Summer 1999

Factors Which Affect Post-Hospital Resource Use and Patient Health Outcomes Among Taiwanese Older Adults

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FACTORS WHICH AFFECT POST-HOSPITAL RESOURCE USE AND PATIENT HEALTH OUTCOMES AMONG TAIWANESE OLDER ADULTS

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A Dissertation Submitted to the Faculty of Old Dominion University in Partial Fulfilment of the Requirement for the Degree of

DOCTOR OF PHILOSOPHY

URBAN SERVICES-HEALTH SERVICES CONCENTRATION

OLD DOMINION UNIVERSITY
(August 1999)

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ABSTRACT

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The purpose of this study was to explore relationships among population characteristics, patient post-hospital resource use and patient health outcomes in terms of the Andersen health behavioral model. An additional purpose of this study was to examine a discharge planning screening instrument used in a large urban hospital in Taiwan to determine if it predicts resource use and patient outcomes. A longitudinal research design was adopted for this study. Data were collected from the general medicine departments of an 800-bed university teaching hospital. Out of 109 patients who were interviewed, 78 participants qualified (participation rate = 71.6%).

The majority of participants were aged 65 to 84 (97%) with an average age of 74.9 (*SD* = 5.92) and female (61.5%). Ninety percent of the participants lived with a spouse or family members. Nearly all participants (95%) had family support while they were sick. Over 60% of the participants had a low individual income. Over half of the participants had visited an ER or a hospital in the past year. Functional status scores for the participants revealed that most of them had problems with bathing, toileting, riding the bus, walking, and shopping. Three quarters of the participants were fully alert, half of the participants had some kind of cognitive problems. Approximately 20% had a hearing/visual deficit, and approximately

60% had more than one medical problem.

The results of the multivariate analyses indicated that 14 out of 25 independent variables were able to predict hospitalization outcomes, postdischarge resource use, or patient health outcomes. Provider-related enabling factors were strong predictors of patient outcomes. However, 11 variables were not predictors of patient outcomes or resource use. The findings did not fully support the Andersen model. The variables identified in this study might not fully explain the constructs of the Andersen model. Recommendations for a discharge planning screening instrument, the Taiwanese government, health care professionals, and future studies are discussed.

To
the Taiwanese elderly
who have survived the Japanese Colonization Period and the Second World War

and

my parents

ACKNOWLEDGMENTS

Before I present my gratitude to people who helped with this dissertation, I would like to show my appreciation to God who supported me through the whole process. God is my stronghold. This work was not completed by my wisdom only nor by my arm; it is God who brought me to this stage. It is God's right hand, His arm, the light of His face, and God's love that helped me complete this work. I also appreciate Jesus's followers who pray for me all the time, Dr. Yuan, Mrs. Yuan, and many others. I could not list all of them, but God knows.

There are a lot of people who contributed, helping this study become reality. Certainly, I acknowledge the guidance and support provided by the dissertation committee. They were helpful and responsive and provided feedback and input throughout the whole process of this dissertation. In particular, Dr. Gail Grisetti, the chairman of the dissertation committee guided me step by step. Dr. Stacey Plichta helped me develop the topic and analyze the data. Dr. Clare Houseman helped me develop the theoretical framework which guided the study. I am deeply indebted to all for their help in different ways.

I appreciate all the patients who participated in this study. This job could not have been completed without their participation. They provided their experience regarding their hospitalization and post-hospital care which was helpful in understanding factors affecting their health outcomes and postdischarge resource use.

I would like to thank the President of China Medical College, Dr. Sheng-Chu Kuo who funded this study. I also wish to thank the university teaching hospital for allowing me to collect data from their patients. They provided a wonderful source for this study.

I am grateful for the contributions and efforts of a group of research partners who provided technical advice and assistance. They contributed their knowledge and hours to help me develop the instrument and collect data. Dr. Jim-Shung Lai, Yu-Mei Zuan, Dr. Hsien-Wen Kuo, Yu-Ho Lu, Mei Tyan, and Sharon Fung helped me increase the validity of the instrument. Li-Chin Chang, Hui-Chiau Tsai, Li-Chuan Hsu, Sandy Lin, Wan-Su Liao, and I-Fang Liu helped me interview patients and review medical charts from which I obtained the valuable data. I appreciate all their work. Especially, Yu-Kui Teng who helped me throughout the whole process of data collection, even though she got married during this time. She was really helpful. I really appreciate all of their experience and input.

