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# A Measurement of Productivity for Kentucky Home Health Care Registered Nurses Full-Time Equivalence by Organizational Type

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*Western Kentucky University*

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Holderman,

Kathy Sue

1993

A MEASUREMENT OF PRODUCTIVITY FOR KENTUCKY  
HOME HEALTH CARE REGISTERED NURSES  
FULL-TIME EQUIVALENCE BY  
ORGANIZATIONAL TYPE

A Thesis

Presented to

the Faculty of the Department of Public Health

Western Kentucky University

Bowling Green, Kentucky

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Kathy Sue Holderman

August 1993

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FULL-TIME EQUIVALENCE BY  
ORGANIZATIONAL TYPE

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A MEASUREMENT OF PRODUCTIVITY FOR KENTUCKY  
HOME HEALTH CARE REGISTERED NURSES FULL-TIME  
EQUIVALENCE BY ORGANIZATIONAL TYPES

Kathy S. Holderman

August 1993

81 pages

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In today's competitive home health industry, productivity has become a major concern, and establishing productivity expectations is necessary for survival. Productivity can be described as a relationship between the outputs produced by an organization and the inputs provided to create the outputs. This means that the outputs consist of the number of home visits performed and the inputs consist of the time, supplies, mileage, and administrative support necessary for producing home visits. In order to have a complete understanding of productivity, one must understand the importance of examining significant service delivery factors that are unique to the home health industry. This study focuses on two such factors: nursing employment and patient care and service. The nursing employment quality indicators include the nursing personnel functions such as orientation programs, home health nursing experience, educational preparation, and staff development. The patient care and service quality indicators include activities that are related to direct and indirect patient care such as the actual home visit; geographic area; travel time; amount of time required to admit a patient; caseload expectations; time it takes to complete paperwork requirements; staffing; and follow-up with doctors, other home health team members, and other service providers.

This observational cross-sectional study was conducted among Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. The necessary data to determine average daily registered

nursing patient visits productivity for home health agencies by organizational type was obtained from information in the Kentucky Semi-Annual Home Health Services Report 1991-2. The statistical technique, one-way analysis of variance, was used to analyze whether there were differences in the patient visit productivity outcomes for the home health registered nurses. No significant differences were found.

The second part of this study involved surveying the study population to determine the effect that overall average daily registered nursing patient visits productivity had on nursing employment and patient care and service quality indicators. The survey instrument was subjected to a peer review evaluation team process to improve its validity before administration. The questionnaires were mailed to the study population during March 1993. The questionnaire return rate was 63.86%. Results of the survey were demonstrated in regular frequency distribution tables. The questionnaire results demonstrated that in some of the nursing employment and patient care and service areas for quality indicators, differences may exist. Some of the home health organizational types place more emphasis in some quality areas than in others. For example, hospital-based home health agencies allow more time for orientation and in-service training, have more home health experienced registered nurses, provide more time for paperwork completion, and allow more time for follow-up activities.

## CHAPTER 1

### INTRODUCTION

#### **OBJECTIVE**

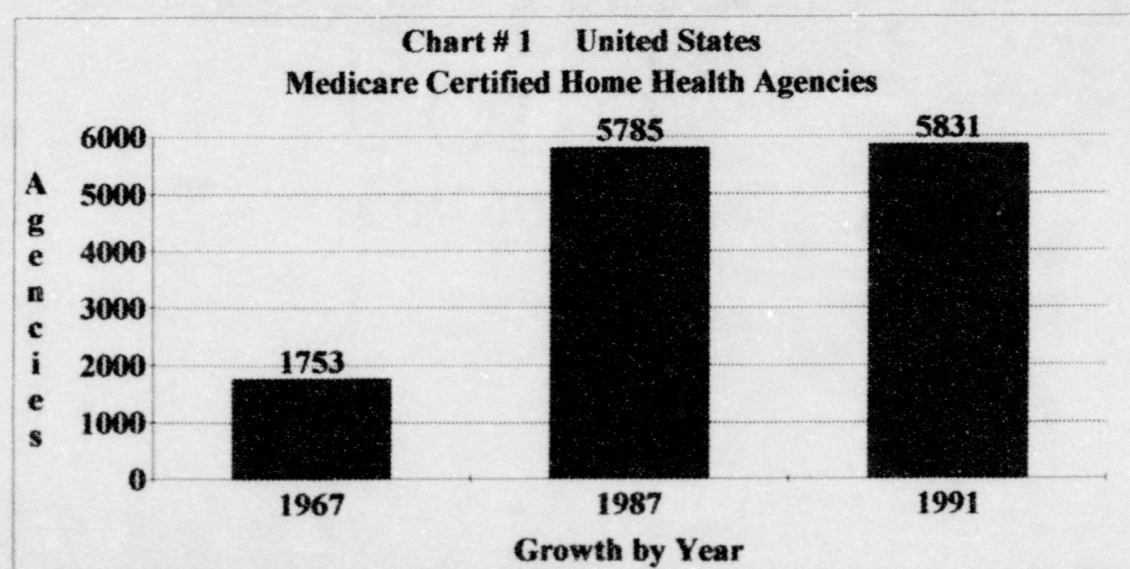
The research objective was to determine if the productivity measurement for registered nurses full-time equivalence among Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association varied in relation to the organizational type of the home health agency. Because any research of productivity needs to incorporate significant service delivery factors that are unique to the home health care industry, an analysis was also completed on two quality indicators: nursing employment and patient care and service. An analysis was conducted to determine the relationships that exist between home health care registered nurses full-time equivalence and quality indicators.

#### **REVIEW OF LITERATURE**

Over the past twenty-five to thirty years the home health care industry has experienced turmoil that has resulted in tremendous growth with increased competition, decreased health care dollars, limitations on reimbursement from third party payors, and increased referrals and acuity of patient care evolving from hospital prospective payment systems. Turmoil in health care has challenged the home health care industry to provide

quality care at the lowest possible cost per visit and to re-examine the industry expectation for average productivity of registered nurses.

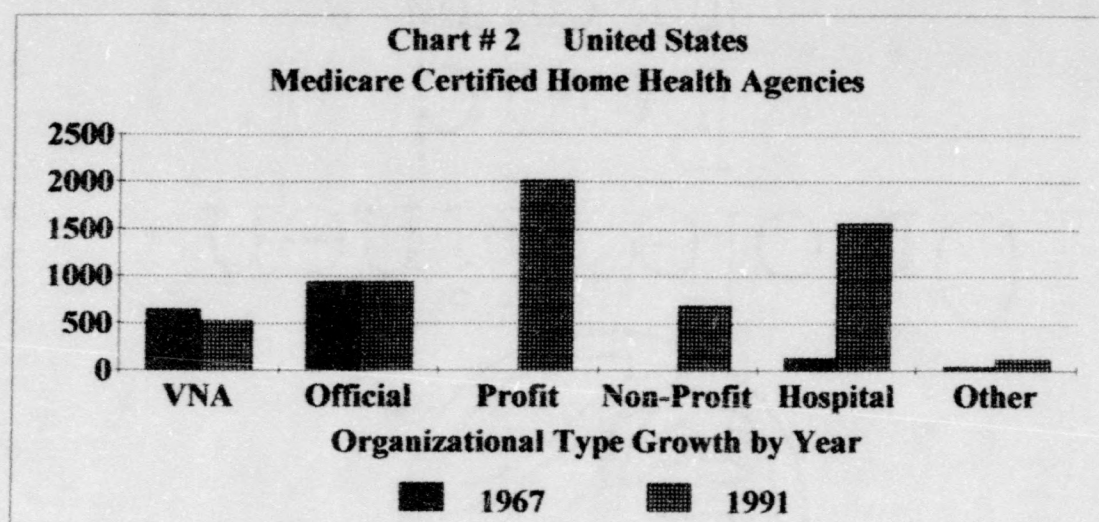
Historically, the health care industry has placed emphasis on institutions and not on home health care. Most of the attention focused on services provided for acute care rather than long-term care, or on treatment of the illness rather than promotion of health. Consequently, only a small percentage of health care dollars has been allocated to fund home health care. Yet, the demand for home health care has increased with the dramatic growth in the elderly population and the increased prevalence of chronic illness and disability in the population.<sup>1</sup> What was once considered a field of charitable organizations and Visiting Nursing Associations (VNAs) has become a growing industry in America. As illustrated in the chart below, in 1967 there were approximately 1,753 Medicare certified home health care agencies in the United States. In 1991, the number increased to approximately 5,831. The increase in these totals represents a 233% growth rate. The largest growth occurred between 1977 and 1987 as a result of the 1980



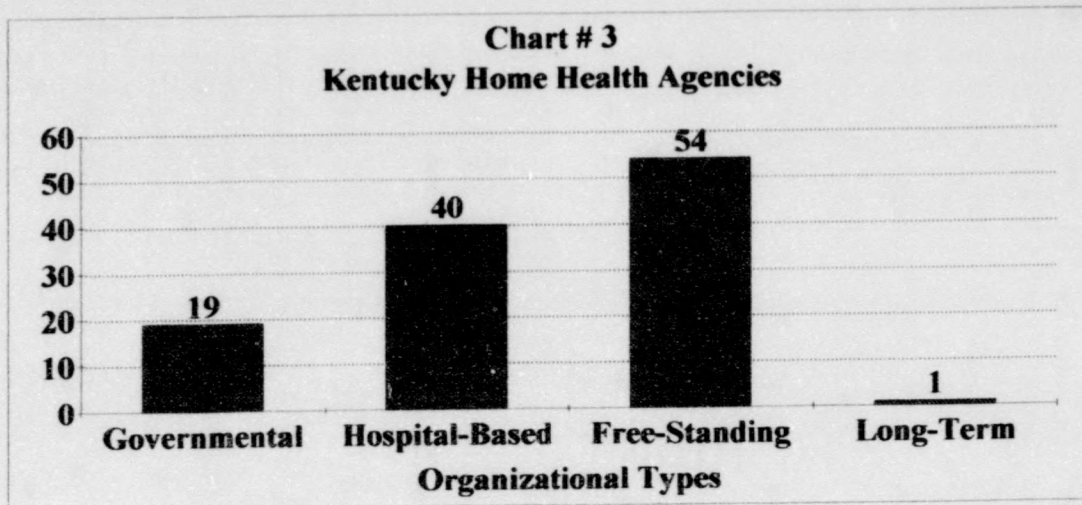
Omnibus Reconciliation Act (OBRA). OBRA allowed certification of proprietary



agencies in states not having licensing laws and liberalized the intensity of services by removing limits on the number of visits allowed and the three day hospitalization stay requirement.<sup>2</sup> The growth rate started slowing in 1987, and the percentage increase has been less than 0.9 from 1987 to 1991. Nevertheless, over the last few years, the home health agency organizational types have changed. Home health care is now provided by a complex network of VNAs, governmental agencies, proprietary agencies, private not-for-profit agencies, and hospital-based agencies as is illustrated in Chart 2.<sup>3</sup>



To bring the tremendous growth of home health care with increased competition closer to home, Kentucky home health agency statistics are presented. There are approximately 114 home health agencies in Kentucky. In the late 1970's, there were only sixty-five such agencies. The home health care industry in Kentucky has experienced approximately a seventy-five percent growth over the past fifteen to twenty years.<sup>4</sup> This growth has increased competition among home health agencies due to a complex network of the different home health agency organizational types. According to the Kentucky Semi-Annual Home Health Services Report 1991-2, the Kentucky home health care industry consists of three main organizational types (hospital-based, governmental, and freestanding) as shown in Chart 3.<sup>5</sup>



As early as 1985, the home health care industry began experiencing the effects of the Health Care Financing Administration (HCFA) imposing restrictions on reimbursement. Such restrictions have consisted of reductions in Medicare cost limits, lowering of Medicare cost caps, Gramm-Rudman-Hollings reductions, increased Medicare denials for service coverage with mandated changes in fiscal intermediaries, and mandates for Medicare electronic claim processing. These changes have stemmed from the expenditure growths for home health care over the past twenty years and predictions for continued growth. The total cost of all home health care services and products increased from \$9 billion in 1985 to approximately \$16 billion in the early 1990's.<sup>6</sup> As a result, new and improved mechanisms to control expenditure growth are presently under consideration. According to the National Home Care Association, a 1991 market analysis showed that a 10% per year growth rate is expected in the home health industry.<sup>7</sup> Because of this growth rate, prospective payment in home health care will probably be used in the future for cost containment measures. In addition more restrictions for reimbursement are expected for the home health care industry.

