal clubs, or other approved activities. The activity level for this category ranged from none for 21.9%, little for 30.1% and less than moderate for 21.6%. Table 36 shows the results.

Nonproductive Activities

The scores of the five identified nonproductive activities were compiled to determine a mean and standard deviation for this group of activities. The mean was 3.2 and the standard deviation .82. The coefficient alpha was .49. The mean score indicates that dietitians were engaging in nonproductive activities on a moderate level.

Correlation Coefficients for Independent Variables

Correlation is a statistical technique used to show the relationship between an independent and dependent variable

TABLE 35

Responses for the Activity Level in Reading Professional Literature by the Clinical Dietitian

Activity level	Number	Percentage
0	10	3.5
1	70	24.7
2	77	27.2
3	87	30.7
4	29	10.2
5	10	3.5

TABLE 36

Responses for the Activity Level in Attending Professional Conferences by the Clinical Dietitian

Activity level	Number	Percentage
0	62	21.9
1	85	30.1
2	61	21.6
3	50	17.7
4	16	5.7
5	8	2.8

(Pedhazur, 1973). Correlational coefficient values range from -1 to 1. The correlation coefficients considered important in this study were those with an absolute values of .25 or greater and which were statistically significant at the .0001 probability level.

Beds

Four variables were correlated with the number of beds in the hospitals. They were:

quality assurance programs	-.31
supervising support personnel	-.28
food service responsibilities	-.31
employment by the hospital	-.52

The correlation values indicate that the smaller the number of beds, the more administrative duties (specifically supervising support personnel, food service responsibilities such as tray line supervision, and developing quality assurance programs) were performed by the clinical dietitian. This could be due to the fact that in many small hospitals one dietitian performs both jobs. It also showed that the smaller the number of beds, the more likely the dietitian was to be employed by the contract food service company. This is illustrated in Table 37 which shows that as the number of beds increase the responses shift from the moderate range to the little or none category for the level of food service

TABLE 37

Number and Percent of Responess According to Bed by Level of Food Service Responsibility

Beds	Numbers and Percent of Responses for the Activity Level in Food Service Responsibilities						
	0	1	2	3	4	5	total
0-200	11	13	15	25	16	12	92
	12%	14%	16%	27%	17%	13%	
201-400	10	26	26	19	10	8	99
	10%	26%	26%	19%	10%	8%	
Over 400	29	29	19	8	4	3	92
	32%	32%	21%	9%	4%	3%	

Chi- Square 44.70 df 10 Prob < .0001

responsibilities performed.

Occupancy

Occupancy was correlated with two variables. They were:

quality assurance programs	-.28
instructing interns and technicians	.25

The correlation coefficients indicate that with a lower occupancy the dietitian was spending more time developing quality assurance programs. This could be a function of the time available for tasks which were postponed in the past due to the lack of time, or a function of size. The instructing of interns and technicians was occuring in facilities with higher occupancy rates. These facilities would have an increased number of patients and possibly a wider variety of clients to provide better learning experiences for the students. Also these may be larger teaching hospitals, in which more technicians would be employed.

Percent Inpatients

The percent of inpatients was corelated with two variables:

giving follow-up diet instructions	-.30
reviewing medical records	.28

The correlation values indicate that as the percent of

inpatients in relation to total patients seen by the clinical dietitian increases, the lower the activity level in giving follow-up diet instructions and higher the activity level in recording in medical records. This relationship can possibly be explained by the shortened length of stay of patients in hospitals. The average patient stay has decreased to seven days which does not allow adequate time for follow up diet instructions. Also the patients who enter the hospital are more seriously ill and require more extensive care which involves adequate documentation in the medical records.

Percent of Outpatients

Two variables were correlated with the percentage of outpatients in relation to the total number of patients seen by the clinical dietitian. They were:

giving follow-up diet instructions	.26
reviewing medical records	-.28

These values indicate that as the number of outpatients seen by the clinical dietitian increases, the activity level in giving follow-up diet instructions increases and decreases for reviewing medical records. Because the average patient is staying fewer days in the hospital, many diet instructions and follow-up diet instructions have been postponed until post discharge. Outpatient clinics frequently do not have

access to all patients medical records, thus shortening the time spent reviewing them.

Percent of Time Spent in Outpatient Care

Two variables were correlated with the percent of time spent in the care of outpatients. They were:

giving individual diet instructions	.28
follow-up diet instructions	.35

The above correlations indicate that as the percent of time spent in outpatient care increases, the activity level in performing individual diet instructions and giving follow-up diet instructions increases. As they length of stay of the patient in the hospital decreases, a shift is occuring in the demand for the services of the dietitian from inpatient to outpatient.

Number of Clinical Dietitians

The number of clinical dietitians employed in the hospital was correlated with two variables. They were:

quality assurance programs	-.31
food service responsiblities	-.30

The correlation values indicate that as the number of dietitians increased that were employed in the hospital, the

lower the activity level in quality assurance programs and food service responsibilities. This could be attributed to the distribution of the tasks between the clinical dietitians or that other staff were employed to perform these tasks. The larger hospitals would require more dietitians and would have the resources to have dietary staff to perform these tasks. Larger hospitals usually have well established quality assurance programs and therefore less time is required in the development of such programs.

Number of Administrative Dietitians

The number of administrative dietitians employeed in the hospital was correlated with three variables. They were:

quality assurance programs	-.31
number of dietary technicians	.50
employment by the hospital	-.50

These values indicate that as the number of administrative dietitians increases the number of technicians increases. This could be due to the size of the hospital or the fact that administrative dietitians realize the importance of these support personnel. Also shown by the correlation was that as the number of administrative dietitians increases the activity level in quality assurance

programs decreases. The activity level in quality assurance programs could be a function of the division of the task among the staff or the size of the hospital and having a well established quality assurance program. As the number of administrative dietitians increased, the correlation indicated that the respondents were more likely to be employed by the contract food service company. The correlation indicates that the contract food service companies may be aware of the importance of the administrative dietitians.

Number of Technicians

The number of dietary technicians employed by the hospital was correlated with:

employment by the hospital	-.33

The correlation indicates that as the number of dietary technicians increases the fewer dietitians were hired by the contract food service company. This could be a function of size of the hosptial. The larger hospitals would have more resources to employ such employees.

Lack of Meaningful Relationships

All correlations for the following independent variables with other independent or dependent variables were either not statistically significant ($p > .05$) or were too

small to suggest meaningful relationships (|r| < .25):

administrative dietitians/clinical dietitians

technicians/clinical dietitians

number of years of experience

profit or nonprofit

number of patients seen by the clinical dietitian

percent of the budget contributed by medicare patients

classification of hospital

This lack of meaningful relationships indicates that there would be no purpose in reporting outcomes by the categories defined by these variables. For example, there would be no statistically significant and meaningful differences for profit versus nonprofit hospitals.

Correlation Coefficients for Dependent Variables

Hours Worked

Three variables were found to correlate with hours worked. They were:

hours spent in nonpatient care	.34
supervising support personnel	.28
employment by the hospital	.27

The correlation values indicate that the more hours a week the dietitian works, the higher the activity level in

the administrative tasks of nonpatient care and supervising support personnel. It also shows that the longer hours per week the dietitian works the more likely they are to be employed with the hospital rather than the food service company. Working longer hours could possibly be due to the fact that most dietitians are staff personnel and feel dedicated to the hospital.