I would like to take this opportunity to thank Professors--ex-President C. K. Chang and Dr. Fun-Ming Chang–both of whom served as critics and consultants to make this work possible in the beginning of the process. Although this was not an easy process, I appreciate their thoughtful suggestions.

I would like to express my appreciation to all my dear friends. Their support makes my life happier. Ramani gave me emotional support and shared her research experience. I am especially grateful to her. Christie listened to my story and provided resources for me, I would like to thank to her. Emilie Hauser gave me much friendship and support. I really appreciate all of them.

And last, but not least, by any measure, this work could not have been completed without my family's continued understanding, support, and encouragement. I especially thank my father-in-law, Chen-Min Hsu, and sisters-in-law, Kuei-Liang Chang and Kuei-Ching Wang, who took good care of my son Matthew while I studied in Norfolk. Of course,

my husband Chu-Yen Hsu, went through the whole process with me and gave me much support and encouragement. Additionally, my son made the whole project easier. He is an understanding boy, which made me feel better when I needed to work at school. He is the best gift from God I ever received. I really appreciate having all of them in my life. I love you all.

Table of Contents

Tables Page

CHAPTER 1

INTRODUCTION

This study examined postdischarge resource use and patient outcomes among recently hospitalized Taiwanese older adults. The elderly comprise a large percentage of the patients who use health care resources during a given year. Since the size of this population will be increasing worldwide during the next 20 years, it is important to understand how these patients access health care and the subsequent outcomes. A useful model for studying resource use and patient outcomes is the Andersen model which evaluated these two components in terms of predisposing, patient and provider-related enabling factors, and need characteristics. However, this model has not yet been applied to evaluate use of post-hospital resources and patient outcomes in an elderly Asian population.

Currently, discharge planning is widely used to assist patients in making a better transition from hospital to home. When discharge planning services were first initiated they represented the disciplines of either nursing or social work. Today, discharge planning has expanded to a multidisciplinary task approach, including social workers, nurses, physical therapists, physicians, and other health care professionals. The benefits of a multidisciplinary approach to discharge planning have been evident for the past 20 years in the USA, but this process was only introduced in Taiwan in 1990. Nevertheless, multidisciplinary discharge planning has not been available to all hospitalized Taiwanese patients. Only patients who met specific hospital criteria according to a discharge planning screening instrument had an opportunity to receive multidisciplinary discharge planning. The discharge planning

screening instrument used in a university teaching hospital (UTH) in Taiwan was examined to determine if the instrument predicts postdischarge resource use and patient outcomes.

This chapter describes the importance of the study and the background of the problem with a specific emphasis on Taiwan. Characteristics of Taiwanese older adults, the health care delivery system in Taiwan, home health care in Taiwan, and health care services available in the local area are addressed in this chapter. The influence of culture in the use of health care resources and discharge planning are also mentioned. The modified Andersen theoretical framework, the purpose of the study, and the research questions that guide the study are addressed. Additionally, limitations and human participants review are mentioned.

The Importance of The Study

Concern for the increase in the size of the elderly population is a global issue. The world's age 60 and over population increased by more than 12 million persons in 1995; nearly 80% of this increase occurred in less-developed countries. Taiwan is a country which illustrates this trend. In 1996, the elderly made up 7.86% of the total population. Estimates project that by the year 2025 this group will be more than 20% of the total Taiwanese population (Department of Health [DOH], 1997; U.S. Bureau of Census, 1996a). Additionally, most older adults have chronic multiple diseases and experience a decline in functional status. As a result they are major consumers of health care services (Wu, 1996).

A goal of health care policy makers and researchers is to provide people with better access to health care services and to improve the health outcomes of patients after using health care services. Analyses of health care resource use and patient outcomes are receiving increasing attention worldwide. Many studies have examined resource use, but few studies

have measured both resource use and patient outcomes. In addition, few studies have examined resource use and patient outcomes among the hospitalized elderly.

In most studies related to resource use among the Taiwanese elderly population (Wu, 1996; Wu, Liang, Chang, Lin & Malay, 1994; Yu, 1994), the study population represented the community dwelling elderly. Most of these subjects were healthy or only mildly disabled. The type of resource use identified in these studies included health examinations, western pharmacies, traditional Chinese drug stores, physician visits, and hospital care. Hospitalized elderly patients are likely to use more health care services compared to community dwelling elderly people. Therefore, hospitalized older adults were selected for this study.