Lastly, the home health care industry experienced significant increases in referrals when the 1983 Social Security Amendments included the Medicare hospital prospective

payment system (PPS). PPS requires that when a patient is admitted to a hospital, he or she is given a diagnosis; and the reimbursement for services is based on the diagnosis. Therefore, if hospitals can render necessary treatment to patients for less, they can keep the savings. However, if the treatment costs more, hospitals must absorb the loss because the charges to Medicare cannot be increased, nor can patients be held financially responsible for the difference. PPS was designed to reduce unnecessary long hospital stays and to encourage use of medical outpatient services. Medicare's system has changed the pattern for hospital care. Patients who would have recuperated in a hospital are now being served through home health care. This shift in medical care has resulted in drastic changes for home health. Because acutely ill patients are now in need of home health care, the acuity level of care needed at home has increased. Medical technology previously used only in health care facilities is now used in the home setting. The utilization of intravenous medications, intravenous feedings, oxygen, ventilators, monitors, pumps, and prosthetic devices are common needs for home health care patients. The home health care industry faces a new challenge responding to the new level of care known as "high-tech." This level of care requires a high degree of competency and accountability, which in turn requires home health agencies to invest time, money, energy in goal-directed change, and innovative program development.<sup>8</sup> According to Marian Merrell Dow, Incorporated's Managed Care Digest, 1991 Long Term Care Edition, "high-tech" services are provided by most United States home health care agencies with home infusion therapy being provided by approximately 60% of such agencies.<sup>9</sup>

These changes in the home health care industry have brought about productivity concerns. Until recently, productivity has been given little attention, especially any systematic review of the relationship between efficiency and quality of home health services provided.<sup>10</sup> Unfortunately, productivity in the home health care industry has been difficult to measure due to limited knowledge and understanding of the meaning of

productivity. Home health care nurses hear the word "productivity" and think only of increasing the number of home visits because, traditionally productivity measurement has meant the number of visits made.<sup>11</sup> Nevertheless, productivity expectations are necessary for survival. Even as far back as 1890, home health care nurses were making an average of six visits per day, while current assumptions in the industry indicate the average to be five to six visits per day.<sup>12</sup> The actual number of home visits per day depends upon the definition of productivity in relation to the significant service delivery factors for quality indicators. A productivity definition involves the number of patient visits as well as all other direct and indirect resources utilized to provide services.

Defining a productivity measurement is a complicated process for the home health care industry. Such a process begins with an understanding to the resistance to productivity measurements. One reason for resistance is the "value-belief system." Traditionally, the home health industry has emphasized the importance of providing quality of care with little regard to the cost. A second reason for resistance is frustration experienced by nurses for the rigid productivity standards that do not reflect significant service delivery factors. A third reason for resistance is that productivity standards are often misunderstood by the administrators of home health care agencies.<sup>13</sup> However, these factors must change if the home health care industry is to survive in a highly competitive and regulated health care environment.

Productivity in the home health care industry can be defined as a relationship between the outputs produced by an organization and the inputs provided to create the outcomes. In the simplest form, it is as follows: 
$$\text{OUTPUTS/INPUTS} = \text{PRODUCTIVITY}$$
 
$$\text{OUTCOMES.}^{14}$$
 In the home health care industry, the outputs are the number of home visits and/or home care services performed. The inputs are the total hours/minutes needed to complete these home visits.<sup>15</sup> While the above formula can provide a measurement for productivity, the significant service delivery factors must be evaluated for their contributions. The significant service delivery factors evaluation is

accomplished by using "multifactor productivity."<sup>16</sup> Multifactor productivity for the home health care industry examines the outputs and inputs in relation to the factors that influence variances in the total productivity. Actual numbers of visits per day will depend upon these factors.

The challenge of defining productivity for the home health care industry is only the beginning. Because productivity is a critical factor in the fiscal survival of home health care, it also needs to be calculated and evaluated. When calculating home health care productivity, all activities for carrying out the home visits should be included. Thus, a complete home visit time includes total time for travel and for all the activities that directly and indirectly contribute to the completion of the home visit. A formula for calculating productivity taking this into consideration would include total hours worked by registered nurses, total registered nursing visits, and total working hours available.<sup>17</sup> Such a calculation indicates the total cost to provide nursing visits. In addition, the number of visits made each fiscal year greatly affects the year-end cost-per-visit rate. This measure is an excellent management tool to determine whether the cost of providing service is greater than the amount of money that the home health agency was reimbursed.<sup>18</sup>

Evaluating the productivity in the home health care industry involves analyzing the significant service delivery factors for determining the quality of care in relation to the nursing employment and patient care and service and what makes a nurse productive in the home health agency. Productivity quality concentrates on the actual delivery of home health care. Direct and indirect activities associated with quality should be geared to assure that patients receive optimal care that meets the highest nursing professional standards.<sup>19</sup> Utilizing indicators that are "measurable dimensions of the quality or appropriateness of an important aspect of patient care" is one way to evaluate productivity quality.<sup>20</sup> Measurable indicators are evaluated to determine the quality and appropriateness of patient care. Because home health nursing is just now beginning to

define services provided, the identified indicators are the most measurable for quality of care. Because home health services entail a multitude of functions, services, processes, policies, procedures, protocols, and requirements, attempting to identify all indicators would be impossible. However, the most common indicators for relating productivity to quality of care are nursing employment and patient care and service indicators.<sup>21</sup> The nursing employment indicators include the nursing personnel functions such as orientation programs, home health nursing experience, educational preparation, and staff development. The patient care and service indicators include activities that are related to direct and indirect patient care such as the actual home visit; geographic area; travel time; amount of time it takes to admit a patient; length of visits; caseload expectations; patient care needs; the time it takes to complete paperwork requirements; staffing; scheduling; and follow-ups with doctors, other home health team members, and other service providers.

In summary, it is important to remember productivity in the home health care industry include many different factors and forces that influence the outcomes. The home health agency should be examined as a whole, and staff should be involved in the planning and evaluating of the productivity of the home health agency. Foremost to effective productivity is management, effective supervision, and the ability to challenge and motivate staff.<sup>22</sup>

### **RATIONALE OF APPROACH**

The purpose of this research is to determine if the productivity measurement of registered nurses full-time equivalence among Kentucky certified home health agencies varied in relation to the organizational type of the home health agency. This study examined two quality indicators, nursing employment and patient care and service, to

determine potential relationships. Registered nurses full-time equivalences productivity measurement was accomplished by analyzing data gathered in the Kentucky Semi-Annual Home Health Services Report 1991-2 of the Health Data Branch of the Division of Vital Records and Health Development in Frankfort, Kentucky. Also, Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association were surveyed to examine more closely the significant service delivery factors for quality indicators that tended to affect the patient visits productivity measurement. Finally, an examination was made to determine potential relationships between these quality factors and information available in relation to the patient visits productivity measurement for the studied population.

#### **STATEMENT OF THE PURPOSE**

The purpose of this research was to formulate information on a measurement of productivity for registered nurses full-time equivalence among the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. No formal research had been conducted on this subject matter for the Kentucky home health agency industry. Providers of home care are constantly searching for ways of determining what should constitute productivity measurements among nursing staff; how to define, calculate, and evaluate productivity measurements; how they compare among home health agencies in Kentucky; and how quality indicators, such as the two selected for this study, nursing employment and patient care and service, can influence productivity measurements. No such analysis of data had been undertaken prior to this study. Accordingly, the Kentucky home health care industry is struggling to deal with the issue of productivity measurements during a critical time for the financial survival of agencies. This study was intended to be a beginning point in filling the need for information on productivity measurements for the Kentucky home health industry.

### **ANALYSIS OF DELIMITATIONS**

The major delimitation of this research was that the group studied only included the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. As previously stated, there are a total of 114 home health agencies in Kentucky that are Medicare and Medicaid certified. According to the Kentucky Home Health Association's Directory of Home Health and Hospice Agencies in Kentucky 1991-1992, there are eighty-three such agencies in the State.<sup>23</sup> Hence, the delimitation excluded the thirty-one agencies that are either not Medicare and Medicaid certified or are not members of the Kentucky Home Health Association, making the total study population eighty-three.

### **ANALYSIS OF LIMITATIONS**

One limitation that existed in this research project was that the significant service delivery factors for quality indicators in relation to the measurement of productivity were limited to two: nursing employment and patient care and service. Because the main purpose of this research was to determine the productivity measurement of registered nurses full-time equivalence for average daily patient visits and to determine if variances existed between the productivity measurement and organizational type, factors for quality indicators possibly affecting productivity were limited.



## **HYPOTHESES**

An analysis of compiled data that compared the measurement of productivity for Kentucky home health care registered nurses full-time equivalence (FTE) and the significant service delivery factors for the two quality indicators, nursing employment and patient care and service, was completed. The purpose was to determine if significant differences existed in relation to the average daily patient visits made per home health care registered nurse by home health organizational type. In addition, the average daily patient visits per FTE and questionnaire responses to the quality indicators for each of the home health organizational type were compared to determine if specific trends emerged. Therefore, the study had two different hypotheses that were stated in the null form. The hypotheses were as follows:

- 1) Among the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association there is no significant difference between the measurement of productivity of registered nurses FTE for average daily patient visits in relation to the home health organizational type.
- 2) Among the significant service delivery factors for the two quality indicators, nursing employment and patient care and service, there are no specific trends noted when questionnaire responses were compared to the registered nurses FTE productivity measurement for average daily patient visits by home health organizational type.

## **DEFINITIONS**

**Home Health Care.** The sensitive, active and educational provision of professional nursing care to people of all ages in their place of residence other than in an institutional setting.<sup>24</sup>

**Certification.** The home health agency has met certain requirements to allow it to accept Medicare and Medicaid reimbursement.<sup>25</sup>

**Organizational Types of Home Health Agencies.** The organizational types of home health agencies means the ownership structure of the institution.<sup>26</sup> There were four different organizational types related to this study. Organizational types included the following:

**Governmental (Health Department).** Home health agencies are created and given their authority through statutes of legislation. Home health services are provided by nursing departments/divisions of state, district, or local health departments.<sup>27</sup>

**Visiting Nursing Associations (VNAs).** Home health agencies which do not depend upon state and/or local taxes. These agencies are funded with non-tax funds such as donations, endowments, United Way funds, and third-party insurance providers. This type of agency is referred to as the Visiting Nursing Associations (VNAs).<sup>28</sup>

**Not-For-Profits (Non-Profits).** Home health agencies that have been privately developed and owned in which no part of the income or profit can be distributed for private gain but can be utilized or reinvested for the organization's purposes.<sup>29</sup>

**Hospital-Based.** Home health agencies that are a operating unit/department of a hospital.<sup>30</sup>

**Proprietary (For-Profit).** Home health agencies that have been privately developed and owned for the purpose of making a profit.<sup>31</sup>

## **SUMMARY**

The researcher identified in the introductory chapter that the research purpose was to determine the measurement of productivity of registered nurses FTE for average daily patient visits among Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association in relation to the organizational type of the home health agency. At the same time, two significant service delivery factors for quality indicators, nursing employment and patient care and service, were outlined. Another purpose of the study was to determine what relationship might exist between these factors for quality indicators and the productivity measurement.

The review of the literature covered the past twenty-five to thirty years of the home health care industry in relation to growth, reimbursement restrictions, and the advent of the Medicare prospective payment system. Further discussion demonstrated how these changes have brought about productivity measurement concerns for the home health care industry. Survival in the highly competitive and regulated health care environment requires the home health care industry to define, calculate, and evaluate productivity measurements.

This research included an analysis of the literature and published data. A survey was conducted among Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association to examine relationships that might exist between identified factors for quality indicators and the productivity measurement. In addition, an explanation was included for the delimitations and limitations of this study.

Finally, the hypotheses of the study were presented. Two different hypotheses are identified: the first being the major one and the second being in relation to some identified factors for quality indicators that have a relation to the productivity measurement. Concluding definitions were provided to illustrate the context of the study and the corresponding measurements.

## CHAPTER 2

### METHODOLOGY

#### **GENERAL DESCRIPTION**

This observational cross-sectional study was conducted in Kentucky among Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. The study examined data from the Kentucky Semi-Annual Home Health Services Report 1991-2 and compiled data for the sample population to determine the productivity measurement of registered nursing average daily patient visits by individual home health agency. The second part involved surveying the home health agencies to examine two significant service delivery factors for quality indicators, nursing employment and patient care and service, that might affect the productivity measurement to determine the relationships that might exist between these factors and the productivity measurement.

#### **STUDY POPULATION**

The population for this study was the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. The population information was obtained in two phases. First, the necessary data to determine the productivity measurement of registered nursing average daily patient visits

among home health agencies by type of organization was obtained by utilizing information available in the Kentucky Semi-Annual Home Health Services Report 1991-2 and the Kentucky Home Health Association's Directory of Home Health and Hospice Agencies in Kentucky 1991-1992. The information obtained from these sources included a list of the eighty-three Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association and information for the number of patients served for nursing services, the total number of patient home visits for nursing services, and the total work hours of service for nursing services. Using this information, the registered nursing FTE and registered nursing average daily patient visits productivity were calculated. The calculations were accomplished by utilizing the following information: total registered nursing paid hours, eight hours per work day as full-time equivalence, and total registered nursing visits. Second, the necessary data to determine the relationships that might exist between two significant service delivery factors for productivity quality indicators were obtained by surveying the eighty-three home health agencies. The information obtained from these sources included information on nursing employment indicators for orientation programs, home health experience, educational preparation, and staff development. The patient care and service indicators included information for activities that are related to direct and indirect patient care for the amount of time it takes to admit a patient; length of home visits; caseload expectations; patient care needs; the time it takes to complete paperwork requirements; and follow-ups with doctors, other home health team members, and other service providers. The study population was contacted by coordinating the survey with the Kentucky Home Health Association. This Association agreed to encourage its members to participate in the survey by co-signing the introductory and follow-up letters that were mailed with the questionnaire.