Direct Advanced Intermediate Care

One variable was correlated with direct advanced intermediate care:

giving individual diet instructions .36

The correlation indicates that as the time spent in direct advanced intermediate care increases, the activity level in giving individual diet instructions increases. Individual diet instructions are appropriate for this group of patient who requires instruction on multiple nutrient restrictions such as sodium and weight loss to control heart disease. Diet instruction in this level should be handled by the dietitian rather than the technician and often requires much individualization from patient to patient.

Direct Indepth Patient Care

Two variables were correlated with direct indepth patient care. They were:

anthopometric measurements	.26
medical rounds	.26

Correlation coefficients indicate that the more time spent in direct indepth patient care, the higher the activity level in taking anthopometric measurements and medical rounds. These tasks are appropriate for patients such as severly burned, those requiring TPN or oncology patients, which would be classified as patients requiring indepth nutritional care. These patients require close monitoring for nutritional adequacy. Wards on which these patients are located frequently have health care rounds in which the dietitian is considered a health care professional and requested to participate. This would account for a portion of the work day or week of these clinical dietitians.

Indirect Indepth Patient Care

Indirect indepth patient care was correlated with two variables:

performing nutritional assessments	.30
nutritional care follow-up	.30

These correlations imply that as the time spent in indirect indepth patient care increases, the activity level performing nutritional assessment and performing nutritional follow-up

increases. These activities are appropriate in this category due the nutritional risk of the patient and the time required to perform indepth nutritional assessments. These patients, as referred to earlier, require close monitoring for nutritional adequacy, which requires time each day by the clinical dietitian.

Nonpatient Care

Time spent in nonpatient care was correlated with ten variables. They were:

total hours worked	.34
performing nutritional assessment	-.31
recording in medical records	-.42
reviewing medical records	-.37
nutritional care follow-up	-.26
quality assurance programs	.38
supervising support personnel	.38
administrative record keeping	.42
document development and review	.36
food service responsibilities	.36

The correlation coefficients indicate that as the time spent in nonpatient care increases the activity level in the tasks of performing nutritional assessment, reviewing and recording in medical records, and performing nutritional

follow-up decreases. As the time spent in nonpatient care activities increases the activity level in administrative tasks increases. This can be shown in Tables 38 and 39. Table 38 indicates that as the activity level in quality assurance programs moves from little to moderate the time spent in nonpatient care activities increases. Table 39 illustrates that as the time spent in nonpatient care activities increases the activity level in performing nutritional assessments decreases.

Productivity Ratio

The productivity ratio was positively or negatively related with six variables. They were:

recording in medical records	.32
reviewing medical records	.33
quality assurance programs	-.26
supervising support personnel	-.32
administrative record keeping	-.28
food service responsibilities	-.28

The above correlations indicate that the higher activity level in reviewing and recording in medical records the higher the productivity ratio. These represent tasks which are appropriate for the clinical dietitian for the more nutritionally complex cases. The higher the activity level

TABLE 38

Number and Percentage of Responses According to Time Spent in Nonpatient Care by Level of Activity in Quality Assurance Programs

Hours in Nonpatient Care	Number and Percent of Responses of the Activity Level in Quality Assurance Programs						
	0	1	2	3	4	5	total
0-3	25	26	14	16	4	2	87
	29%	30%	16%	18%	4%	2%	
4 - 7	20	24	11	27	5	7	94
	21%	26%	12%	29%	5%	7%	
8 - 30	10	9	17	29	27	10	102
	10%	9%	17%	29%	27%	10%	

Chi- Square 51.55 df 10 Prob < .0001

TABLE 39

Number and Percentage of Responses According to Time Spent in Nonpatient Care by Level of Activity in Performing Nutritional Assessments

Hours in Nonpatient Care	Number and Percent of Responses for the Activity Level in Nutritional Assessments						
	0	1	2	3	4	5	total
0 - 3	0	5	6	17	18	40	86
	0%	6%	7%	20%	21%	47%	
4 - 7	3	8	14	21	23	25	94
	3%	9%	15%	22%	24%	27%	
8 - 30	8	5	10	25	27	25	100
	8%	5%	10%	25%	27%	25%	

Chi- Square 51.55 df 10 Prob < .0001

in the negatively correlated activities, administrative tasks, the lower the productivity ratio. The negatively correlated variables are tasks that are usually associated with the administrative dietitian. This relationship is possibly due to the definition of productivity ratio as the time spent in direct and indirect patient care divided by the total time worked, which does not reflect the time spent in administrative duties.

Nonproductive Activities

The dependent variable of nonproductive activities was correlated with ten variables. They were:

individual diet instruction	.25
calculating modified diets	.35
writing modified diet menus	.30
department committee meetings	.28
marketing nutritional services	.30
procuring specialized products	.39
document development and review	.45
quality assurance programs	.49
setting nutritional care standards	.35
supervising support personnel	.55

The correlation coefficient values indicate that the more time that was spent in the, researcher defined,

nonproductive activities, the higher the activity levels in giving individual diet instructions, calculating modified diets and writing modified diet menus. These tasks, depending upon the care level of the patient, could be performed by the dietary technician. Often individual diet instructions could be handled as group diet instructions, which make better use of the dietitian's time and also aid the patient in understanding the nutrition implications of a specific diet. As the time spent in nonproductive activities increases, the time spent in administrative activities increases. These tasks are associated with the job of administrative dietitians rather than clinical dietitians.

Direct/Hours Worked

The total time spent in direct patient care for all care levels divided by the total hours worked per week was correlated with two variables. They were:

giving individual diet instructions	.38
giving follow-up diet instructions	.34

These correlations indicate that as the ratio of direct hours spent in patient care for all care levels to total hours worked increases, the activity level in individual diet instructions and follow-up diet instructions increases.

These tasks are the major function of the clinical dietitian and constitute a large percentage of the work time, based on the researchers experience.

Indirect/Hours Worked

Three variables were correlated with the ratio of time spent in indirect patient care for all care levels to total hours worked. They were:

supervising support personnel	-.27
document development and review	-.26
food service responsibilities	-.26

The correlation coefficients indicate that as the activity level in these activities increases the ratio of indirect/hours worked decreases. These activities are administrative type activities often associated with the administrative dietitian or the food service supervisors. When the dietitian is performing these tasks time is taken from performing the indirect care activities.

Nonpatient/Hours Worked

Hours worked in nonpatient care divided by the total hours worked was correlated with the following variables:

recording in medical records	-.35
reviewing medical records	-.33

supervising support personnel	.34
document development and review	.36
community hospitals	.26
performing nutritional assessments	-.26

These correlation coefficient values indicate that as the ratio of hours spent in nonpatient care divided by total hours worked increases the activity level in reviewing and recording in medical records and performing nutritional assessments decreases. As the ratio increases the activity level of supervising support personnel and document development review increases. The ratio was also correlated with community hospitals which indicates that clinical dietitians in community hospitals spend a large amount of their time in nonpatient care activities. This could be due to the hospital employing only one dietitian who is responsible for patient care as well as nonpatient care activities.

Lack of Meaningful Relationships

For the following dependent variables, all correlations with the independent variables were either not statistically significant ($p > .05$) or were too small to suggest meaningful relationships ($|r| < .25$):

hours spent in direct basic care

hours spent in direct intermediate care

hours spent in indirect basic care

hours spent in indirect intermediate care

hours spent in indirect advanced intermediate care

The lack of meaningful relationships could possibly be due to the wide range of activity levels of variables in direct, indirect and nonpatient care. It could also be due to the fact that these identified categories were researcher developed and dietitians experienced difficulty distinguishing time spent in each division.