The Background of the Problem

The major concerns of this study are: "what is the health care resource utilization of Taiwanese older adults who are discharged from the hospital?" "what are their health outcomes after using these resources?" and "what factors can influence postdischarge resource use and patient outcomes?" The following sections will present characteristics of Taiwanese older adults, a description of the health care delivery system in Taiwan, an explanation of the influence of culture on the use of health care services, and a review of discharge planning screening instruments.

Characteristics of Taiwanese Older Adults

The number of Taiwanese older adults is increasing rapidly. The population in Taiwan was 21,525,433 persons at the end of 1996. At that time, 7.86% of the total population (1,691,899 persons) was 65 years or older. It is estimated that this figure will increase to 8.7% in 2000, and to 14.9% in 2020. Since the number of elderly in the total

population was 7.4% in 1994, the rate of increase will be 100% in the next 25 years (Manpower Planning Department, 1993). Life expectancy has increased from approximately 40 years in 1945, to 71.85 for males and 77.74 for females in 1996. The mortality rate has decreased significantly from 18.15% in 1947 to 5.71% in 1996. The three leading causes of death of Taiwanese older adults were malignant neoplasms, cerebrovascular diseases, and heart disease (DOH, 1996). The decrease in mortality and changes in causes of mortality means that Taiwanese older adults are living longer than they used to, often with chronic diseases. The increasing size of this group will challenge health care providers to adapt and increase services.

Health Care Delivery System in Taiwan

Since National Health Insurance (NHI) has been available in 1994, the number of insured individuals has reached approximately 20.42 million which is 95.9% of the total population (DOH, 1996). Most elderly have health insurance which allows them access to medical care without a heavy personal financial burden. For lower-income elderly, the insurance premium which individuals have to pay for keeping the insurance benefits is paid by national and local governments. Although there are no statistics available concerning the percentage of the elderly population who are insured, the number is probably higher than 95.9% (DOH, 1996). The coverage provided by NHI includes physician visits, pharmacy use, hospitalization costs, and home health care. Also, the elderly can receive a physical examination once a year. The copayment is 5%, 10% or 15% of the total payment, depending on the type of admission. The maximum deductible is $1,000 (US dollars) per person per year, which most elderly can afford. In general, most elderly have had greater access to

medical care and benefits since NHI was introduced. The elderly with low-income receive more government purchased benefits than the general population.

Nursing home care is not reimbursed by NHI. Patients who want to stay in a nursing home need to cover these costs themselves. The cost ranges from 25,000 NT to 35,000 NT (≒US $1,000) per month which is difficult for most elderly patients and their families to afford. Additionally, an unfavorable view of nursing homes in this culture results in lower utilization of this type of care. Less than 1% of the total population stayed in a nursing home.

Home Health Care in Taiwan

Home health care service is a relatively new program in Taiwan. This service has developed since the Nursing Regulation Law was passed in 1990 which allowed registered nurses to open home health care agencies. The DOH has been encouraging health care providers to develop home health care agencies. The government offers incentives for nurses and hospitals who establish home health care agencies. The NHI has been paying for home health care services since 1994. Recently the number of home health care agencies has increased. There are presently 97 agencies in the entire country which have had a contract with NHI (Zuan, 1996).

However, NHI only reimburses skilled nursing care offered by nurses in the home, and the reimbursement rate is low. Only patients who require NG tubes, Foley tubes, or trachea tubes qualify for reimbursement from NHI. Reimbursement is given only for two services a month and patients still have to make copayment for these services. NHI pays only a fixed rate for skilled nursing care, so the users have to pay the rest of these charges. Patients who need more home health care are not reimbursed. This causes patients who use

home health care to have to pay more out-of-pocket than patients who stay in a hospital for the same kind of care. Therefore, elderly people with chronic diseases and functional limitations who need multiple services find it difficult to live at home with home health care. Even though the philosophy of home health care is compatible with the Taiwanese culture, home health care has not been as popular as expected. The costs of copayment are a most likely reason.

Health Care Services Available in Taiwan

According to a report by the Ministry of the Interior, R.O.C (1998), health care resources in the city of the UTH were better than those in other cities in the Taiwan Province (Appendix A). For example, the number of clinics per 10,000 people, medical care personnel, and people served per medical personnel were all higher than average. Although the number of medical care resources and home health care agencies was much higher than the average, nursing care facilities were very few in this area. Only four registered nursing homes were available (Ministry of the Interior, 1998). These four facilities served a population of approximately 800 thousand people. Although un-registered nursing homes were available, quality of care was a problem in these facilities. The lack of long-term care agencies and nursing care facilities was one of the major health care problems in Taiwan. This city is an example of a city with a critical lack of nursing home services.