### SAMPLING DESIGN

The sampling population for this study was comprised of the eighty-three Medicare and Medicaid home health agencies belonging to the Kentucky Home Health Association. Since the target population was relatively small and a large portion of data needed for this study had already been gathered through the Kentucky Semi-Annual Home Health Services Report 1991-2, the researcher felt that the survey portion of this study needed to be as representative as possible. Therefore, the decision was made to survey the complete target population. The unit of analysis and unit of data collection for this study were the same --- the individual Kentucky Medicare and Medicaid certified home health agencies. Overall, this sampling design ensured an equal representation of the population in order to have findings that were a reflection of the target population.

### DATA COLLECTION

Data for this study was collected by utilizing the available information from the Kentucky Semi-Annual Home Health Services Report 1991-2, Directory of Home Health and Hospice Agencies in Kentucky 1991-1992, and by conducting a survey of the eighty-three Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. The survey was a self-administered mailed format questionnaire (Appendix A) that was sent to the administrators of the target population. In the hope of encouraging support and increasing overall participation, the survey was coordinated through the Kentucky Home Health Association. This type of survey format was chosen because it was a cheap, quick way to survey, and it could be designed to offer anonymity to respondents. Also, it enabled the total population to participate, provided the means to describe some characteristics of Kentucky home health agencies, and eliminated interviewer bias.

## **QUESTIONNAIRE**

As illustrated in Appendix A, the questionnaire consisted of a total of thirteen questions that were related to nursing employment and patient care quality indicators. One question was open-ended and required numerical responses. Twelve questions were close-ended questions fixed responses. The levels of measurement consisted of both nominal and ordinal data. This instrument was developed specifically for this study; therefore, before it was administered to the study population, it required refinement. Home health peers evaluated the questionnaire to ensure that questions were stated in a clear, concise, and understandable manner and that fixed response choices were appropriate for the home health industry. The peer review evaluation team consisted of one home health agency administrator and three home health nursing supervisors. In addition, the peer review group was representative of the Kentucky home health organizational types. After the peer review group completed its evaluation, the questionnaire was revised and pilot tested with this same group. Additional revisions were made after the pilot test.

After the peer review process, the questionnaire was mailed to the eighty-three identified home health agencies. The packet consisted of the introductory letter (Appendix B), questionnaire (Appendix A), a self-addressed and stamped envelope, and a self-addressed and stamped postcard that was coded to verify response percentage. Packet instructions requested that the questionnaire be completed within two weeks and mailed in the provided envelope. The postcard was mailed separately but simultaneously so that the researcher would know to whom to send a follow-up mailing if the initial



response rate was low. Approximately three weeks after the initial mailing, a follow-up mailing was to be sent to the study population who did not return the postcard. The follow-up packet was the same as the initial packet except for the letter which identified it as a second mailing (Appendix C). The questionnaires were returned to the researcher's post office box. The researcher assumed the responsibility of tallying all results.

### **PEER REVIEW EVALUATION**

Since the questionnaire was developed specifically for this research study, it lacked validity. It was necessary to improve the validity through the peer review evaluation process. Such a process consisted of selecting a peer review evaluation team which was composed of a group of four home health experts representing each of the four Kentucky home health organizational types. The team's purpose was to assist with reviewing the questionnaire to assure that response categories provided for each question were exhaustive, mutually exclusive, clear, and precise. Also, these home health experts reviewed the introductory and follow-up letters that were to go out with the questionnaire to make sure they clearly explained the research. The researcher provided the peer review evaluation team with some background information for the study to introduce them to its purpose and how objectives were to be accomplished. The research method known as the delphi technique was incorporated into this process. Each member of the team received copies of the above mentioned information. They reviewed the materials and analyzed them utilizing the following guidelines:

1. Does the introductory letter clearly identify the purpose of the study, who is completing the study, who is sponsoring the study, what the study is attempting to accomplish, how the home health agencies were selected for the study, importance of responding to the study, anonymity of the participants, and instructions for mailing the completed questionnaire?
2. Does the follow-up letter explain that a previous letter was sent and all of the above information specified under #1?
3. Does the questionnaire identify the study, provide for clear instructions, ask appropriate questions to measure the quality indicators (nursing employment and patient care and service), provide appropriate fixed responses, and provide for all exclusive fixed responses?
4. Are there additional questions that need to be included in this questionnaire?
5. Are there questions that need to be deleted from the questionnaire? If so, please explain your reasoning for this.

There were three rounds of the peer review evaluation process which included analyzing the introductory letter, follow-up letter, and the questionnaire. After the third round, the team had no additional improvements to suggest.

The team's review and analysis resulted in changes that were incorporated into the letters and the survey tool. One major change included informing the participants in the introductory and follow-up letters that they would be given the results of this study if they participated and requested results. Additionally, changes were made to most of the questions to more clearly indicate that information requested was for registered nursing direct service staff.

Several issues raised by the team members regarding the survey questions required further explanation. One of these dealt with the nursing employment quality indicators such as orientation, in-service training, and continuing education, and the relationship to registered nursing productivity. The relationship is that productivity is a function of orientation training, in-service training, continuing education, and home health nursing experience.<sup>32</sup> All of these have a direct relationship to productivity in

that such areas affect the productivity outcome levels. Therefore, it can be said that the more orientation training, in-service training, continuing education, and experience one has in home health, the more productive one will be until the optimal functioning level is reached. A second question dealt with whether the questionnaire should divide orientation into categories of formal and informal training. The quality indicator for nursing employment in relation to orientation programs did not make a distinction between whether such training is formal or informal. Instead, the purpose was to determine, in general terms, the amount of orientation training provided to registered nursing direct service staff and to determine if such training might have an effect on their average productivity. A third question dealt with the issue of paperwork. The definition of paperwork includes all paperwork related directly and indirectly to providing the nursing services to clients. Accordingly, it includes such activities as completing laboratory forms, taking physician orders, writing progress notes, completing treatment plans, completing billing forms, and completing any other required paperwork related to patient care. A fourth question concerned keeping full-time employees from skewing the results compared to contract nurses for calculating time allowed for paperwork completion. The survey tool requested participants to identify an approximate range of hours allowed for paperwork completion on a weekly basis. Therefore, the response meant an overall average for all registered nursing direct service staff in an agency, including all exceptions and variances. A final question dealt with the data source for calculating registered nursing productivity. The researcher chose the Semi-Annual Home Health Survey data source to analyze registered nursing productivity because of the following reasons:

1. The same period of time for all agencies needed to be utilized for the comparison, and all agencies are required to submit data for this report for the same time period.
2. Each agency receives the same instructions and definitions for completing this report. Even though agencies have different ways of gathering this data the results should be very similar to what they would report in a Medicare cost report.
3. This report does include some checks and balances for information that is provided on total hours for the different disciplines and with unduplicated patients served.
4. A representative of the agency is required to sign the report stating the information reported is correct.

### **PILOT STUDY**

After the peer review evaluation team completed reviewing and analyzing the letters and survey tool, they completed the pilot testing for the survey instrument. Each of the home health experts completed the questionnaire for the agency in which they were employed. Once the questionnaires were completed they were mailed to the researcher. The completed questionnaires were analyzed to determine if instructions were followed. No problems were identified that indicated difficulties in understanding how to respond to the questionnaire. Therefore, it was determined that the survey tool was ready for mailing to the participants.

### **SOURCES OF BIAS**

The anticipated sources of bias that might have compromised the study results included error in recording findings from the gathering of data and through the compiling of questionnaire responses. Other possible biases included respondents not answering questions truthfully and the possibility of a low questionnaire response rate that would not be representative of the study population. To assist in reducing the impact these sources of bias, the researcher and a neutral individual independently recorded and counted the questionnaire responses so that results could be compared. When there were discrepancies, the activity was repeated until the two were identical. Second, respondents were encouraged to provide responses that were accurate and candid because the survey results would be kept anonymous. Third, to assure an adequate response rate of at least fifty percent, a follow-up mailing was to be sent to those respondents who did not return their coded postcard from the initial mailing. The second mailing was to be sent three weeks after the initial mailing emphasizing the importance of each home health agency's participation in this study.

### **MEASUREMENTS**

Data measurements for this study were collected by completing a detailed analysis of the official existing statistics contained in the Kentucky Semi-Annual Home Health Services Report 1991-2, as illustrated on the tally sheet in Appendix D. The analysis was completed by recording the total number of patient visits by nursing services, total hours for nursing services, average daily patient visits productivity for registered nursing services, and the totals for registered nursing FTE for each of the eighty-three Kentucky Medicare and Medicaid certified home health agencies by organizational type identified from the Directory of Home Health and Hospice Agencies

in Kentucky 1991-92. This information was then calculated for each of the four different home health agency organizational types to determine the average daily patient visits productivity for registered nurses by utilizing the following information:

1. Time period to calculate was from July 1, 1991 through December 31, 1991.
2. Average work week was forty hours for each FTE.  
Total number of maximum work hours per FTE for the time period was 1,040.
3. To calculate the average daily registered nursing productivity based on total paid hours, the following formula was utilized:

$$\frac{(\text{RN Visits})}{(\text{RN Paid Hours}/8 \text{ hours per day})} =$$

RN Average Daily Patient Visits.

In addition, the questionnaire responses were recorded by home health agency organizational type for each response provided on a questionnaire response sheet, as illustrated in Appendix E.

## **VARIABLES**

The variables and the attributes for this study were as follows in Table 1.

<b>TABLE 1</b>	
<b>VARIABLES AND ATTRIBUTES</b>	
<b><u>VARIABLES</u></b>	<b><u>ATTRIBUTES</u></b>
1. Kentucky Medicare and Medicaid Certified Home Health Agencies.	Hospital-Based, Health Department, For-Profit, Not-for-Profit, and VNA.
2. Patient Visits Productivity for Nursing.	Number of patients served for nursing services, total indirect and direct hours for nursing services, total direct service hours for nursing services, and total nursing full-time equivalence.
3. Quality indicators of nursing employment.	Orientation programs, home health nursing experience, educational preparation, and staff development.
4. Quality indicators of patient care and services.	Geographic area, travel time, amount of time it takes to admit a patient, length of visits, caseload expectations, patient care needs, time it takes to complete paperwork requirements, staffing levels, follow-up with doctors, other home care team members, and other service providers.

The independent variables and attributes for this study were the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association by organizational type. The dependent variables and attributes included

patient visits productivity for nursing, quality indicators of nursing employment, and quality indicators of patient care and service.

### **VALIDITY AND RELIABILITY**

Survey research has been criticized for being superficial and lacking validity; however, survey research is strong on reliability. Accordingly, it is important to remember that survey responses are only approximate indicators and not necessarily absolutes. Additionally, since this study analyzed existing official statistics, the reliability depended on the quality of the report and the statistics themselves. The researcher developed reliability by designing a questionnaire that was simple and required straightforward responses. Before the questionnaire was utilized, it was reviewed and evaluated by a peer review evaluation team and pilot test process. The data collection for the study was completed using report forms that were specifically designed for this study, as are illustrated in Appendices D and E. For validity, the researcher determined that a return rate of at least 50% was required to assure that findings from the study could be generalized to the entire target population. Consequently, a follow-up mailing process was designed to assure that this return rate was met.



## CHAPTER 3

### ANALYSIS OF DATA

#### **METHOD FOR PRESENTING DATA**

The data obtained from completing the report forms illustrated in Appendices D and E was compiled into a format that indicated the average daily registered nursing patient visits productivity by home health agency organizational type. Also, the two significant service delivery factors for quality indicators, nursing employment and patient care and service, were compiled into a format that indicated the total responses from the questionnaire by home health agency organizational type.

#### **SORTING AND CLASSIFICATION OF DATA**

The data was sorted, classified, and tabulated by manual and computer methods. The computer was used to develop the mathematical calculations for the formulas that were utilized on the data obtained from the analysis of the Kentucky Semi-Annual Home Health Service Report 1991-2 and the questionnaire results. The KwikStat statistical data analysis computer software program was used for statistical analysis.

## **RELATIONSHIPS BETWEEN VARIABLES**

The relationships between the independent and dependent variables and attributes that were examined included the following for this research study.