Intercorrelations Among Dependent Variables

Intercorrelations between independent variables were analyzed to show the relationship between the hours spent in the categories of patient care. The intercorrelations among the dependent variables are shown in Table 40. Positive and negative correlations exist between these variables. The correlations between the productivity ratio and dependent variables result from the formula for calculating the productivity ratio.

Regression Analyses

Analyses of the data, based on the correlation analyses, revealed five possible models for measuring productivity of the clinical dietitian. These models were:

TABLE 40

Intercorrelations Between Dependent Variables

	DCB	DIC	DAI	DIP	IBC	IIC	IAI	IIP	NPC	D/T	I/T	N/T	PR
DCB	1.00				.27		-.38	-.27			.27		
DIC		1.00											
DAI			1.00		-.25		.31		-.25	.31		.29	.31
DIP				1.00									
IBC					1.00						.42		
IIC						1.00				.31	.47		.30
IAI							1.00	.20			.52		
IIP								1.00					
NPC									1.00	-.55		.97	-.55
D/T										1.00	-.41	.43	.63
I/T											1.00		.45
N/T												1.00	-.56
PR													1.00

Direct Care Basic - DCB
Direct Intermediate Care - DIC
Direct Advanced Intermediate Care - DAI
Direct Indepth Care - DIP
Indirect Basic Care - IBC
Indirect Intermediate Care - IIC
Indirect Advanced Intermediate - IAI
Indirect Indepth Care - IIP
Nonpatient Care - NPC
Time Spent in Direct Care/Total Hours Worked - D/T
Time Spent in Indirect Care/Total Hours Worked - I/T
Time Spent in Non Patient Care/Total Hours Worked - N/T
Productivity Ratio - PR.

* Prob. F >.0001

Hours spent in direct patient care/total hours worked

Hours spent in indirect patient care/total hours worked

Hours spent in nonpatient care/total hours worked

Hours spent in direct plus indirect patient care/total hours worked

The activity level in nonproductive activities

The proposed dependent variables of time spent in each level of care for the direct and indirect patient care were not used as models due to the lack of meaningful relationships with the independent variables. As noted earlier, no meaningful relationships with the independent variables were found for :

Hours spent in direct basic patient care

Hours spent in direct intermediate patient care

Hours spent in indirect basic patient care

Hours spent in indirect intermediate patient care

Hours spent in indirect advanced intermediate patient care

Because of the lack of meaningful relationships the categories of levels of care were collapsed for each of the direct and indirect patient care to create the following measures of productivity:

Hours spent in direct patient care/total hours worked

Hours spent in indirect patient care/total hours worked

The variables (level of nonproductive activities) and (hours spent in direct plus indirect patient care/total hours worked or the productivity ratio) were developed by the researcher. The activity level in nonproductive activities was used to provide information about the activity level of clinical dietitians in tasks which should be performed by the dietary technician, as previously discussed. The measure (hours spent in direct plus indirect patient care/total hours worked) defined as the productivity ratio, was developed by the researcher based on the concept that these are the areas in which the dietitian should be spending the largest percentage of work time.

Following the development of the models, the independent variables were entered into the stepwise multiple regression program using SAS (Statistical Analysis System). This methodology adds and deletes independent variables until all the variables have been added and tested for significance. This procedure was used to explain more fully the relationship of the variables. The models resulting explain the variance in the dependent variable by the independent variables.

Hours in Direct Patient Care/Total Hours Worked

Two independent variables accounted for 16% of the

variance in the dependent variable. They were (1) giving individual diet instructions and (2) giving follow-up diet instructions. As indicated by the regression equation an increase or decrease in these variables would increase or decrease the hours spent in direct patient care as a proportion of the total time worked. Table 41 presents the beta values and mathematical model.

Hours Spent in Indirect Patient Care/Total Hours Worked

Five independent variables accounted for 20% of the variance in the dependent variable. They were the activity level in (1) food service responsibilities (2) document development and review (3) giving follow-up diet instructions (4) performing nutritional assessment and (5) hospital committee meetings. The beta values and mathematical models are presented in Table 42. As noted by the regression model, as the amount of time spent in indirect patient care increases or decreases the activity level of performing nutritional assessments increases or decreases. However, as the time spent in indirect care increases or decreases the opposite effect is noted in the activity level of giving follow-up diet instructions, participating in hospital committee meetings, document development and review and food service responsibilities.

TABLE 41

Direct Hours Worked/Total Hours Worked

Stepwise Multiple Regression Results

R^2 = .159

F = 23.67

Prob > F .0001

Intercept .2399

Model .2399 + .0467 (IDI) + .0283 (FDI) = Proportion of Time Spent in Direct Care

Variables	Coefficient (B)	F for (B)	Prob > F
Individual Diet Instructions (IDI)	.0467	17.15	.0001
Follow-up Diet Instructions (FDI)	.0283	8.44	.004

TABLE 42

Indirect Hours Worked/Total Hours Worked

Stepwise Multiple Regression Results

R^2 = .195

F = 12.67

Prob > F .0001

Intercept .43

Model .43 + -.034 (FDI) + .019 (NA) + -.015 (HCM) + -.016 (DDR) + -.02 (FSR) = Proportion of Time Spent in Indirect Care

Variables	Coefficient (B)	F for (B)	Prob > F
Follow-up Diet Instructions (FDI)	-.034	19.61	.0001
Performing Nutritional Assessments(NA)	.019	6.92	.009
Hospital Committee Meetings (HCM)	-.015	3.44	.06
Document Development and Review (DDR)	-.016	4.21	.04
Food Service Responsibilities (FSR)	-.020	7.44	.006

Hours Spent in Nonpatient Care/Total Hours Worked

A seven independent variable model was found to explain 33% of the variance in the dependent variable. The seven variables were (1) recording in the medical records (2) reviewing medical records (3) nutritional care follow-up (4) marketing nutritional services (5) quality assurance programs (6) supervising support personnel and (7) document development and review. Table 43 shows the beta values and the mathematical model. This regression model shows that as the time spent in nonpatient care increases or decreases the opposite effect is noted for the activity level of recording in medical records, reviewing medical records and performing nutritional care follow-up. Each of these activities were categorized as indirect patient care activities. However, as the time spent in nonpatient care increases or decreases the activity level of marketing nutritional services, quality assurance programs, supervising support personnel and document development and review increase or decrease.

Productivity Ratio

A four variable model accounted for 18.3% of the variance in the dependent variable. They were (1) recording in medical records, (2) reviewing medical records, (3) quality assurance programs, and (4) supervising support personnel. Table 44 shows the beta scores and mathematical

TABLE 43

Nonpatient Hours Worked/Total Hours Worked

Stepwise Multiple Regression Results

R^2 = .33

F = 15.47

Prob > F .0001

Intercept .335

Model .33 + -.033 (RMR) + -.02 (RVMR) + -.015 (NCF) + .01 (MNS) + .02 (QA) + .01 (SSP) + .01 (DDR) = Proportion of Time Spent in Nonpatient Care

Variables	Coefficient (B)	F for (B)	Prob > F
Recording in Medical Records (RMR)	-.034	8.87	.003
Reviewing Medical Records (RVMR)	-.019	4.13	.04
Nutritional Care Follow-up (NCF)	-.015	4.12	.04
Marketing Nutritional Services (MNS)	.01	3.42	.06
Quality Assurance Programs (QA)	.02	10.44	.001
Supervising Support Personnel (SSP)	.01	2.91	.08
Document Development and Review (DDR)	.01	4.30	.03

TABLE 44

Productivity Ratio

Stepwise Multiple Regression Results

R^2

Multiple R = .183

F = 15.37

Prob > F .0001

Intercept .607

Model .607 + .0332 (RMR) + .037 (RVMR) + -.018 (QA) +

- .0244 (SSP) = Proportion of Time Spent in Indirect plus Direct Patient Care

Variables	Coefficient (B)	F for (B)	Prob > F
Recording in Medical Records (RMR)	.033	4.27	.039
Reviewing Medical Records (RVMR)	.037	7.75	.005
Quality Assurance Programs (QA)	-.018	4.14	.043
Supervising Support Presonnel (SSP)	-.024	7.67	.006

model. The regression model (the productivity ratio) indicates that as the activity level of recording in the medical records and reviewing the medical records increases or decreases the productivity ratio increases or decreases. As the productivity ratio increases or decreases the opposite occurs in the activity level of quality assurance programs and supervising support personnel.