The Influence of Culture in the Use of Health Care Resource

According to Taiwanese philosophy, it brings happiness to the elderly to live with their children, grandchildren, or even great grandchildren. Therefore, the cultural ideal for older adults is to live with their children and to be taken care of by them. Most elderly people

do not feel comfortable living in a nursing home. In most people's mind, especially, traditional Taiwanese older adults, a nursing home is only for people who are poor or have no family or relatives nearby. Cultural beliefs indicate that the Taiwanese are more comfortable if their older family members stay in a hospital rather than a nursing home: hospital use rates are more likely to be higher among the elderly. Although people might eventually change their perceptions of nursing homes, 80% of respondents are still not willing to live in a nursing home when they need long-term care (Wu & Chu, 1995). Researchers studied public attitudes toward three long-term care arrangements for the elderly. The results showed that only 10% of respondents would choose institutional care for their elderly family members. Ninety percent would choose either home-based care or community-based care. Yet, as a result of industrialization and the emergence of the nuclear family rather than the extended family, the number of family members who are willing and able to take care of elderly family members has decreased.

The challenge of culture and industrialization results in two different utilizations of health care services among Taiwanese older adults compared to older Americans. Disabled Taiwanese older adults either stay in the home without receiving formal care giving, or over-stay in a hospital. Wu (1996) reported that 10% of Taiwanese older adults with functional limitations lived in institutions such as long-term care facilities and hospitals, 40% of those institutionalized remained in hospitals, and the remainder lived in nursing homes. About 80% of the elderly who had functional limitations lived at home and 10% of the elderly had other arrangements. Eight percent of this group hired assistants to help with care giving (Wu, 1996). It should be noted, however, that most of the disabled elderly who live at home are still cared

for by their family members. Many Taiwanese older adults with functional disabilities live with family without receiving formal care giving. Another different use of health care services is that some disabled Taiwanese older adults stay in a hospital instead of in a long-term care facility. They stay in the hospital longer, not because of medical treatment, but because of their need for skilled nursing care. This causes inappropriate use of acute care beds. However, there were no exact numbers which substantiated the size of this problem, even though it has been a concern of health care policy makers and researchers (Hsu & Tsai, 1996; Wu, 1996).

The major reasons underlying inappropriate use of hospital beds are post-hospitalization placement and the inability of patients and families to make decisions about post-hospital care before discharge from a hospital. These problems arise because of the lack of knowledge of post-hospital care and the lack of informal caregivers (Chen, 1996; Ching, 1996; Tyan, 1996). In fact, when older patients are discharged from a hospital to their home, they may need to deal with physiological, psychological, social, economic, and functional changes which have resulted from their illness. Their families have to adjust their work schedules in order to provide appropriate care to the older patient. It is not easy for either older patients or their families when older patients need help with daily care. The patients in these situations need help to access appropriate care.

Discharge Planning

Discharge planning can help patients and their families make the transition from hospital to home. Discharge planning provides information about what services will be suitable to the patients and family's needs, and how they may contact and receive these services. In the United States, a considerable number of research studies carried out over the

past 20 years have drawn attention to discharge planning. The major benefits of discharge planning are: (1) reduced length of stay, (2) reduced cost for both patients and health care providers, (3) reduced levels of unmet patient needs, (4) reduced readmission rates, and (5) increased patient satisfaction. In other words, it is generally believed that discharge planning has positive implications for both patients and hospitals (Farren, 1991; Haddock, 1991; Kennedy, Neidlinger, & Scroggins, 1987; Mamon, Stinwachs, Fahey, Bone, Oktay, & Klein, 1992; Naylor, Brooten, Jones, Lavizzo-Mourey, Mezey, & Pauly, 1994; Neidlinger, Scroggins, & Kennedy, 1987; Schrager, Halman, Myers, Nichols, & Rosenblum, 1978; Weitheimer & Kleiman, 1990).

The Taiwanese government and hospitals have tried to implement a multidisciplinary approach to discharge planning to help elderly patients get more appropriate information about options for staying at home or to make arrangements for post-hospital care services before leaving the hospital. The DOH has been encouraging hospitals to establish and use discharge planning services since 1994. The DOH gives hospitals incentives if they offer a multidisciplinary approach to discharge planning to patients. Three hospitals established multidisciplinary discharge planning services in January 1994.