1. The independent variables were the four Kentucky Medicare and Medicaid certified home health agency organizational (auspice) types. These types included hospital-based, health department, not-for-profit, and proprietary. These variables were compared to the dependent variables of home health registered nursing patient visits productivity for each of these organizational types. An analysis of these variables determined whether there were significant differences between average registered nursing patient visits productivity in comparison to each home health organizational type. This analysis of data was measured by using the one way analysis of variance (ANOVA).
2. The independent variables described above were then used again to compare the dependent variables consisting of the significant service delivery factors of quality indicators for nursing employment and patient care and service. This data came from the tallied results of the questionnaire process for each of the home health agency organizational types. Descriptive statistics, in particular frequency distribution tables, were utilized to analyze the questionnaire response data to determine what relationship these two quality indicators have with the average daily registered nursing patient visits productivity.

### **RELATIONSHIP OF THE ANALYSIS TO THE SPECIFIC AIMS**

The statistical analysis of the data in this study allowed the researcher to determine if average daily patient visits productivity for registered nurses among Kentucky Medicare and Medicaid certified home health agencies showed significant differences in relation to the organizational type of the home health agency. Also, the statistical analysis of data for the significant service delivery factors for the quality indicators, nursing employment and patient care and service, provided information to determine whether they played a role in relation to overall average daily registered nursing patient visits productivity among the different home health agency organizational types. Consequently, the overall analysis of data provided the relationship of home health agency organizational types with average daily registered nursing patient visits productivity and the quality indicators: nursing employment and patient care and service.

## CHAPTER 4

### FINDINGS

#### **OVERVIEW**

The results for this study came from two different sources. The first source was the data that were analyzed in the Kentucky Semi-Annual Home Health Services Report 1991-2. Data were extracted to determine the average daily registered nursing patient visits productivity for each of the four different home health organizational types belonging to the Kentucky Home Health Association and being Medicare and Medicaid certified. The statistical technique, one-way analysis of variance (ANOVA) was utilized to analyze the average daily registered nursing patient visits productivity data to determine whether there were differences in the outcomes for the different home health organizational types.

The second source of data was the questionnaire results. The purpose of this survey was to determine whether a relationship existed between the average daily registered nursing patient visits productivity and the two quality indicators: nursing employment and patient care and service. The survey results were categorized into regular frequency distribution tables. Summaries were completed for each home health organizational type and totals for all responses.

### **ANALYSIS OF REGISTERED NURSING PRODUCTIVITY**

The computerized statistical data analysis program called KwikStat was utilized to enter data for the following categories: home health agency name, organizational type, and average daily registered nursing average patient visits productivity. The productivity data were then analyzed for descriptive statistics in which the average daily registered nursing patient visits productivity variable was calculated from summary statistics for all of the home health agencies. The descriptive statistics results were as follows in TABLE 2.

<b>TABLE 2</b>							
DESCRIPTIVE STATISTICS							
KENTUCKY HOME HEALTH AGENCIES							
FOR							
AVERAGE DAILY REGISTERED NURSING							
PATIENT VISITS PRODUCTIVITY							
<b>Field Name</b>	<b>Number (N)</b>	<b>Mean</b>	<b>STD</b>	<b>SEM</b>	<b>MIN</b>	<b>MAX</b>	<b>SUM</b>
RN PATIENT VISIT PRODUCTIVITY	83	4.16	1.661	0.182	0.640	11.240	324.850

Patient visits productivity data for each home health organizational type were calculated and analyzed. The summary statistical results are on the next page in TABLE 3.

<b>TABLE 3</b>							
DESCRIPTIVE STATISTICS							
EACH HOME HEALTH AGENCIES REGISTERED NURSING							
AVERAGE PRODUCTIVITY							
<b>Field Name</b>	<b>Number (N)</b>	<b>Mean</b>	<b>STD</b>	<b>SEM</b>	<b>MIN</b>	<b>MAX</b>	<b>SUM</b>
Health Dept.	12	3.52	0.899	0.259	2.250	5.810	44.100
Hospital-Based	33	3.45	0.950	0.165	0.640	5.270	118.220
Not-For-Profit	11	4.37	1.015	0.306	2.170	5.860	45.500
Proprietary	27	4.88	2.545	0.490	1.340	11.240	117.030

The one-way analysis of variance (ANOVA) procedures were utilized to test the hypothesis of the equality of means of the four different home health organizational types in order to analyze the average daily registered nursing patient visits productivity data. The purpose was to determine whether there was a difference in the outcomes of patient visits productivity of four home health organizational types.

The ANOVA procedure separated the total variation in the database into parts, to determine whether the variation was due to chance (error) or due to true differences among the home health organizational types. Accordingly, the ANOVA procedure error was measured as sums of squares and the sum of the squared deviations of values from their mean. The F-test statistic was calculated using the sums of squares. The F-test statistic had an F distribution under the null hypothesis, and a decision was made by comparing the calculated F value with a critical value obtained in an F-table.<sup>33</sup> The results are as follows in TABLE 4.

<b>TABLE 4</b>					
ONE-WAY ANALYSIS OF VARIANCE (ANOVA)					
ALL HOME HEALTH AGENCIES AVERAGE DAILY					
REGISTERED NURSING PATIENT					
VISITS PRODUCTIVITY					
Source	S.S.	DF	MS	F	Approx P
Total	226.17	82			
Treatment	9.63	3	3.21	1.17	0.326
Error	216.54	79	2.74		

At the 0.05 significance level, the means of any two home health organizational types were not significantly different. On the other hand, the following characteristics were noted:

- Hospital-Based home health agencies has the smallest mean of 3.45, with the proprietary home health agencies having the largest of 4.88.
- The mean for the health department home health agencies is slightly more (0.07) than the mean of hospital-based agencies; however, 0.85 less than the mean for the not-for-profit home health agencies.
- The mean for the hospital-based home health agencies is less than the means for the other three home health organizational types.
- The mean for the not-for-profit home health agencies is higher than for the health department and hospital-based home health agencies, but lower than the mean for the proprietary home health agencies.

- The mean for the proprietary home health agencies was the highest, but only 0.51 higher than the mean for the not-for-profit home health agencies.

Based on the above characteristics, it was concluded that the average daily registered nursing patient visits productivity for the not-for-profit and proprietary home health agencies was higher than for the health department and hospital-based home health agencies for the Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. However, there was no significant difference overall between the home health organizational types in relation to the average daily registered nursing patient visits productivity, and the first null hypothesis as follows was accepted as being true:

**Among the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association, there is no difference between the measurement of productivity of registered nurses full-time equivalence for average daily patient visits in relation to the home health organizational type.**

#### **ANALYSIS OF THE QUESTIONNAIRE RESULTS**

During March 1993, all of the Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association were mailed a questionnaire introductory letter (Appendix B) and a questionnaire for productivity quality indicators (Appendix A). The questionnaire return rate of 63.86% was higher than the 50% return rate requirement set for the study. The return rate breakdown by home health organizational type is indicated in TABLE 5.



<b>TABLE 5</b>	
<b>QUESTIONNAIRE FOR PRODUCTIVITY QUALITY INDICATORS</b>	
<b>RETURN RATE BY HOME HEALTH ORGANIZATIONAL TYPE</b>	
<b>Organizational Type</b>	<b>Return Rate</b>
Health Department	75.00%
Hospital-Based	66.67%
Not-For-Profit	54.55%
Proprietary	59.26%

The return rate percentages demonstrated that not only was the overall participation good, but there was also excellent participation among the different home health organizational types. Hence, characteristics and trends identified through analysis and evaluation of responses were representative of the study population.

### **ANALYSIS OF QUESTIONNAIRE RESPONSES**

Questionnaire responses by totals and individual home health organizational types are provided and analyzed for each of the thirteen questions. The following pages show regular frequency distribution tables to exhibit the questionnaire outcomes. The outcomes for each response choice for each question represent the number of home health agencies indicating this response with the response percentages being shown in parenthesis.

<b>TABLE 6</b>	
<b>QUESTIONNAIRE RESPONSE # 1</b>	
<b>"What organizational (agency) type is your home health agency?"</b>	
<b>Organizational Type</b>	<b>Number Responding</b>
Hospital-Based	22
Health Department	9
Not-For-Profit	6
Proprietary	16
Total	53

#### **Analysis Explanation**

This table shows that fifty-three home health agencies participated in the survey. Also, it provides a breakdown by organizational type of the number of home health agencies participating. Participation rates were very positive. Possible explanations for excellent participation were that the researcher sought assistance from the Kentucky Home Health Association to encourage its members participation; participation provided for complete anonymity; and in return for participation, the researcher agreed to provide a summary of the results to those participants desiring such information.

<b>TABLE 7</b>					
QUESTIONNAIRE RESPONSE # 2					
"On an annual average, how many hours of orientation training are provided for your registered nursing direct service staff?"					
Response Choices	HB	HD	NFP	P	TOTAL
0-40 hours	4 (18)	0	0	6 (38)	10 (19)
41-80 hours	10 (45)	2 (22)	2 (33)	4 (25)	18 (34)
81-120 hours	2 (9)	5 (56)	2 (33)	3 (19)	12 (23)
121-160 hours	2 (9)	2 (22)	1 (17)	2 (12)	7 (13)
More than 160 hours	4 (18)	0	1 (17)	1 (6)	6 (11)
HB = Hospital-Based HD = Health Department NFP = Not-For-Profit P= Proprietary					

#### **Analysis Explanation**

Responses for orientation training indicated that the majority of home health agencies provided approximately 41-80 hours of orientation training for registered nursing direct service staff. Approximately 45% of the hospital-based home health agencies provided this same range of orientation hours; whereas, 56% of the health department home health agencies provided a range of 81-120 hours of orientation training, and 38% of the proprietary home health agencies only provided a range of 0-40 hours of orientation training to registered nursing direct service staff. The not-for-profit home health agencies tended to provide anywhere from 41-120 hours of orientation. Only 11% of the home health agencies provided more than 160 hours of orientation training.

<b>TABLE 8</b>					
QUESTIONNAIRE RESPONSE # 3					
"What is the average amount of home health experience your current registered nursing direct service staff presently have?"					
Response Choice	HB	HD	NFP	P	Total
0-2 years	4 (18)	0	0	5 (31)	9 (17)
2-4 years	4 (18)	5 (56)	0	7 (44)	16 (30)
4-6 years	8 (36)	2 (22)	2 (33)	4 (25)	16 (30)
6-9 years	2 (9)	2 (22)	2(33)	0	6 (11)
9+ years	4 (18)	0	2(33)	0	6 (11)
HB = Hospital-Based                      HD = Health Department                      NFP = Not-For-Profit P = Proprietary					

#### Analysis Explanation

The majority of home health agencies had registered nursing direct service staff with 2-6 years of home health experience. The hospital-based home health agencies had the most registered nursing direct service staff with more than nine years of home health experience, approximately 18%. The not-for-profit home health agencies also had registered nurses with the same amount of experience; however, their 33% consisted of only two agencies. Consequently, when these home health experience percentages are compared to the total study population they were not significant. For example, the hospital-based agencies 18% dropped to 12% and the not-for-profit agencies 33% dropped to 18%. The proprietary home health agencies appeared to have the least home health experienced registered nursing direct service staff with the following breakdowns: 0-2 years representing 31%, 2-4 years representing 44%, and 4-6 years representing 25%.

When this was compared to the total study population for this home health organizational type, the percentages dropped to 18.51%, 25.92%, and 14.81%, respectively.

<b>TABLE 9</b>					
QUESTIONNAIRE RESPONSE # 4					
"Approximately how many hours of in-service training does your agency provide annually for direct service registered nurses?"					
Response Choice	HB	HD	NFP	P	TOTAL
0-6 hours	2 (9)	0	2 (33)	0	4 (8)
6-12 hours	3 (14)	2 (22)	2 (33)	9 (56)	16 (30)
12-18 hours	11 (50)	2 (22)	1 (17)	2 (12)	16 (30)
18-24 hours	2 (9)	3 (33)	0	2 (12)	7 (13)
24+ hours	4 (18)	2 (22)	1 (17)	3 (19)	10 (19)
HB = Hospital-Based    HD = Health Department    NFP = Not-For-Profit P = Proprietary					

#### Analysis Explanation

The results indicated that 60% of home health agencies provide their registered nursing direct service staff between 6-18 hours of in-service training annually, with 19% providing more than 24 hours. Such findings strongly demonstrated that home health agencies do recognize the importance of ongoing educational training for their registered nursing staff. The not-for-profit agencies participating in the survey provided the least amount of in-service training, with approximately 66% only providing from 0-12 hours. All of the proprietary home health agencies provided at least six hours of in-service

training, with 19% providing more than 24 hours annually. For the hospital-based agencies, approximately 50% provided 12-18 hours of in-service training.

An additional analysis was completed on the response data by home health organizational type for the range of in-service hours provided. A two-way analysis of variance was completed to determine whether there were significant differences between the in-service hours of the four different organizational types. The results indicated no significant differences at both the .01 and .05 significance levels. The calculated F value of 1.48 was compared with critical values for the .01 significance level (5.29) and the .05 significance level (3.24) obtained in an F-table.