Nonproductive Activities

A six variable model accounted for 52.2% of the variance in the dependent variable. The variables were (1) individual diet instructions, (2) calculating modified diets, (3) procuring specialized products, (4) document development and review, (5) quality assurance programs, and (6) supervising support personnel. The regression equation indicates that as the activity level of these variables increases the time spent in nonproductive activities increases. Table 45 shows the beta coefficients and mathematical model.

Models in Order of Significance

Based upon the data generated from this research project, the following models are presented in order of significance. The significance is based on their ability to

TABLE 45

Nonproductive Activities

Stepwise Multiple Regression Results

Multipel R^2 = .522

F = 47.43

Prob > F .001

Intercept 7.127

Model 7.127 + .448 (IDI) + .898 (CMD) + .427 (PSP) + .467 (DDR) +.369 (QA) + .958 (SSP) = Activity Level in Nonproductive Activities

Variables	Coefficient (B)	F for (B)	Prob > F
Individual Diet Instructions (IDI)	.448	7.62	.006
Calculating Modified Diets (CMD)	.898	40.41	.0001
Procuring Specialized Products (PSP)	.427	6.97	.0088
Document Development and Review (DDR)	.467	9.73	.002
Quality Assurance Programs (QA)	.369	6.19	.014
Supervising Support Personnel (SSP)	.958	44.20	.0001

explain the variance in the dependent variable.

Nonproductive Activities - six significant independent variables explaining 52.2% of the variance.

Time Spent in Nonpatient Care/Total Hours Worked - seven significant independent variables explaining 33% of the variance.

Productivity Ratio - four significant independent variables explaining 18.3% of the variance.

Hours Spent in Direct Patient Care/Total Hours Worked - two significant variables explaining 16% of the variance.

Hours Spent in Indirect Patient Care/Total Hours Worked - two significant variables explaining 9% of the variance.

The models of the activity level of nonproductive activities and hours in nonpatient care/total hours worked are the best models for measuring the productivity of the clinical dietitian. The nonpatient care model measures the time spent away from patient care activities rather that the time spent in patient care. The model of unproductive activities measures the productivity based on the performance of activities which are more appropriately performed by other personnel. One reason for these models producing better

measures of productivity for the clinical dietitian may associated with the definition of service and that the clinical dietitian performs a service related job. The preformance of a service job involve a sequence of service transactions. These transactions are heterogenous and simultaneously produced and consumed in an information procession transaction between the employee and customer. These factors help to explain the difficulty in measuring productivity of the clinical dietitian using measures of dierect and indirect patient care categories.

Validity and Reliability of Measures

Internal validity is the extent to which the detected relationship between the independent and dependent variables is causal or the extent to which detected treatment effects are not due to other competing causes (Judd and Kenny, 1982). As indicated by previously reported correlation coefficients, internal validity was exhibited in this study by the relationships of the independent variables and the dependent variables, among the independent variables and among the dependent variables. The relationships exhibited by the variables indicates that respondents were interpreting the questions in a similar manner. Had there been misinterpretation of these measures, no meaningful

relationships would have been noted due to the variation among respondents.

The correlation coefficients noted in the study also imply reliability of the measures. Had the respondents arbitrarily selected responses with which to complete the survey, misinformation would have been reported. As a result correlation coefficients would be very low and nonsignificant at the .05 probability level. Reliablility of the measures was also suggested by the coefficient alpha (.49) for the summed nonproductive activities. The coefficient alpha value shows the consistency with which responses were given by the respondents for this group of questions.

Chapter 5

CONCLUSIONS

Purpose

The major purpose of this study was to analyze variables which affect the productivity of the clinical dietitian in order to develop appropriate models for measurements of productivity for the clinical dietitian.

Methodology

Due to the lack of published research on the productivity of the service worker and the clinical dietitian, a modified Delphi Technique was used to determine the appropriate input and output measures. Twelve members participated in this three step process. Four members were executive dietitians employed by the contract food service company backing the research project. Four were members of the American Dietetic Association Task Force on Productivity and four were individuals who had published studies on productivity of the clinical dietitian.

Information from the Delphi Technique was used to develop a survey to measure the productivity of the clinical dietitian. Two hundred eighty-three usable responses were

received before the established deadline.

The data were analysed to yield means, frequencies and standard deviations for each of the variables. Correlations and stepwise multiple linear regression was used to analyze the relationships among the variables. Models were developed for measuring the productivity of the clinical dietitian by regression procedure.

Measures of Productivity

The measures of productivity used in this study were:

Hours in direct patient care/total hours worked

Hours in indirect patient care/total hours worked

Hours in nonpatient care/total hours worked

The productivity ratio (hours in direct plus indirect patient care/total hours worked)

The activity level in nonproductive activities

Independent Variables

Independent variables used in this study were:

Patient load of the clinical dietitian

Years of experience of the clinical dietitian

The allocation of time to tasks performed by the clinical dietitian

Consultation methods used by the clinical dietitian

Size of the hospital

Employment status of the clinical dietitian

Mission of the hospital

Percent occupancy of the hospital

Percent of the budget generated by Medicare patients

Objectives

The results of the study have lead to the accomplishment of the objectives:

To develop an appropriate input measure of productivity for the clinical dietitian

To determine appropriate output measures of productivity for the clinical dietitian

To identify the independent variables which affect the productivity of the clinical dietitian

To develop a model by which the productivity of the clinical dietitian can be measured

As discussed earlier, input and output measures of productivity of the clinical dietitian were developed. These measures involved the proportion of time spent in direct, indirect and nonpatient care activities in relation to the total time worked and the activity level in nonproductive activities. Additionally independent variables which affected the productivity of the clinical dietitian were identified. However, only two of the relationships between the independent and dependent variables investigated

yielded statistically significant results. The community hospital dietitian was found to perform a greater amount of nonpatient care activities than dietitians employeed in other types of hospitals. Also, as expected, several of the time allocation variables were significantly related to the various productivity measures, as shown in the multiple regression models. The final objective was met through the development of five models for the measurement of productivity of the clinical dietitian. These models were composed of independent variables which explained the largest amount of variance in the performance of the productivity measures. One of these models explained 52% of the variance and a second 33%.

Summary

Level of Activity

A wide variety of time was spent in each of the categories and levels of patient care by the clinical dietitians. Even though the dietary technician is trained to counsel patients in the basic level and intermediate levels of patient care, an accepted practice in the dietetic profession, the clinical dietitian was found to be spending time in these care levels. The clinical dietitians were also found to have a high activity level in performing diet histories, a technicians task (Journal of the American Dietetic Association, 1974).