<b>TABLE 10</b>					
QUESTIONNAIRE RESPONSE # 5 and # 6					
"Does your agency provide outside educational opportunities to registered nursing direct service staff?"					
<b>Response Choice</b>	<b>HB</b>	<b>HD</b>	<b>NFP</b>	<b>P</b>	<b>TOTAL</b>
yes	20 (91)	9 (100)	6 (100)	14 (88)	49 (92)
no	2 (9)	0	0	2 (12)	4 (8)
"If yes to #5, approximately how many hours are provided for each direct service registered nurse per year?"					
<b>Response Choice</b>	<b>HB</b>	<b>HD</b>	<b>NFP</b>	<b>P</b>	<b>TOTAL</b>
1-8 hours	10 (46)	0	2 (33)	4 (25)	16 (30)
9-16 hours	5 (22)	8 (89)	3 (50)	8 (50)	24 (45)
More than 16 hours	5 (22)	1 (11)	1 (17)	2 (12)	9 (17)
HB = Hospital-Based HD = Health Department NFP = Not-For-Profit P = Proprietary					

### Analysis Explanation

Over 90% of all home health agencies provided for outside continuing educational opportunities for their registered nursing direct service staff. There were only four agencies not providing this opportunity, two hospital-based and two proprietary agencies. Most of the home health agencies (45%) provided from 9-16 hours. Approximately 46% of the hospital-based home health agencies provided a range of 1-8 hours and another 22% provided more than 16 hours annually. Health department agencies provided from 9-16 hours, approximately 89%. Both the not-for-profit and proprietary home health agencies provided the same amount of educational hours, 50%. These results show a very strong trend of home health agencies providing additional training to their registered nursing direct service staff.

An additional analysis by home health organizational type for the range of continuing education hours each provided. A two-way analysis of variance was used to determine if there were significant differences between the continuing educational hours offered by the four different organizational types. The results indicated no significant differences. The calculated F value of 0.71 was less than one. Therefore, the calculated F value was not compared to critical values for significant levels in an F-table.

<b>TABLE 11</b>					
<b>QUESTIONNAIRE RESPONSE # 7</b>					
<b>"What type of geographic area does your agency primarily serve?"</b>					
<b>Response Choice</b>	<b>HB</b>	<b>HD</b>	<b>NFP</b>	<b>P</b>	<b>TOTAL</b>
Rural	18 (82)	7 (78)	5 (83)	8 (50)	38 (72)
Urban	4 (18)	2 (22)	1 (17)	8 (50)	15 (28)
HB = Hospital-Based    HD = Health Department    NFP = Not-For-Profit					
P = Proprietary					

#### **Analysis Explanation**

Approximately 72% of the participating home health agencies serve rural areas of Kentucky. The hospital based agencies served a larger proportion ( approximately 82%) of the rural areas than did the other organizational types. However, not-for-profit agencies served more rural than urban areas, approximately 83%. Based on the percentages for proprietary agencies, they served equal percentages of rural and urban areas in Kentucky.

In addition, a two-way analysis of variance was used on the response data by home health organizational type for the geographic areas served. The results indicated no significant differences. The calculated F value of 0.87 was less than one. Therefore, the calculated F value was not compared with critical values for significant levels in an F-table.



<b>TABLE 12</b>					
QUESTIONNAIRE RESPONSE # 8					
"What is the approximate range for the average number of miles per direct service registered nursing home visit for your agency?"					
Response Choice	HB	HD	NFP	P	TOTAL
0-15 miles	11 (50)	2 (22)	3 (50)	8 (50)	24 (45)
15-30 miles	9 (41)	6 (67)	3 (50)	5 (31)	23 (43)
More than 30 miles	2 (9)	1 (11)	0	3 (19)	6 (11)
HB = Hospital-Based    HD = Health Department    NFP = Not-For-Profit P = Proprietary					

#### Analysis Explanation

The majority of home health agencies averaged from zero to thirty miles per registered nursing visit, approximately 88%. There was less than a 2% difference between the number of home health agencies averaging 0-15 and 15-30 miles per visit. Both the hospital-based and proprietary organizational types had a higher percentage of agencies averaging zero to fifteen miles per registered nursing visit than the other two organizational types; both being at 50%. The hospital-based organizational type had more agencies averaging from fifteen to thirty miles per visit, approximately 41%. An estimated 67% of the health department agencies averaged from fifteen to thirty miles per visit and the not-for-profit agencies were at 50%, respectively, for 0-15 and 15-30 miles. The proprietary organizational type represented 19% of the home health agencies averaging more than thirty miles per registered nursing visit.

TABLE 13

## QUESTIONNAIRE RESPONSE # 9

"What is the approximate range for the amount of time it takes to admit a patient to registered nursing home health services (this includes visit, travel, and office time for paperwork completion on an admission)?"

Response Choice	HB	HD	NFP	P	TOTAL
0-1 hour	0	0	0	0	0
1-2 hours	5 (22)	2 (22)	3 (50)	5 (31)	15 (28)
More than 2 hours	17 (77)	7 (78)	3 (50)	11 (69)	38 (72)

HB = Hospital-Based  
P = Proprietary

HD = Health Department  
NFP = Not-For-Profit

**Analysis Explanation**

For all home health organizational types, one hour or longer was required to complete an admission visit for registered nursing services. One-half of the not-for-profit respondents reported a requirement of one to two hours for their nursing admission visits. An estimated 72% of the home health agencies reported more than two hours to complete an admission nursing visit. The breakdown by organizational type for this includes 77% for hospital-based, 78% for health department, 50% for not-for-profit, and 69% for proprietary.

<b>TABLE 14</b>					
<b>QUESTIONNAIRE RESPONSE # 10</b>					
<b>"What is the approximate range for the average direct service registered nursing caseload for your agency?"</b>					
<b>Response Choice</b>	<b>HB</b>	<b>HD</b>	<b>NFP</b>	<b>P</b>	<b>TOTAL</b>
0-15	0	0	0	3 (19)	3 (6)
15-30	9 (41)	4 (44)	4 (67)	9 (56)	26 (49)
30-45	13 (59)	5 (56)	1 (16.5)	4 (25)	23 (43)
More than 45	0	0	1 (16.5)	0	1 (2)
HB = Hospital-Based    HD = Health Department    NFP = Not-For-Profit P = Proprietary					

#### **Analysis Explanation**

Almost 50% of the Kentucky home health agencies indicated that 15-30 was the approximate range for an average direct service registered nursing caseload. An estimated 43% of the home health agencies maintained that 30-45 was the approximate range for an average direct service registered nursing caseload. Only three proprietary agencies, representing approximately 5.66%, had a direct service registered nursing caseload of 0-15, with the remaining 1.89% being one not-for-profit agency requiring registered nurses to carry more than 45 for a caseload. The percentage breakdowns representing approximate registered nursing caseloads by home health organizational types were as follows: 59% of hospital-based agencies had caseloads of 30-45; 56% of health department agencies had caseloads of 30-45 with the remaining 44% being a range of 15-30; 67% of not-for-profit agencies had a range of 15-30; and 56% of proprietary agencies had a range of 15-30. The proprietary agencies had more variance in caseload

expectations than the other organizational types with their additional percentages being 19% for a caseload of 0-15 and 25% for a caseload of 30-45.

<b>TABLE 15</b>					
QUESTIONNAIRE # 11					
"What is the approximate range for the average amount of direct service registered nursing time spent for paperwork completion on a weekly basis?"					
Response Choice	HB	HD	NFP	P	TOTAL
0-4 hours	1 (4)	1 (11)	0	0	2 (4)
4-8 hours	3 (14)	3 (33)	1 (17)	3 (19)	10 (19)
8-12 hours	8 (36)	2 (22)	1 (17)	7 (44)	18 (34)
More than 12 hours	10 (46)	3 (33)	4 (66)	6 (37)	23 (43)
HB = Hospital-Based    HD = Health Department    NFP = Not-For-Profit P = Proprietary					

#### **Analysis Explanation**

For an average week, a direct service registered nurse spends more than twelve hours on paperwork completion, an estimated 43% of the time. Approximately 46% of the hospital-based, 66% of the not-for-profit, and 37% of the proprietary agencies had registered nurses spending more than twelve hours per week on paperwork completion. One hospital-based and one health department home health agency reported that staff spend 0-4 hours per week on paperwork completion. Only an estimated 19% of home health agencies reported spending 4-8 hour per week on paperwork completion, with an estimated 34% reporting from 8-12 hours per week.

TABLE 16

## QUESTIONNAIRE # 12

"On a weekly basis, what is the approximate range for the average amount of direct service registered nursing time spent on follow-up with doctors, other home health team members, and other service providers?"

Response Choice	HB	HD	NFP	P	TOTAL
0-4 hours	5 (23)	3 (33)	0	6 (37)	14 (26)
4-8 hours	11 (50)	5 (56)	5 (83)	4 (25)	25 (47)
8-12 hours	5 (23)	0	1 (17)	4 (25)	10 (19)
More than 12 hours	1 (4)	1 (11)	0	2 (12)	4 (8)

HB = Hospital-Based    HD = Health Department    NFP = Not-For-Profit  
P = Proprietary

**Analysis Explanation**

Approximately 47% of the Kentucky home health agencies had their registered nursing staff spending 4-8 hours per week for follow-up with doctors, other home health team members, and other service providers. Another estimated 19% of registered nursing staff were spending 8-12 hours per week for follow-up. Overall, 66% of the home health agencies ranged from 4-12 hours per week on follow-up activities. Of the remaining home health agencies, 26% reported spending 0-4 hours per week on this activity with the remaining 8% spending more than twelve hours per week. The breakdown by organizational type for the most frequent responses included: 50% of hospital-based agencies ranged from 4-8 hours; 56% of health department agencies ranged 4-8; 83% of not-for-profit agencies ranged 4-8; and 37% of proprietary agencies ranged 0-4 hours per

week for this activity. Hence, the proprietary agencies seemed to be spending less time per week on follow-up activities than the other organizational types.

<b>TABLE 17</b>					
QUESTIONNAIRE # 13					
"Indicate the number of direct service registered nursing staff in your agency by highest educational preparation."					
<b>Response Choice</b>	<b>HB</b>	<b>HD</b>	<b>NFP</b>	<b>P</b>	<b>TOTAL</b>
Diploma Degree	20	7	26	25	78
Associate Degree	88	121	98	85	392
Bachelor Degree	36	26	24	25	111
Master Degree	6	1	5	5	17
Doctoral Degree	0	0	0	1	1
No Response	0	0	0	1	1
Wrong Response	6	2	1	4	13
% No/Wrong Responses	27%	22%	17%	31%	26%

#### **Analysis Explanation**

This particular question required respondents to indicate the number of direct service registered nursing staff by highest educational preparation. However, of the fifty-three different home health agencies participating in this survey, there were fourteen respondents who did not respond by indicating staff numbers. They responded by placing an "x" in at least one of the response choices. Due to incorrect responses, only

thirty-nine agencies responded to question thirteen correctly, representing a correct response rate of 46.99%. Based on the correct responses to question thirteen, there were more associate degree registered nurses (392) working in Kentucky home health agencies than any other degree type. The second largest degree category was the bachelor degree nurses (111). There were fewer master and doctoral degree nurses working in home health than any of the other categories. Seventy-eight were diploma degree registered nurses. In Kentucky, it appears there are more associate degree nurses (121) working in the health department agencies than the other organizational types, with hospital-based agencies having more bachelor degree nurses (36). However, out of the total nurses working in hospital-based agencies, there were more associate degree nurses (88) than other degree categories. The not-for-profit agencies, as well as the proprietary agencies, had a larger number of associate degree nurses (98) than for other categories. The not-for-profit agencies had more diploma degree nurses (26) than other organizational types, and proprietary agencies were at 25 diploma degree nurses. Health department, not-for-profit, and proprietary agencies seemed to have an equal number of master degree nurses, while health department agencies were lagging behind in this area. Only one home health agency (a proprietary agency) had a doctoral degree direct service registered nurse.

#### **ANALYSIS OF REGISTERED NURSING PRODUCTIVITY IN RELATION TO QUESTIONNAIRE RESPONSES**

In comparing the average daily registered nursing patient visits productivity to questionnaire responses by organizational type, an analysis of the most frequent questionnaire responses was completed as shown in TABLE 18. This information provided assistance in completing the comparison of average daily registered nursing patient visits productivity to questionnaire responses.

TABLE 18

ANALYSIS OF REGISTERED NURSING PRODUCTIVITY AND QUESTIONNAIRE FOR MOST FREQUENT RESPONSES BY ORGANIZATIONAL TYPE				
ORGANIZATIONAL TYPES	HB	HD	NFP	P
REGISTERED NURSING PRODUCTIVITY	3.582	3.675	4.136	4.334
QUESTIONNAIRE RESPONSES BY CATEGORIES:				
NUMBER RESPONDING	22	9	6	16
ORIENTATION TRAINING HOURS	41-80	81-120	41-80/81-120	0-40
RN HOME HEALTH EXPERIENCE	4-6	2-4	4-6/6-9/+9	2-4
RN SERVICE TRAINING HOURS	12-18	18-24	0-6/6-12	6-12
PROVIDES OUTSIDE ED OPPORTUNITIES	Y=20/N=2	Y=9/N=0	Y=6/N=0	Y=14/N=0
OUTSIDE ED HOURS	1-8	9-16	9-16	9-16
GEOGRAPHIC AREAS SERVED	R=18/U=4	R=7/U=2	R=5/U=1	R=8/U=8
AVERAGE # MILES PER VISIT	0-15	15-30	0-15/15-30	0-15
TIME TAKES TO ADMIT A PATIENT (HOURS)	2+	2+	1-2/2+	2+
AVERAGE CASELOAD RANGE	30-45	30-45	15-30	15-30
AVERAGE RANGE PAPERWORK TIME (HOURS)	12+	4-8/12+	12+	8-12
AVERAGE RANGE FOLLOW-UP TIME (HOURS)	4-8	4-8	4-8	0-4
RN #S BY HIGHEST ED PREPARATION				
DIPLOMA	20	7	26	25
ASSOCIATE	88	121	98	85
BACHELOR	36	26	24	25
MASTER	6	1	5	5
DOCTORAL	0	0	0	1
NO RESPONSE	0	0	0	1
WRONG RESPONSE	6	2	1	4
CODE EXPLANATION				
HOSPITAL-BASED	HB			
HEALTH DEPARTMENT	HD			
NOT-FOR-PROFIT	NFP			
PROPRIETARY	P			
YES	Y			
NO	N			
RURAL	R			
URBAN	U			



The proprietary home health organizational type had the highest average registered nursing patient visits productivity (4.88). On the other hand, the questionnaire responses demonstrated that proprietary agencies on an average allow less time for orientation training; had the least home health experienced registered nurses; and spent less time per week on follow-up with doctors, other home health team members, and other service providers. In addition, the proprietary agencies tended to utilize a higher percentage of registered nurses with diploma educational degrees than did other home health organizational types. Hence, an observation that proprietary home health agencies had a higher average daily registered nursing patient visits productivity than the other home health organizational types could be made based on the questionnaire response data, which shows that less time was dedicated to the two quality indicators: nursing employment and patient care and service.

The hospital-based home health organizational type had the lowest average registered nursing patient visits productivity (3.45). In comparison to proprietary agencies, the questionnaire responses demonstrated that hospital-based agencies on an average allowed more time for orientation training; had more home health experienced registered nurses; provided more hours of in-service training; provided more time for registered nurses to complete paperwork; and allowed more time to be spent on follow-up with doctors, other home health team members, and other service providers. Additionally, the hospital-based agencies tended to utilize a lower percentage of registered nurses with both diploma and associate educational degrees. Therefore, the observation could be made that hospital-based home health agencies had a lower average daily registered nursing patient visits productivity than the other home health organizational types because more time was dedicated to the two the quality indicators: nursing employment and patient care and service.

As for the other two home health organizational types (not-for-profit and health department), the following observations could be made about patient visits productivity and questionnaire responses. The not-for-profit home health agencies had the second highest average daily registered nursing patient visits productivity (4.37). According to questionnaire responses, not-for-profit agencies seemed to provide a wider range of orientation training hours, had registered nurses with a wider span of home health experience, had a wider service area based on the average miles per home visit, and provided more time for follow-up activities. Also, the not-for-profit agencies tended to utilize more registered nurses with associate educational degrees, but an almost equal percentage of registered nurses with diploma educational degrees as the proprietary agencies. Thus, an observation could be made that based on some of the questionnaire responses, the average daily registered nursing patient visits productivity for not-for-profit agencies was slightly lower than proprietary agencies as a result of more emphasis being placed on quality of service. This determination was drawn from the fact that the not-for-profit home health agencies provided more orientation training, had a higher percentage of home health experienced registered nurses, provided a higher percentage of outside educational opportunities, allowed more time for paperwork completion, and provided more time for follow-up activities.

The health department home health agencies had the second lowest average registered nursing productivity (3.52). According to questionnaire responses, health department agencies seemed to provide the highest number of orientation and in-service training hours, had an average caseload range equal to that of hospital-based agencies, and had the widest span of hours for paperwork completion. In addition, the health department agencies tended to utilize more registered nurses with associate educational degrees and the least amount of registered nurses with diploma educational degrees than the other home health organizational types. Consequently, based on the above observations, when the health department agencies are compared to the other

organizational types for average daily registered nursing patient visits productivity and the two quality indicators, nursing employment and patient care and service, health department agencies were compatible with the other organizational types.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### **SUMMARY**

This study was focused on whether the average daily nursing patient visits productivity among the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association varied by organizational type. In addition, the average daily patient visits productivity analysis was compared to the questionnaire responses for the two specific quality indicators: nursing employment and patient care and service. The nursing employment quality indicators included the nursing personnel functions such as orientation programs, home health nursing experience, educational preparation, and staff development. The patient care and service quality indicators included activities that are related to direct and indirect patient care such as the actual home visit, geographic area, travel time, amount of time it takes to admit a patient, caseload expectations, the time it takes to complete paperwork requirements, staffing, and follow-up activities.

The study design required the researcher to perform an analysis of data gathered in the Kentucky Semi-Annual Home Health Services Report 1991-2 of the Health Data Branch of the Division of Vital Records and Health Development in Frankfort, Kentucky. In addition, the Kentucky Medicare and Medicaid certified

home health agencies belonging to the Kentucky Home Health Association were surveyed to determine the effect that overall average daily registered nursing patient visits productivity had on the significant service delivery factors for the two quality indicators.

The study population consisted of a total of eighty-three home health agencies. Their respective average daily nursing patient visits productivity was derived by utilizing the registered nursing visits and paid hours information in Appendix D. The following formula was then used to calculate the average daily registered nursing patient visits productivity for each of the home health agencies:

$$\frac{\text{(RN Visits)}}{\text{(RN Paid Hours/8 Hours Per Day)}} =$$

**RN Average Daily Patient Visits.**

The statistical technique one-way analysis of variance (ANOVA) was utilized to analyze this data to determine whether there was a difference in the outcomes for the different home health organizational types related to productivity. The findings demonstrated that at the 0.05 significance level, the means of any two home health organizational types were not significantly different. Therefore, the first null hypothesis was accepted as being true:

**Among the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association, there is no difference between the measurement of productivity of registered nurses full-time equivalence for average daily patient visits in relation to the home health organizational type.**

Because the questionnaire for this study lacked validity, it was necessary to utilize a peer review evaluation process to improve its validity. This process was begun by selecting a peer review evaluation team composed of four home health experts each representing the four Kentucky home health organizational types. The home health experts reviewed the introductory and follow-up letters with the questionnaire to make sure they were clear; explained about the research; and that response categories provided for each question were exhaustive, mutually exclusive, and precise. Three review rounds were conducted before the survey information was finalized. The last task the peer review evaluation team performed was to complete the questionnaire for the agencies in which they were employed. The researcher analyzed the four completed questionnaires to determine whether instructions were followed. The results indicated there were no problems in understanding how to respond to the questions making up the questionnaire. All of the Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association were mailed a questionnaire introductory letter (Appendix B) and a questionnaire for patient visits productivity quality indicators (Appendix A) during March 1993. The questionnaire return rate was 63.86%, which was higher than the fifty percent rate required for the study. Thus, a follow-up mailing to the home health agencies not responding to the first mailing was not necessary. The analysis of questionnaire responses was recorded by totals and individual home health organizational types for each of the thirteen questions. The results were shown by utilizing regular frequency distribution tables. The results demonstrated that in some of the nursing employment and patient care and service areas for quality indicators, some of the home health organizational types placed more emphasis on productivity quality. However, the statistical analysis completed on the questions relating to in-service training hours, outside continuing educational hours, and geographic areas

served demonstrated there was no significant differences found between the home health organizational types.

When comparing the average daily registered nursing patient visits productivity to questionnaire responses by home health organizational types, some relationships were determined. One observation made was that proprietary home health agencies may have had a higher average daily registered nursing patient visits productivity than the other home health organizational types because they spent less time for orientation training; had the least home health experienced registered nurses; and spent less time per week on follow-up activities to doctors, other home health team members, and other service providers. A second observation made was that hospital-based home health agencies allowed more time for orientation training, had more home health experienced registered nurses, provided more in-service training hours, provided more time for paperwork completion, and allowed more time for follow-up activities. In addition, hospital-based agencies utilized fewer registered nurses with diploma and associate educational degrees. Hence, the hospital-based home health agencies may have had a lower average daily registered nursing patient visits productivity than the other home health organizational types because they dedicated more time to some of the quality indicators of nursing employment and patient care and service. A third observation was that the not-for-profit home health agencies appeared to provide a wider range of orientation training, had more home health experienced registered nurses, averaged more mileage per home visit, and provided more time for follow-up activities. A fourth observation was that the health department agencies provided the highest number of orientation and in-service training hours, had an average caseload range equal to that of hospital-based agencies, and provided the widest span of hours for paperwork completion. Also, they tended to utilize the least amount of registered nurses with diploma educational degrees than did the other home health organizational types. Accordingly, upon

observation the overall questionnaire results may point to the fact that the health department organizational type demonstrated more of a balance with average daily registered nursing patient visits productivity in relation to the two significant service delivery quality indicators: nursing employment and patient care and service. In summary, the second null hypothesis was accepted as being true:

**Among the significant service delivery factors for the two quality indicators, nursing employment and patient care and service, there are no specific trends noted when questionnaire responses were compared to the registered nurses FTE productivity measurement for average daily patient visits by home health organizational type.**

However, the study results revealed a trend that might need further study, such as a retrospective longitudinal study because higher and lower average daily registered nursing patient visits productivity may be linked to the degree of emphasis being placed on the quality indicators: nursing employment and patient care and service.

## **CONCLUSIONS**

Several conclusions can be drawn that demonstrate an overall relationship to the two research hypotheses in regards to average daily registered nursing patient visits productivity and to the two significant service delivery quality indicators: nursing employment and patient care and service. First, the research results concluded there was no significant difference between the study population organizational types in average daily registered nursing patient visits productivity. Therefore, the first null hypothesis was accepted as being true because the differences



in average daily patient visits productivity by home health organizational types was too small to demonstrate any relationship.

The second null hypothesis involved an analysis of descriptive data from questionnaire results for the two significant service delivery quality indicators, nursing employment and patient care and service, for the study population. Conclusions drawn indicate the proprietary home health organizational type had the highest average registered nursing productivity at 4.88; however, proprietary agencies on an average allowed less time for orientation training, had the least experienced and educated nursing staff, and spent less time per week on follow-up with doctors, other home health team members, and other service providers. On the other hand, the hospital-based home health organizational type had the lowest average daily registered nursing patient visits productivity at 3.45. Hospital-based agencies spent more time for orientation training, employed more experienced and educated nursing staff, provided more in-service training, provided more time for paperwork completion, and allowed more time for follow-up activities.

Other conclusions include information on questionnaire responses for the not-for-profit and the health department home health organizational types. Not-for-profit agencies had the second highest average daily registered nursing patient visits productivity at 4.35, and provided a wider range of orientation training hours, had registered nurses with a wider span of home health experience, had a wider service area based on the average miles per home visit, and provided more time for follow-up activities. As for the health department, they had the second lowest average registered nursing productivity at 3.52. Based on questionnaire responses, health department agencies provided the highest number of orientation and in-service training hours, had an average caseload range equal to that of hospital-based agencies, and had the widest span of hours for paperwork completion.

In summary, the conclusions indicate that a trend exists when comparing average daily registered nursing patient visits productivity with the two quality indicators: nursing employment and patient care and service. Based on research observations, the home health organizational type having the highest average daily registered nursing patient visits productivity was providing the least amount of emphasis on the quality indicators studied than the other home health organizational types. The home health organizational type having the lowest average daily registered nursing patient visits productivity was providing more of an emphasis on the quality indicators studied than the other home health organizational types.

### **RECOMMENDATIONS**

The major recommendation from this study is that in researching significant variances in average daily registered nursing patient visits productivity and comparing this to the two quality indicators, nursing employment and patient care and service, by home health organizational types, a retrospective longitudinal study should be utilized. A retrospective longitudinal study would allow the same measuring instrument and calculations again and again to determine responses to pinpoint trends and issues. Such a study design would involve collecting data for patient visits productivity and the quality indicators from the same study population at regular stated intervals.

A second recommendation is that when looking at productivity measurements for average daily registered nursing, numbers should not be looked at in isolation. When administrative and management personnel of the home health industry analyze registered nursing productivity, it is extremely important that they realize the need to examine what quality indicators are a part of the productivity measurement. By doing this, the whole aspect of productivity is examined rather than just isolated

measurements that may not be clearly defined. A thorough examination is important because at first glance it may appear that productivity figures show no variances. However, a more in-depth analysis shows a different picture. An example of productivity figures showing no variances at first glance is demonstrated in this study. By including quality indicators into productivity measurements an agency's emphasis on quality service would provide a more in-depth determination of whether the agency was concerned with the quality of service produced in relation to productivity.