This was attributed to the low usage of the dietary technicians. The clinical dietitians participating were also found to have a low activity level in performing anthopometric measurements which is necessary to adequately monitor patients at nutritional risk. However, a high activity level task identified was that of performing nutritional assessments. Both of these tasks are associated with patients in the advanced intermediate and indepth level of care which require careful monitoring. In direct patient care the activity level of performing individual diet instructions was high. As noted earlier, this task should be performed by the technician for basic and intermediate care level patients. Reviewing and recording in medical records and developing nutritional care plans were found to have a high activity level for indirect patient care. One explanation for these activity levels may have been due to the inclusion by the dietitian of the time spent searching for charts on the floors.

Dietitians were found to be spending a variety of time in nonpatient care activities. In several cases as much as 66% of their time. These were noted in community hospitals in which one dietitian often performs both administrative and clinical functions. The participants had a very low activity level in reading professional literature which is necessary

to remain current in the health care field.

The activities most appropriate for the clinical dietitian to be performing are those associated with the direct and indirect care of the patients in the advanced intermediate and indepth nutritional care level. Patients in these categories would also be associated with the DRG's listed in Table 2, as well as others. These patients are at nutritional risk and require nutritional assessments, careful follow-up and counseling on multiple nutritient restricted diets. This requires the expertise of a professionally trained clinical dietitian. However, an average of six hours in advanced intermediate and 10 hours in indepth direct care of patients was found. For indirect an average of three hours was found for each of the categories. This indicates that dietitians are spending time in activities which do not make the best use of their skills.

Correlations

The correlation analyses revealed weak correlations between the independent and dependent variables. The strongest correlation noted was .55 and significant at the .0001 level of probability. There are two phenomena which occur in sociological research that may provide an explanation for this outcome. In sociological research the independent variables tend to be intercorrelated and are

often measured by proxy variables (Pedhazur, 1973). However, the independent variables in this study were not found to be highly intercorrelated. The more plausible explanation for the low correlation values was the use of the measure of the activity level in the tasks performed instead of the hours spent in each of the tasks performed by the clinical dietitian, as explained previously. In addition data were gathered using a survey methodology which often produces inflated values for some respondents and it is difficult to correct for these inflationary tendencies.

In the studies found in the literature using regression analysis to analyze productivity, correlation coefficients of independent variables correlated with the dependent variables ranged from .39 to.70 (Mayo, 1984; Young, 1981). Each of these research studies used data that were physically gathered by the researcher and did not involve survey methodology. Mayo (1984) reported values ranging from .39 to -.59. Young (1981) reported correlation coefficients ranging from 0.55 to 0.70. The probability level reported in both of these studies was .05.

The correlational analyses in this study indicated that the hours spent in direct intermediate care were correlated with the activity level of giving individual diet instructions. The hours spent in direct indepth patient care were correlated with the activity level in performing

anthopometric measures and medical rounds. Hours spent in indirect indepth patient care were correlated with performing nutritional assessments and nutritional care follow-up. The hours spent in nonpatient care were correlated with ten variables. It was positively correlated with the administrative tasks of the activity level in: quality assurance programs, supervising support personnel, administrative record keeping, document development and review and food service responsibilities. Hours spent in nonpatient care activities were negatively correlated with the indirect patient care activities of: performing nutritional assessment, reviewing medical records, recording in medical records, and performing nutritional care follow-up.

A lack of meaningful relationships was found for the variables of time spent in: direct basic care, direct intermediate care, indirect basic care, indirect intermediate care and indirect advanced intermediate care. This may be due to the use of proxy measures for the time allocation of tasks performed by the clinical dietitian (Pedhazur, 1973). It may also be due to the dietitians' inability to distinguish time spent in these categories. This is the first reaseach project in which these measures have been tested.

Based on these correlations, the measures of productivity

were developed. These measures were then correlated with the independent variables. The analysis showed that the measure (hours in direct patient care/total hours worked) was correlated with the activity level in giving individual diet instructions and follow-up diet instructions. Both of these variables were direct patient care tasks. The measure (hours in indirect patient care/total hours worked) was negatively correlated with the activity level of the administrative tasks of supervising support personnel, document development and review and performing food service responsibilities. The measure (hours in nonpatient care activities/total hours worked) was correlated with the activity level in supervising support personnel and document development and review. This measure was negatively correlated with the indirect patient care activity levels of recording in medical records, reviewing medical records, and performing nutritional assessments. It was also correlated with the dietitians employed in community hospitals (versus employment in other types of hospitals). The productivity ratio (hours in direct plus indirect patient care/total hours worked) was meaningfully correlated with six variables. It was negatively correlated with the activity level performed by those administrative activities of quality assurance programs, supervising support personnel, administrative record keeping and food service responsibilities. It was

positively correlated to the indirect patient care tasks of recording and reviewing medical records. The activity level in nonproductive activities was found to correlate with ten variables. One variable, the activity level in giving individual diet instructions, was a direct patient care activity. Two variables, calculating modified diets and writing modified menus, were indirect patient care activities. As noted earlier, these three patient care activities should be performed by the technician for the basic and intermediate care level patient. The remaining seven were nonpatient care activities.

Regression Models

To further investigate the relationship of the independent variables with the measures of productivity and to develop models for the measurement of productivity of the clinical dietitian, stepwise multiple linear regression was used. Of the five regression models developed for measuring the productivity of the clinical dietitian, the models of (hours in nonpatient care/total hours worked) and the activity level in nonproductive activities were found to be the better models.

Development of models by regression is based on the concept that measures of the criterion are valid and reliable

(Pedhazur, 1973). Several problems have been noted in the development of models to be used for measuring productivity in the service industry (Mark, 1982 ; Mills, 1983). Measurement development is complicated by the nature of the tasks performed in the service sector. These tasks are characterized as nonrepetitive, unpredictable and information processing (Ruch, 1982; Sasser, 1978). The performance of tasks depends upon the customer. The process involves an information processing transaction which does not produce a tangible item which can be counted or stored. The transaction which occurs between the customer and employee is different for each transaction due to the background, values and experiences of the individuals involved (Mark, 1982). Additionally, employees in the service sector are involved in a variety of tasks (Sasser, 1978). These factors make it very difficult to develop measures to access the productivity of the service personnel. Because of these factors, the measures of the criterion which incorporate only the service variables of direct and indirect patient care did not produce good models for measuring productivity of the clinical dietitian.

The nonpatient care activities and three of the five, researcher identified, nonproductive tasks do not involve information exchange between individuals, only within an individual. They also produce a tangible output, such as the

number of journal articles read or the number of documents revised which can be counted. This is a possible reason these models were better measures for productivity of the clinical dietitian.

An interesting finding was the inclusion of the direct patient care activity (the activity level in giving individual diet instructions) and the indirect patient care activity (calculating modified diets), was included in the model nonproductive activities. As noted earlier, these activities should be performed by the technician for the basic and intermediate care level of patient. Therefore, these variables may measure the performance of inappropriate activities for the clinical dietitian who is performing them for the basic and intermediate level of patient. Even though dietitians may be considered productive (in the strict use of the term) when performing these tasks for the basic and intermediate care level patient, it is not the best use of their skills. The calculation of modified diets may also be an appropriate measure of the performance of nonproductive activities if the clinical dietitian is spending excessive time on these tasks instead of performing other important tasks. Noted previously, hand held calculators have been developed for the calculation of certain modified diets which can greatly speed the calculation process.