Another recommendation is that the questionnaire needs to be reviewed and evaluated due to the problem with wrong responses for question number thirteen. This particular question required respondents to indicate the number of direct service registered nursing staff by highest educational preparation. Out of the fifty-three different home health agencies participating in this survey, there were fourteen respondents who did not respond by indicating staff numbers. Instead, they responded by placing an "x" in at least one of the response choices. As a result, only thirty-nine agencies actually responded to this question correctly. Therefore, the response rate for this question was 46.99%, an indication that the survey instrument needs additional work.

A final recommendation is that the Kentucky home health industry needs to encourage and participate in more research studies. To date, very little review and analysis of readily available home health data has been conducted. In today's highly competitive and changing home health environment, home health agencies will need to focus on the continuous quality improvement management style. Quality is both desirable and essential because it drives productivity which in turn drives visits that produce revenues, and revenues represent the future. Quality is a pragmatic, dollars and cents approach to management that when done honestly and diligently will increase productivity and lower costs.<sup>34</sup> Such an approach will mean the home health industry will need to focus on quality. A quality focus will mean a demanding,

difficult, never-ending effort to improve. Therefore, it can be concluded that when examining average daily registered nursing patient visits productivity, both the productivity figures and quality indicators need to be compared and analyzed before forming any opinions. Research opportunities need to be tapped in the near future because of growth, increasing reimbursement sources, and improving quality of services that a customer-focused environment dictates from the home health industry.

### **SUGGESTIONS FOR FURTHER RESEARCH**

As the home health industry begins to analyze and examine productivity to assure for resource efficiency further research will need to be completed. The whole concept of measuring productivity is complex and impossible to accomplish in one research study. When determining the productivity measurement of patient visits, the researcher identified other measurements of productivity that need further research. The productivity measurement areas include the following:

- visits per home health patient
- visits by payor
- visits by acuity care levels
- patient outcome achievements
- payment of full-time and part-time direct service staff on the basis of visits completed
- analysis of service delivery: efficiency, effectiveness, and equity
- analysis of environmental factors affecting productivity
- analysis of staff factors that affect productivity

In summary, when analyzing and evaluating productivity measurements it is important to avoid doing so in a vacuum. Improving and/or monitoring only one component of productivity will not provide an accurate measurement of productivity.<sup>35</sup> Instead, an approach that would include all aspects of productivity should be considered.

**APPENDIX A****A MEASUREMENT OF PRODUCTIVITY FOR KENTUCKY  
HOME HEALTH CARE REGISTERED NURSES  
FULL-TIME EQUIVALENCE BY  
ORGANIZATIONAL TYPE****QUESTIONNAIRE FOR PRODUCTIVITY QUALITY INDICATORS**

Please answer the questions below to assist in determining if a relationship between registered nursing productivity and certain quality indicators may exist. The researcher would appreciate the completed questionnaire returned in the self-addressed and stamped envelope by **March 29, 1993**.

**INSTRUCTIONS:** Please place an X or the correct numerical figure inside the ( ) beside the correct response. Only one response per question is allowed.

**EXAMPLE:** ( X ) yes ( ) no or ( 20 ) registered nurses by degree type

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1. What organizational (agency) type is your home health agency?

- 1.( ) Hospital-Based
- 2.( ) Health Department
- 3.( ) Not-For-Profit
- 4.( ) Proprietary

2. On an annual average, how many hours of orientation training are provided for your registered nursing direct service staff?

- 1.( ) 0 - 40 hours
- 2.( ) 41 - 80 hours
- 3.( ) 81 - 120 hours
- 4.( ) 121 - 160 hours
- 5.( ) More than 160 hours

3. What is the average amount of home health experience your current registered nursing direct service staff presently have?
1. ( ) 0 - 2 years
  2. ( ) 2 - 4 years
  3. ( ) 4 - 6 years
  4. ( ) 6 - 9 years
  5. ( ) More than 9 years
4. Approximately how many hours of in-service training does your agency provide annually for direct service registered nurses?
1. ( ) 0 - 6 hours
  2. ( ) 6 - 12 hours
  3. ( ) 12 - 18 hours
  4. ( ) 18 - 24 hours
  5. ( ) More than 24 hours
5. Does your agency provide outside continuing educational opportunities to registered nursing direct service staff?
1. ( ) yes
  2. ( ) no
6. If yes to #5, approximately how many hours are provided for each direct service registered nurse per year?
1. ( ) 1 - 8
  2. ( ) 9 - 16
  3. ( ) More than 16

7. What type of geographic area does your agency primarily serve?
1. ( ) Rural
  2. ( ) Urban
8. What is the approximate range for the average number of miles per direct service registered nursing home visit for your agency?
1. ( ) 0 - 15 miles
  2. ( ) 15 - 30 miles
  3. ( ) More than 30 miles
9. What is the approximate range for the amount of time it takes to admit a patient to registered nursing home health services ( this includes visit, travel, and office time for paperwork completion on an admission)?
1. ( ) 0 - 1 hour
  2. ( ) 1 - 2 hours
  3. ( ) More than 2 hours
10. What is the approximate range for the average direct service registered nursing caseload for your agency?
1. ( ) 0 - 15
  2. ( ) 15 - 30
  3. ( ) 30 - 45
  4. ( ) More than 45



11. What is the approximate range for the average amount of direct service registered nursing time spent for paperwork completion on a weekly basis?
1. ( ) 0 - 4 hours
  2. ( ) 4 - 8 hours
  3. ( ) 8 - 12 hours
  4. ( ) More than 12 hours
12. On a weekly basis, what is the approximate range for the average amount of direct service registered nursing time spent on follow-up with doctors, other home health team members, and other service providers?
1. ( ) 0 - 4 hours
  2. ( ) 4 - 8 hours
  3. ( ) 8 - 12 hours
  4. ( ) More than 12 Hours
13. Indicate the number of direct service registered nursing staff in your agency by highest educational preparation.
1. ( ) Diploma Degree
  2. ( ) Associate Degree
  3. ( ) Bachelor Degree
  4. ( ) Master Degree
  5. ( ) Doctoral Degree

These survey results will be available through the Kentucky Home Health Association; however, if you would like a copy of this research summary report upon its completion, please complete the information below. If you desire to maintain your anonymity, please mail this separate from the completed questionnaire.

NAME OF ORGANIZATION: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**APPENDIX B****SAMPLE INTRODUCTORY LETTER  
FOR  
QUESTIONNAIRE**

813 Woodland Drive  
Suite # 135  
Elizabethtown, KY 42701  
March 1, 1993

**CONTACT (ADMINISTRATOR)  
AND HOME HEALTH AGENCY ADDRESS**

Dear Home Health Agency Administrator:

A research study is being completed by a Western Kentucky University Health Care Administration graduate student entitled "A Measurement Of Productivity For Kentucky Home Health Care Registered Nurses Full-Time Equivalence By Organizational Type". This study is being completed for a thesis requirement. The Kentucky Home Health Association is encouraging your participating in this research study since it is directly related to the home health care industry. For your participation in this research study, the researcher will provide you with a copy of the results.

A survey is being conducted of the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. The purpose of this survey is to determine if registered nursing employment and patient care service quality indicators for productivity have a relationship with the average daily registered nursing patient visits productivity by organizational (agency) type.

The first part of this study will analyze the data in the Kentucky Semi-Annual Home Health Services Report 1991-2, that is reported by all licensed Kentucky home health agencies to the Data Branch of the Division of Vital Records and Health Development in Frankfort, Kentucky. This data will be analyzed to determine average daily registered nursing patient visits productivity by home health agency organizational types.

The second part of this study involves the survey. Enclosed you will find a questionnaire packet that provides instructions for completing and returning this questionnaire. The responses to this questionnaire will be tallied by organizational type. The tallied responses will then be analyzed along with the findings from part one of this study to determine what relationships exist between average daily registered nursing patient visits productivity and nursing employment and patient care services quality indicators by organizational type.

This questionnaire provides for complete anonymity so that you can provide accurate responses to the questions. However, in order to know what home health agencies have responded, a coded postcard is included as part of this process. This postcard should be mailed separately from the questionnaire but simultaneously. The purpose of this is to know who to send the follow-up mailing to if the initial response rate is too low.

Please complete the questionnaire within the next two weeks. Upon its completion, please mail the questionnaire in the enclosed self-addressed and stamped envelope. If you have any questions about this study and/or questionnaire please feel free to contact the Kentucky Home Health Association office or me (1-800-633-9844).

Thank you,

Kathy S. Holderman  
WKU Graduate Student

Karen Hinkle  
KHHHA Executive Director

**APPENDIX C****SAMPLE FOLLOW-UP LETTER  
FOR  
QUESTIONNAIRE**

813 Woodland Drive  
Suite # 135  
Elizabethtown, KY 42701

DATE

CONTACT (ADMINISTRATOR)  
AND HOME HEALTH AGENCY ADDRESS

Dear (Name of Administrator):

A few weeks ago you received an introductory letter and questionnaire packet for a research study. This is a study being completed by a Western Kentucky University Health Care Administration graduate student for a thesis requirement. The Kentucky Home Health Association is encouraging your participation in this research study. We need your cooperation in completing the enclosed questionnaire. For your participation in this research study, the researcher will provide you with a copy of the results.

A survey is being conducted of the Kentucky Medicare and Medicaid certified home health agencies belonging to the Kentucky Home Health Association. The purpose of this survey is to determine if registered nursing employment and patient care service quality indicators for productivity have a relationship with the average daily registered nursing patient visits productivity by organizational (agency) type.

The first part of this study will analyze the data in the Kentucky Semi-Annual Home Health Services Report 1991-2, that is reported by all licensed Kentucky home health agencies to the Data Branch of the Division of Vital Records and Health Development in Frankfort, Kentucky. This data will be analyzed to determine average daily registered nursing patient visits productivity by home health agency organizational types.

The second part of this study involves the survey. Enclosed you will find a questionnaire packet that provides instructions for completing and returning this questionnaire. The responses to this questionnaire will be tallied by organizational type. The tallied responses will then be analyzed along with the findings from part one of this study to determine what relationships exist between average daily registered nursing patient visits

productivity and nursing employment and patient care services quality indicators by organizational type.

This questionnaire provides for complete anonymity so that you can provide accurate responses to the questions. However, in order to know what home health agencies have responded, a coded postcard is included as part of this process. This postcard should be mailed separately from the questionnaire but simultaneously. The purpose of this is to know who to send the follow-up mailing to if the initial response rate is too low.

Please complete the questionnaire within the next two weeks. Upon its completion, please mail the questionnaire in the enclosed self-addressed and stamped envelope. If you have any questions about this study and/or questionnaire please feel free to contact the Kentucky Home Health Association office or me (1-800-633-9844).

Thank you,

Kathy S. Holderman  
WKU Graduate Student

Karen Hinkle  
KHHHA Executive Director

## APPENDIX D

TALLY FORM FOR THE ANALYSIS OF DATA FROM THE KENTUCKY SEMI-ANNUAL HOME HEALTH SERVICES REPORT 1991-2					
HOME HEALTH AGENCY NAME	ORGANIZATIONAL TYPE	RN VSTS	RN PD. HRS.	RN FTEs	AVG. DAILY RN PATIENT VISITS PRODUCTIVITY
Barren River Home Care	Health Department	5033	10272	9.88	3.92
Bluegrass Home Health Agency	Health Department	2782	6676	6.42	3.33
Clark County Home Health Agency	Health Department	2595	7375	7.09	2.81
Cumberland Valley District Health Dept.	Health Department	11879	27493	26.44	3.46
Franklin County Home Health Agency	Health Department	3179	4377	4.21	5.81
Green River District Health Dept.	Health Department	2334	8294	7.98	2.25
Knox County Health Dept.	Health Department	3489	6503	6.25	4.29
Lincoln Trail Dist. Health Dept.	Health Department	9119	20660	19.87	3.53
North Central District Home Health Agency	Health Department	5343	13410	12.89	3.19
Purchase District Home Health Agency	Health Department	8046	19365	18.62	3.32
Three Rivers District Health Dept.	Health Department	3517	6366	6.12	4.42
Whitley County Home Health Agency	Health Department	2975	6309	6.07	3.77
TOTALS FOR HEALTH DEPARTMENT		60291	137100	131.83	3.52
Baptist Hospital East HHA	Hospital-Based	5652	12190	11.72	3.71
Bellefonte Home Health Care Agency	Hospital-Based	3263	6603	6.35	3.95
Breckinridge Memorial Hospital HHA	Hospital-Based	676	2927	2.81	1.85
Carroll County Memorial Hospital HHA	Hospital-Based	2363	6076	5.84	3.11
Central Baptist Hospital HHA	Hospital-Based	2421	30058	28.90	0.64
Community Hospital Home Care	Hospital-Based	4107	8132	7.82	4.04
Community Methodist Hospital HHA	Hospital-Based	2619	5902	5.68	3.55
Harlan ARH HHA	Hospital-Based	4801	10786	10.37	3.56
Hazard ARH HHA	Hospital-Based	5819	8840	8.50	5.27
Jennie Stuart Medical Center HHA	Hospital-Based	1959	5792	5.57	2.71
King's Daughter's Medical Center HHA	Hospital-Based	5903	10560	10.15	4.47
Livingston County Hospital HHA	Hospital-Based	1487	3143	3.02	3.78
Lourdes Home Care	Hospital-Based	8608	13173	12.67	5.23
Marion Home Health Agency	Hospital-Based	2575	5150	4.95	4.00
MBHC, Inc. Home Health Agency	Hospital-Based	2238	7086	6.81	2.53
McDowell ARH HHA	Hospital-Based	6922	13091	12.59	4.23
Med. Ctr. Bowling Green Home Care	Hospital-Based	3187	6437	6.19	3.96
Middlesboro ARH HHA	Hospital-Based	2245	6214	5.98	2.89
Morgan County ARH HHA	Hospital-Based	3480	6217	5.98	4.48
Muhlenberg Community Hospital HHA	Hospital-Based	3025	7008	6.74	3.45
Murray-Calloway County Hospital HHA	Hospital-Based	3196	7308	7.03	3.50
Owensboro-Daviess County Hospital HHA	Hospital-Based	5285	11701	11.25	3.61
Pineville Community Hospital HHA	Hospital-Based	1275	4867	4.68	2.10
Regional Medical HHA	Hospital-Based	8036	19077	18.34	3.37
St. Claire Medical Center HHA	Hospital-Based	13871	29798	28.65	3.72
St. Elizabeth Home Health Hospice	Hospital-Based	2998	6704	6.45	3.58
T J Samson Community Hosp. HHA	Hospital-Based	3974	6539	6.29	4.86
Taylor County Home Health Services	Hospital-Based	1172	3405	3.27	2.75
Twin Lakes Home Health Agency	Hospital-Based	1704	3889	3.74	3.51
University of Kentucky Home Care HHA	Hospital-Based	1427	3545	3.41	3.22
Westlake Home Health Agency	Hospital-Based	2393	4546	4.37	4.21
Whitesburg Home Health Agency	Hospital-Based	2536	5484	5.27	3.70
Williamson ARH HHA	Hospital-Based	1560	2664	2.56	4.68
TOTAL FOR HOSPITAL-BASED		122777	284912	273.95	3.45
Community Health Services Nazareth HHA	Not-For-Profit	9023	12326	11.85	5.86
Hayswood Home Health Agency	Not-For-Profit	3866	8150	7.84	3.79
Lake Cumberland Home Health Agency	Not-For-Profit	37361	74231	71.38	4.03
Lensd-A-Hand Center HHA	Not-For-Profit	1036	2080	2.00	3.98
Martin County Home Health Care	Not-For-Profit	2011	5318	5.11	3.03

TALLY FORM FOR THE ANALYSIS OF DATA FROM THE KENTUCKY SEMI-ANNUAL HOME HEALTH SERVICES REPORT 1991-2					
HOME HEALTH AGENCY NAME	ORGANIZATIONAL TYPE	RN VSTS	RN PD. HRS.	RN FTEs	AVG. DAILY RN PATIENT VISITS PRODUCTIVITY
McDowell Home Health Agency	Not-For-Profit	5983	11181	10.75	4.28
Professional Home Health	Not-For-Profit	20886	35700	34.33	4.68
Red Bird Medical Center HHHA	Not-For-Profit	478	1760	1.69	2.17
Seton Home Health Service Inc.	Not-For-Profit	2324	4969	4.78	3.74
United Home Care	Not-For-Profit	2521	3804	3.66	5.30
Visiting Nurse Assn. of Louisville	Not-For-Profit	30301	52270	50.26	4.64
TOTALS FOR NOT-FOR-PROFIT		115790	211789	203.64	4.37
American Nursing Care	Proprietary	3644	8594	8.26	3.39
American Nursing Care, Inc.	Proprietary	2407	7643	7.35	2.52
Caretenders of Louisville, Inc.	Proprietary	24661	45427	43.68	4.34
Caretenders of the Bluegrass	Proprietary	10733	31200	30.00	2.75
Comprehensive Home Healthcare Svs, Inc.	Proprietary	3876	7752	7.45	4.00
Continuicare, Inc.	Proprietary	8548	14109	13.57	4.85
Family Care Home Health Agency	Proprietary	4451	13219	12.71	2.69
Family Home Health Care	Proprietary	13884	33325	32.04	3.33
Florence Home Health Care - The Agency	Proprietary	440	1936	1.86	1.82
Gateway Home Health Agency	Proprietary	3057	4080	3.92	5.99
Home Care Health Services, Inc.	Proprietary	1969	8042	7.73	1.96
Interim Healthcare of Central Kentucky	Proprietary	1196	7158	6.88	1.34
Interim Healthcare of Northern Kentucky	Proprietary	31	77	0.07	3.22
Lifeline Home Health Services	Proprietary	45945	37783	36.33	9.73
Northern Kentucky Nursing Services	Proprietary	3497	5250	5.05	5.33
Nurses Calling	Proprietary	2493	4986	4.79	4.00
Nurses Registry and Home Health Corp.	Proprietary	1956	4351	4.18	3.60
Olsten Healthcare-Covington	Proprietary	4997	16392	15.76	2.44
Olsten Healthcare-Hopkinsville/PP/MM	Proprietary	22251	16631	15.99	10.70
Olsten Healthcare-Lexington	Proprietary	9067	6456	6.21	11.24
Olsten Healthcare-Louisville/PP/MM	Proprietary	7686	14891	14.32	4.13
Parkway Regional Home Health Agency	Proprietary	1113	3486	3.35	2.55
Partners Extended Care-Henderson, Inc.	Proprietary	8027	12221	11.75	5.25
Pro-Care Home Health, Inc.	Proprietary	6494	10386	9.99	5.00
Rural Health Care Services, Inc.	Proprietary	436	1248	1.20	2.79
Spectracare of Lexington Inc.	Proprietary	1196	3443	3.31	2.78
Spectracare Home Health Inc.	Proprietary	16994	25719	24.73	5.29
TOTALS FOR PROPRIETARY		211049	345805	332.50	4.88
TOTALS FOR ALL HOME HEALTH AGENCIES		509907	979606	941.93	4.16
<b>HOME HEALTH AGENCY SUMMARY</b>					
	<b>HD</b>	<b>HB</b>	<b>NFP</b>	<b>P</b>	<b>TOTALS</b>
<b>RN VISITS</b>	<b>60291</b>	<b>122777</b>	<b>115770</b>	<b>211049</b>	<b>509887</b>
<b>RN PAID HOURS</b>	<b>137100</b>	<b>284912</b>	<b>211789</b>	<b>345805</b>	<b>979606</b>
<b>RN FTEs</b>	<b>131.83</b>	<b>273.95</b>	<b>203.64</b>	<b>332.50</b>	<b>941.92</b>
<b>AVERAGE DAILY RN</b>	<b>3.52</b>	<b>3.45</b>	<b>4.37</b>	<b>4.88</b>	<b>4.16</b>
<b>PATIENT VISITS PRODUCTIVITY</b>					
<b>MINIMUM</b>	<b>2.25</b>	<b>0.64</b>	<b>2.17</b>	<b>1.34</b>	<b>0.64</b>
<b>MAXIMUM</b>	<b>5.81</b>	<b>5.27</b>	<b>5.86</b>	<b>11.24</b>	<b>11.24</b>
<b>STANDARD DEVIATION</b>	<b>0.899</b>	<b>0.950</b>	<b>1.015</b>	<b>2.545</b>	<b>1.661</b>
<b>STANDARD ERROR OF MEAN</b>	<b>0.259</b>	<b>0.165</b>	<b>0.306</b>	<b>0.490</b>	<b>0.182</b>



## APPENDIX E

TALLY FORM FOR THE QUESTIONNAIRE RESPONSES FOR EACH HOME HEALTH ORGANIZATIONAL TYPE						
[1]	<b>ORGANIZATIONAL TYPE PARTICIPATION</b>					
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[2]	<b>0-40 HRS</b>	<b>41-80 HRS</b>	<b>81-120 HRS</b>	<b>121-160 HRS</b>	<b>160+ HRS</b>	
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[3]	<b>0-2 YRS</b>	<b>2-4 YRS</b>	<b>4-6 YRS</b>	<b>6-9 YRS</b>	<b>9+ YRS</b>	
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[4]	<b>0-6 HRS</b>	<b>6-12 HRS</b>	<b>12-18 HRS</b>	<b>18-24 HRS</b>	<b>24+ HRS</b>	
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[5]	<b>YES</b>	<b>NO</b>				
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[6]	<b>1-8 HRS</b>	<b>9-16 HRS</b>	<b>16+ HRS</b>			
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[7]	<b>RURAL</b>	<b>URBAN</b>				
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[8]	<b>0-15 MILES</b>	<b>15-30 MILES</b>	<b>30+ MILES</b>			
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[9]	<b>0-1 HR</b>	<b>1-2 HRS</b>	<b>2+ HRS</b>			
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						
[10]	<b>0-15</b>	<b>15-30</b>	<b>30-45</b>	<b>45+</b>		
HOSPITAL-BASED						
HEALTH DEPARTMENT						
NOT-FOR-PROFIT						
PROPRIETARY						



## Notes

- <sup>1</sup> Charlene Harrington, "Quality, Access, and Costs: Public Policy and Home Health Care," Nursing Outlook 36, no. 4, 1988, 164.
- <sup>2</sup> Ida M. Martinson and Ann Widmer, Home Health Care Nursing (Philadelphia: W. B. Saunders, 1989), 9.
- <sup>3</sup> Val J. Halamandaris, "Basic Statistics About Home Care." (National Association of Home Care, 1991), 1.
- <sup>4</sup> Karen Hinkle, Telephone Interview, 4 October 1991.
- <sup>5</sup> Cabinet for Human Resources, Department for Health Services, Division of Vital Records and Health Development, Health Data Branch, "Kentucky Semi-Annual Home Health Services Report 1991-2," (July 1, 1991 - December 31, 1991), 6.
- <sup>6</sup> Harrington, 164.
- <sup>7</sup> Halamandaris, 2.
- <sup>8</sup> Marilyn D. Harris, Home Health Administration (Maryland: National Health Publishing, 1988), 363.
- <sup>9</sup> Marion Merrell Dow, Inc., "Marion Merrell Dow Long Term Care Managed Care Digest," (1991), 34.
- <sup>10</sup> Harris, 205.
- <sup>11</sup> Ibid., 207.
- <sup>12</sup> Sandra Spoelstra, "Productivity of Registered Nurses in Home Health Care: A Nationwide Survey," Caring (February 1988), 57.

- <sup>13</sup> Robert G. Bonstein and Jill Mueller, "Improving Agency Productivity," Caring (November 1990), 6.
- <sup>14</sup> W. Joseph Williamson, Jr. and Jeanette Johnston, "Understanding, Evaluating and Improving Nursing Productivity," Nursing Management (May 1988), 49.
- <sup>15</sup> Oralia Madera-Vanderlinde, "A Tool for Monitoring Productivity in a Home Health Agency," Caring (July 1987), 42.
- <sup>16</sup> William J. Baumol, "Is There a U.S. Productivity Crisis?" Science 243 (February 3, 1989), 611.
- <sup>17</sup> Mary Power, "Calculating Productivity," Caring (July 1987), 41.
- <sup>18</sup> *Ibid.*, 40.
- <sup>19</sup> Harris, 218.
- <sup>20</sup> Donna M. Wagner, Managing for Quality in Home Health Care Effective Business Strategies, (Maryland: Aspen, 1988), 174.
- <sup>21</sup> *Ibid.*, 175.
- <sup>22</sup> Harris, 218.
- <sup>23</sup> Kentucky Home Health Association, "A Directory of Home Health and Hospice Association, "A Directory of Home Health and Hospice Agencies in Kentucky," (1991-1992), 3-78.
- <sup>24</sup> Harris, 3.

- 25 Patricia L. Spath, Comprehensive Quality Assurance: Home Health Care Services, (Oregon: Brown-Spath Associates, 1987), 6.
- 26 Halamandaris, 1.
- 27 Harris, 22.
- 28 Ibid.
- 29 Halamandaris, 1.
- 30 Ibid.
- 31 Ibid.
- 32 Harris, 212.
- 33 Elliott, Alan and Marcia Stoesz, KwikStat Statistical Data Analysis Reference Guide 3.3, (Texas: TexaSoft, 1992), 4-27.
- 34 Dobyys, Lloyd and Clare Crawford-Mason, Quality Or Else, (Massachusetts: Houghton Mifflin, 1991), 281.
- 35 Harris, 218.

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