The indirect patient care activities, the activity level in recording in medical records, reviewing medical records, and nutritional care follow-up, were included in the model (hours in nonpatient care/tatal hours worked). The inclusion of these variables could have been due to an intervening variable, the inclusion of time required to locate the charts by the clinical dietitian. It is not uncommon in medium and large hospitals to be unable to locate charts which results in wasted time. If dietitians do indeed spend a large amount searching for charts, then these variables would be appropriate to measure hours spent in nonpatient care. Also, even though these variables do not directly involve information processing with the patient, but do affect the nutritional care of the patient, they may not be included in the model when the intervening variable is not present.

Significance of the Study

This analysis of productivity of the clinical dietitian developed a means of measuring productivity of the clinical dietitian through a "back door approach." The models that were identified as good measures of productivity for the clinical dietitian were nonpatient care and unproductive activity models. By analyzing the time spent in nonproductive activities and nonpatient care activities an

estimate can be made of the time being spent in direct and indirect patient care. This method overcomes the difficulty discussed by Mark (1982) and Ruch (1982) of developing direct measures of productivity for service employees.

For these models to be totally effective in measuring productivity of the clinical dietitian, additional analyses should be made for efficiency. To be truly productive the clinical dietitian should perform direct and indirect activities involving patients in the indepth and advanced intermediate care levels. One means of measuring the efficiency would be to compare the time spent in direct patient care for the basic and intermediate patient care level with that in the advanced intermediate and indepth care level. Additionally, a similar comparison should be made of the time spent in indirect patient care. An effectiveness adjustment of this nature would encompass activities performed by the clinical dietitian which are more appropriately performed by other personnel.

Limitations of the Study

This study was limited by the sample being composed of dietitians employed in hospitals in which the food service was contracted to an outside agency. This may not present a representative picture of all dietitians nation wide.

A second limitation was the survey methodology utilized. The dietitians were using rough estimeates for the amount of time spent in each of the care levels. Many participants noted that records were not available which would enable sound reporting of the data.

The third limitation was the use of the proxy measure, level of task activity performed, for the measure of the time spent in each of the activities performed by the clinical dietitian.

The final limitation was the nature of the computerized address system used by the contract food service companies. It was not possible to distinguish between administrative and clinical dietitians, thus increasing the cost of the study since both were included in the mailings.

Recommendations

From the data gathered from this study designed to analyze the productivity of the clinical dietitian, it is recommended that:

1. The models of nonpatient care and the activity level in nonproductive activities should be used as general measures of productivity. They should not be used to develop standards without further research to establish reliability.

2. The activities performed by the clinical dietitian should be analyzed for appropriateness and cost effectiveness for individual hospitals.

3. The increased use of dietary technicians should be considered and evaluated for cost effectiveness by the hospital. The use of this type of personnel could free the clinical dietitians for more indepth patient care and outpatient care activities. Providing the dietitians with more patient care contact hours will enable them to devote more time to developing outpatient programs which generate revenue for the hospital. It will also provide time needed for appropriate preparation for delivery of quality nutritional services by the clinical dietitian to the patient. Clinical dietitians participating in this study spent very little time reading professional literature or attending professional conferences. These activities provides valuable information concerning the most recent nutrition research. The adequacy of the nutritional care provided by the clinical dietitian depends upon their knowledge of the subject. In todays rapidly changing technological environment, it is vital that the clinical dietitian be current in the techniques used and information presented the client. To do this, the dietitian must have adequate time to read professional literature and attend professional conferences.

4. A comprehensive model for measuring the productivity of the clinical dietitian which includes quality is needed. The quality measures should encompass the feedback of the client concerning the performance of the clinical dietitian, as well as the assessment by the dietitian of the patients understanding of the information presented the patient. Two aspects as defined by Mills (1983) for evaluation of a service transaction are the actual interaction and the consequence of the service administration. Mills (1983) recommends measuring the perceived quality by the client. This measure may be obtained by a survey of the patients concerning the interaction with the dietitian. In addition to this, a measure of the consequence of the service transaction is needed to fully assess the service transaction between the patient and clinical dietitian. This measure can be as simple as asking the patient specific questions about foods he should avoid, or as complicated as asking the patient to plan a weeks menu according to his diet pattern. Both methods provide feedback on the level of understanding the patient received from the service transaction.

Due to the lack of the research conducted on productivity in the service sector and dietetic profession, future research projects are needed.

Future Research

Research projects needed as a result of this project are:

1. A confirmation of the times spent in each of the levels of patient care is needed. This can be accomplished by the use of a one month time log during a typical month which could verify the times reported by the participants. The activities performed could be uniformly coded to eliminate misunderstanding of terms and reduce possible biases.

2. The results of the time log study should be used to test the models previously developed using a similar multiple regression methodology. This would provide information on the validity of the models developed.

3. An analysis of dietitians according to the specialized units of care, such as cardiac rehabilitation, burn, or pediatrics to determine if the tasks performed and time spent the various care levels are different from the dietitians who are assigned a variety of types of patients.

4. Based the difference of tasks performed by the inpatient and outpatient dietitians, seperate models should be developed to measure the productivity of outpatient dietitians.

5. Appropriate measure of quality should be developed for the clinical dietetics profession.

6. Quality measures should be incorporated into the productivity measurement of the clinical dietitian.

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APPENDIX A

Definitions

Clinical dietitian - A member of the health care team who affects the nutritional care of individuals and groups for health maintenance. The clinical dietitian assesses nutritional needs, develops and implements nutritional care plans and evaluates and reports these results appropriately. The clinical dietitian spends no more than thirty hours per week in administrative activities.

Administrative dieititian - A member of the management team who affects the nutritional care of groups through the management of foodservice systems and provides support for the clinical dietitians. The administrative dietitian spends more than thrity hours a week in administrative related activites. This catagory would include Chief Clinical dietitians.

Dietary technician - A technically skilled person who has completed an associate degree program which meets the American Dietetic Association Standards. This individual is trained in performing diet histories, calculating dietary patterns, developing nutritional care plans, and calculating nutritional intakes.

Productivity - The measurement of production. Mathematically defined as the ratio of output/input.

Input - The measure of the amount of resources used to produce the product or service.

Output - The product or services produced as a result of the input.

Dietitian - The clinical dietitian directly involved with patient care.

Direct patient care activities - Those activities directly related to patient care such as collecting preferences, conducting diet histories, counseling, performing anthropometric measures, and giving diet instructions.

Indirect patient care activities - Those activities which do not directly involve the patient, but affect their care such as recording in medical charts, writing menus for modified diets, analysis of nutrient intake, calculating diets, tray sampling or tray line checking, conducting inservice classes for support personnel, and participating in medical rounds

and patient care conferences.

Nonpatient care activities or administrative functions - Those activities which the dietitian performs that are not directly related to patient care such as serving on hospital and professional organization committees, conducting conferences for other health care professionals, participating in professional improvement activities participating in hospital or departmental committee meetings, instructing interns, performing administrative record keeping, procurement of nutritional supplements or specialized products, writing cycle menus, developing nutritional care standards, and supervising support personnel.

APPENDIX B

COLLEGE OF HUMAN RESOURCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

DIVISION OF HOTEL, RESTAURANT & INSTITUTIONAL MANAGEMENT [(703) 961-5515 - (703) 961-6783]

January 13, 1986

Mr. Gerald Mendenhall
Arthur Young and Co.

Dear Mr. Mendenhall,

The profession of dietetics is reaching a crossroads in its history. The proactive payment system enacted by Medicare has caused hospital administrators to evaluate staffing in order to make the most efficient use of operating funds, since labor costs compose approximately 60% of these funds. Because of this, emphasis has been placed on the productivity level of hospital employees.

In an effort to develop a comprehensive study of the productivity of the clinical dietitian, it is first necessary to develop appropriate input, output and quality measures.

Your assistance in developing these measures is needed. The modified Delphi Technique to be used in this study will involve three phrases. Each will be composed of a short one page survey. The first phase will be used to present the presently identified measure of input, output and quality of services rendered by the clinical dietitian. Each participant will be asked to add any additional measures they feel would be appropriate. The second phase will reflect these additions and request that the participant choose which measure they feel would be best and state why. The final phase will reflect the data from the second phase and will attempt to gain a consensus of the best measure of input, output and quality of services rendered by the clinical dietitian.

Please take a few minutes to fill out the following survey. Each member's contribution will further the development of productivity measures which can be used for future research and strengthen the field of dietetics.

Attached are definitions which you may find helpful while participating in this research effort.

If you have any question please feel free to call me at

Sincerely,

Mary Kay Meyer, R.D.
Doctoral Candidate

Delphi I

Survey for Development of Productivity Measures for the Clinical Dietitian

The following measures have been used to measure productivity of Health Care Professionals in the service sector.

Please fill in the blank spaces with ADDITIONAL MEASURES you feel would be appropriate measures of input, output and quality of services rendered by the Clinical Dietitian. These should be treated as mutually exclusive measures.

PLEASE RETURN THIS SURVEY BY JANUARY 21 WITH OR WITHOUT FILLED BLANKS.

Input:

hours worked
hours paid
cost of materials in dollars
nutrients
cost of facilities in dollars
_____

_____

Output:

patients visited
patients counseled
inpatients counseled
outpatients counseled
patients visited according to nutritional level of care
patients counseled according to nutritional level of care
DRG's
admissions
inpatient days
_____

_____

_____

Quality of Services Rendered by the Clinical Dietitian

summary results of inhouse patient surveys
percentage compliance with JCAH accrediation standards
percentage performance on internal quality audits
_____

_____

THANK YOU FOR YOUR ASSISTANCE AND PROMPT RETURN OF THIS SURVEY.

Delphi II

Survey for Development of Productivity Measures for the Clinical Dietitian

The following measures have been used to measure productivity of Health Care Professionals in the service sector.

Please check which measure or measures best describe the input, output, and quality of services rendered by the clinical dietitian and provide a brief explanation of why you feel these are most appropriate.

PLEASE RETURN THIS SURVEY BY JANUARY 31.

Input:

___ hours worked
___ hours worked in patient care activities
___ hours worked in indirect patient care activities
___ hours spent in work related activities
___ hours paid
___ cost of materials in dollars
___ nutrients
___ cost of facilities in dollars
___ capital equipment and depreciation

Reason:_____
_____

Output:

___ patients visited
___ patients counseled
___ inpatients counseled
___ outpatients counseled
___ patients visited according to level of care
___ patients counseled according to level of care
___ patients monitored according to level of care
___ indepth nutritional assessments
___ percentage of needed services provided to the patient according to the level of care
___ inservice education classes conducted by the dietitian
___ modified diet classes conducted for patients
___ direct patient care activities
___ indirect patient care activities
___ nonpatient care activities
___ DRG's

___ admissions
___ inpatient days
___ discharges
___ revenue generated

Reason_____
_____

Quality of Services Rendered by the Clinical Dietitian

___ summary results of inhouse patient surveys
___ percentage compliance with JCAH accreditation standards
___ percentage performance on internal quality audits
___ cost effectiveness of nutritional intervention
___ measured outcomes of patient interventions
___ percentage compliance with identified quality indicators

Reason:_____
_____

THANK YOU FOR YOUR ASSISTANCE AND PROMPT RETURN OF THIS SURVEY.

Delphi III

Survey for Development of Productivity Measures for the Clinical Dietitian

Please check which of the following best describes your feeling about the output/input ratios developed to measure the productivity of the Clinical Dietitian.

_____ APPROPRIATE

_____ INAPPROPRIATE

hours spent in direct patient care activities according to the level of care divided by total hours worked

hours spent in indirect patient care activities according to the level of care divided by total hours worked

hours spent in nonpatient care activities according to the level of care divided by total hours worked

PLEASE RETURN BY FEBRUARY 14

COLLEGE OF HUMAN RESOURCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

DIVISION OF HOTEL, RESTAURANT & INSTITUTIONAL MANAGEMENT [(703) 961-5515 - (703) 961-6783]

March 7, 1986

Alice Zehmer, R.D.
Virginia Beach General Hospital
1060 1st Colonial Road
Virginia Beach, VA 23454

Dear Ms. Zehmer:

The profession of dietetics is reaching a crossroads in its history. The proactive payment system enacted by Medicare has caused hospital administrators to evaluate staffing in order to make the most efficient use of operating funds, since labor costs compose approximately 60% of these funds. Because of this, emphasis has been placed on the productivity level of hospital employees.

A study has been designed in cooperation with the contract foodservice company presently serving your hospital. The purpose of the study is to measure the productivity of the clinical dietitian in order to develop a fair and accurate system for determining productivity standards.

Please take a few minutes to fill out the following survey. Each participant's contribution will further the development of productivity measures which can be used for future research and to strengthen the field of dietetics.

Included are definitions which you may find helpful while participating in this research effort.

If you have any questions, please feel free to call me at .

Sincerely,

Mary Kay Meyer, R.D.
Doctoral Candidate

MKM/kah

COLLEGE OF HUMAN RESOURCES

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VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

DIVISION OF HOTEL, RESTAURANT & INSTITUTIONAL MANAGEMENT [(703) 961-5515 - (703) 961-6783]

April 4, 1986

Alice Zehmer, R.D.
Virginia Beach General Hospital
1060 1st Colonial Road
Virginia Beach, VA 23454

Dear Ms. Zehmer:

About three weeks ago I wrote you seeking your assistance in a research project designed to measure the productivity of the Clinical Dietitian. The purpose of this research project is to develop a fair and accurate system for determining productivity standards. As of today we have not yet received your completed questionnaire.

I am writing you again because of the significance of your participation in this study. In the event that your questionnaire has been misplaced, a replacement is enclosed.

If you have any questions, please feel free to call me at

Sincerely,

Mary Kay Meyer
Doctoral Candidate

MKM/kah

enclosure

Survey for Measuring Productivity of the Clinical Dietitian

INSTRUCTIONS

THIS SURVEY IS TO BE COMPLETED BY ONLY CLINICAL DIETITIANS

ALL QUESTIONS REFER TO YOUR PRESENT JOB

Please fill in the following blanks using whole numbers

1. How many beds does your hospital presently have available for patient use?_____

2. For the last month, what has been the average percentage occupancy for your hospital?_____

3. During the last month on the average, how many hours a week did you work?_____

4. For the last month, what has been the average number of patients per week you have seen professionally?_____

5. What percentage of these patients are:

_____ INPATIENTS
_____ OUTPATIENTS

6. During the last month on the average, how many hours a week did you spend in each of the following category of activities?

____Direct care of patients in the basic care level
____Direct care of patients in the intermediate care level
____Direct care of patients in the advanced intermediate care level
____Direct care of patients in the indepth care level

____Indirect care of patients in the basic care level
____Indirect care of patients in the intermediate care level
____Indirect care of patients in the advanced intermediate care level
____Indirect care of patients in the indepth care level

____Nonpatient care activities

7. Of the time spent in direct, indirect, and nonpatient care activities, what percentage involved outpatients and/or outpatient activities? _____

For questions 8,9, and 10 according to the scale below Please circle the category which best describes your activity level, during the last month, in each of the following tasks.

0_____1_____2_____3_____4_____5
none little moderate high

8. Direct patient care:

Collecting patient preferences	0	1	2	3	4	5
Conducting diet histories	0	1	2	3	4	5
Individual diet instructions	0	1	2	3	4	5
Group Diet Instructions	0	1	2	3	4	5
Diet instruction with film strips	0	1	2	3	4	5
Giving follow-up diet instructions	0	1	2	3	4	5
Taking anthropometric measures	0	1	2	3	4	5

9. Indirect patient care:

Intake nutrient analysis	0	1	2	3	4	5
Performing nutritional assessments	0	1	2	3	4	5
Calculating modified diets	0	1	2	3	4	5
Recording in medical records	0	1	2	3	4	5
Reviewing medical records	0	1	2	3	4	5
Medical rounds	0	1	2	3	4	5
Patient care conferences	0	1	2	3	4	5
Writing modified diet menus	0	1	2	3	4	5
Developing nutritional care plans	0	1	2	3	4	5

Nutritional care follow-up	0	1	2	3	4	5
10. Nonpatient care:						
Medical conferences	0	1	2	3	4	5
Hospital committee meetings	0	1	2	3	4	5
Department committee meetings	0	1	2	3	4	5
Departmental staff meetings	0	1	2	3	4	5
Marketing nutritional services	0	1	2	3	4	5
Procuring specialized products	0	1	2	3	4	5
Dispensing specialized products	0	1	2	3	4	5
Quality Assurance Programs	0	1	2	3	4	5
Setting nutritional care standards	0	1	2	3	4	5
Supervising support personnel	0	1	2	3	4	5
Instructing Interns/Technicians	0	1	2	3	4	5
Administrative record keeping	0	1	2	3	4	5
Document development/review	0	1	2	3	4	5
Food service responsibilities	0	1	2	3	4	5
Reading Professional Literature	0	1	2	3	4	5
Attending professional conferences	0	1	2	3	4	5

Finally,to help interpret the results, we would like to ask a few questions about you and the hospital in which you work. Please fill in the blanks with whole numbers.

11. Of the total number of Dietitians employed in your hospital, how many full time equivalence are:

____CLINICAL
____ADMINISTRATIVE

Full time equivalence is equal to working 40 hours per week.

12. How many full time equivalence Dietary Technicians are employed in your hospital?_____

13. In what year did you receive your registration with the American Dietetic Association?_____

Please check one answer in each of the following questions.

14. By what route did you become eligible for registration with the American Dietetic Association?

____ B.S. IN NUTRITION WITH INTERNSHIP
____ B.S. IN NUTRITION WITH TRAINEESHIP
____ B.S. IN NUTRITION WITH 3 YEAR WORK EXPERIENCE
____ B.S. IN NUTRITION IN A CUP PROGRAM
____ M.S. IN NUTRITION WITH WORK EXPERIENCE
____ M.S. IN A RELATED FIELD
____ ELIGIBLE THROUGH THE GRANDFATHER CLAUSE

15. Is your hospital:

____ PROFIT
____ NONPROFIT

16. In what classification is your hospital :

____GENERAL HOSPITAL
____MEDICAL CENTER
____COMMUNITY HOSPITAL
____PSYCHIATRIC HOSPITAL
____PEDIATRIC HOSPITAL
____OTHER SPECIALIZED

17. By whom are you employed?

____ THE HOSPITAL
____ THE FOOD SERVICE CONTRACT COMPANY

18. What percentage of the hospital revenue is generated by unsupplemented medicare or medicaid patients?

____20% AND UNDER
____21 To 40%
____41 To 60%
____61 To 80%
____81 To 100%

Unsupplemented excludes all other insurance coverage.

Please use this space to make any comments which you feel may help us in future efforts to measure and analyze the productivity of the Clinical Dietitian. These comments will be greatly appreciated.

APPENDIX C

Statistical Equations

I. Calculation for the overall mean scores for each variable

$$\bar{X} = \frac{\sum_{i=i}^{N} X_i}{N}$$

II. Calculation of the standard deviation

$$s = \sqrt{\frac{\left(\sum_{i=1}^{N} X_i^2\right) - N\bar{X}^2}{N-1}}$$

III. Calculation for the Correlation Cofficients

$$R^2_{Y/X_1 X_2 \ldots X_k} = \frac{\sum_{i=1}^{n} (Y_i - \bar{Y})^2 - \sum_{i}^{n} (Y_i - \hat{Y})^2}{\sum_{i=1}^{n} (Y_i - \bar{Y})^2}$$

IV. Calculation for regression

$$Y = B_o + B_1 X$$

Where

$$B_1 = \left[\sum_i X_i Y_i - \left(\sum_i X_i\right)\left(\sum_i Y_i\right)/n\right] \Big/ \left[\sum_i X_i^2 - \left(\sum_i X_i\right)^2 / n\right]$$

$$B_o = \bar{Y} - B_1 \bar{X}$$

V. F ratio

$$F = \frac{SS\ reg/k}{SS\ res/N-K-1}$$

Where:
SS reg is the sum of squares regression
SS res is the sum of squares residual
K is the number of independent variables in the equation
N is the sample size

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A PRODUCTIVITY ANALYSIS OF THE CLINICAL DIETITIAN AS A HEALTH CARE TEAM MEMBER IN THE SERVICE SECTOR

by

Mary Kay Meyer

Committee Chairman: Michael D. Olsen

Human Nutrition and Foods
Division of Hotel, Restaurant and Institutional Management

(ABSTRACT)

The major purpose of this study was to analyze the productivity of the clinical dietitian in order to develop appropriate models for measurement of productivity of the clinical dietitian.

Due to the lack of research on productivity in the service sector, a modified Delphi Technique was used to identify appropriate measures of input and output for the clinical dietitian. The information gathered from the Delphi Technique was used to develop a survey designed to measure the productivity of the clinical dietitian. Two hundred eighty-three participants responded to the survey.

Five measures of productivity were developed. They were: (1) hours in direct patient care/total hours worked (2) hours in indirect patient care/ total hours worked (3) hours

in nonpatient care/ total hours worked (4) hours spent in direct plus indirect patient care/total hours worked and (5) the activity level in nonproductive activities. The independent variables used in this study were: (1) patient load of the clinical dietitian (2) years of experience of the clinical dietitian (3) the allocation of time to tasks performed by the clinical dietitian (4) consultation methods used by the clinical dietitian (5) size of the hospital (6) employment status of the clinical dietitian (7) mission of the hospital (8) percent occupancy of the hospital and (9) percent of the budget generated by Medicare patients.

Results of the analyses showed that dietitians were spending a variety of time in the thirty-three identified activities. They had a high activity level in performing diet histories, individual diet instructions, performing nutritional assessments, and reviewing and recording in medical records. Tasks involving low levels of activity were taking anthopometric measurements, reading professional literature and attending professional conferences.

To fully investigate the relationship between the measures of productivity (dependent variables) and the independent variables stepwise multiple linear regression in the SAS statistical program was used. Analyses revealed two models appropriate for measuring the productivity. These models involved nonpatient care and nonproductive activities.

The development of these models overcame the difficulty discussed in the service literature of developing direct measures of productivity of employees in the service sector.