The most popular discharge planning model in Taiwan is the consultant model, whereby the hospital's primary nurse assesses a patient's needs for discharge planning services based on a discharge planning screening instrument. The nurse refers high-risk patients who need discharge planning to discharge planners. Most hospitals assign one or more senior nurses to be discharge planners, and they are trained in the process. They visit patients and assess patients' needs for post-hospital care after they receive the consultation

request. They help patients and families decide the best way to obtain the post-hospitalization care that the patients and families want. If the patients need dietary services or social worker services, the discharge planner refers them to these in-hospital services. If a patient needs multidisciplinary care, the discharge planner will call a conference on the needs of this particular patient. Professionals included in this meeting will be physicians, primary nurses, social workers, dietitians, physical therapists, and others. The discharge planner also refers the patients to appropriate institutions if necessary.

A discharge planning screening instrument is designed to identify patients' discharge planning problems. All patients who are admitted to a hospital have discharge planning needs, but all patients may not have discharge problems. At a minimum all patients need to be screened for high risk factors and even if no factors are identified, patients need information on follow-up care. For those patients who do not have discharge problems, it must be noted that the patient was screened and that no discharge problems exist (Birmingham, 1991). A discharge planning screening instrument is important to primary nurses to help them recognize a patient's need for discharge planning. However, no standardized formal instrument is available. Most Taiwanese hospitals develop an instrument based on their own experience or review of the literature. There is no evidence to determine whether these instruments really help identify patients who need post-hospital care. Another problem is that even though primary nurses refer patients who are qualified for discharge planning services to discharge planners, some patients may not receive appropriate discharge planning before they leave the hospital. Therefore, most patients and families need to search for post-hospital care by themselves.

The university teaching hospital (UTH) has developed a discharge planning screening instrument (Appendix C) that primary nurses can use to evaluate patients on admission to determine if the patients need discharge planning. The discharge planning screening instrument used in UTH was not developed in terms of research analysis, but was based on a review of the literature and nurses' experiences. Most items used in the tool evaluated a patient's physical and functional status (for example, level of consciousness, activities of daily living, eating, incontinence, respiratory function, need for oxygen, risk for pressure ulcer development, nutrition, and pain level). In this study, the discharge planning screening instrument used in the UTH was examined to determine whether or not patients who met its criteria have significantly different uses of postdischarge resources and patient outcomes.

The Modified Andersen Theoretical Framework

The Andersen health behavioral model was developed in 1968 by Ronald M. Andersen and others (Aday & Andersen, 1974; Andersen, 1968; Andersen & Aday, 1978; Andersen & Newman, 1973). The model measured utilization of health care services by describing health behaviors and patient outcomes. The model consisted of five components: health policy, characteristics of the health delivery system, characteristics of the population at risk, utilization of health services, and consumer satisfaction. They developed three factors which they called predisposing factors, enabling factors and need characteristics under the construct-- "characteristics of the population at risk" to predict the utilization of health care services and outcomes. Outcome measures only included consumer satisfaction at that time. The model can be used to evaluate the utilization of health care services by assessing only population characteristics or by extending the assessment to the whole health care system

(health care policy and health care delivery system). In other words, health care policy, characteristics of the health care delivery system, and characteristics of the population at risk affect patient utilization of health services and consumer satisfaction. The relationship among these variables was presented in a linear relationship in 1974 (Appendix B). It has become one of the most popular models for evaluating resource use.

The model was revised by Andersen in 1995. The revised model presented four components, which are environmental factors (health care system and external environmental factors), population characteristics (predisposing, enabling, and need characteristics), health behaviors (personal health choices and use of health services), and patient outcomes (perceived health status, evaluated health status, and consumer satisfaction). The relationship among components is a feedback loop. Phillips, Morrison, Andersen, and Aday (1998) emphasized the importance of community-level enabling variables and provider related variables in assessing health care utilization. A community-level enabling variable was defined as an attribute of community service (e.g., availability of physicians in the community, availability of hospital resources in the community). They defined provider related variables as (1) patient factors that may be influenced by providers and which enable patients to obtain services (e.g., whether individuals have a regular source of care, the convenience of obtaining care, previous use of services, and out-of-pocket price of services), and (2) provider characteristics that interact with patient characteristics to influence utilization (e.g., specialty or gender of physicians). They added these two factors in the enabling component (Appendix B).

The current study was designed to determine what factors predict postdischarge

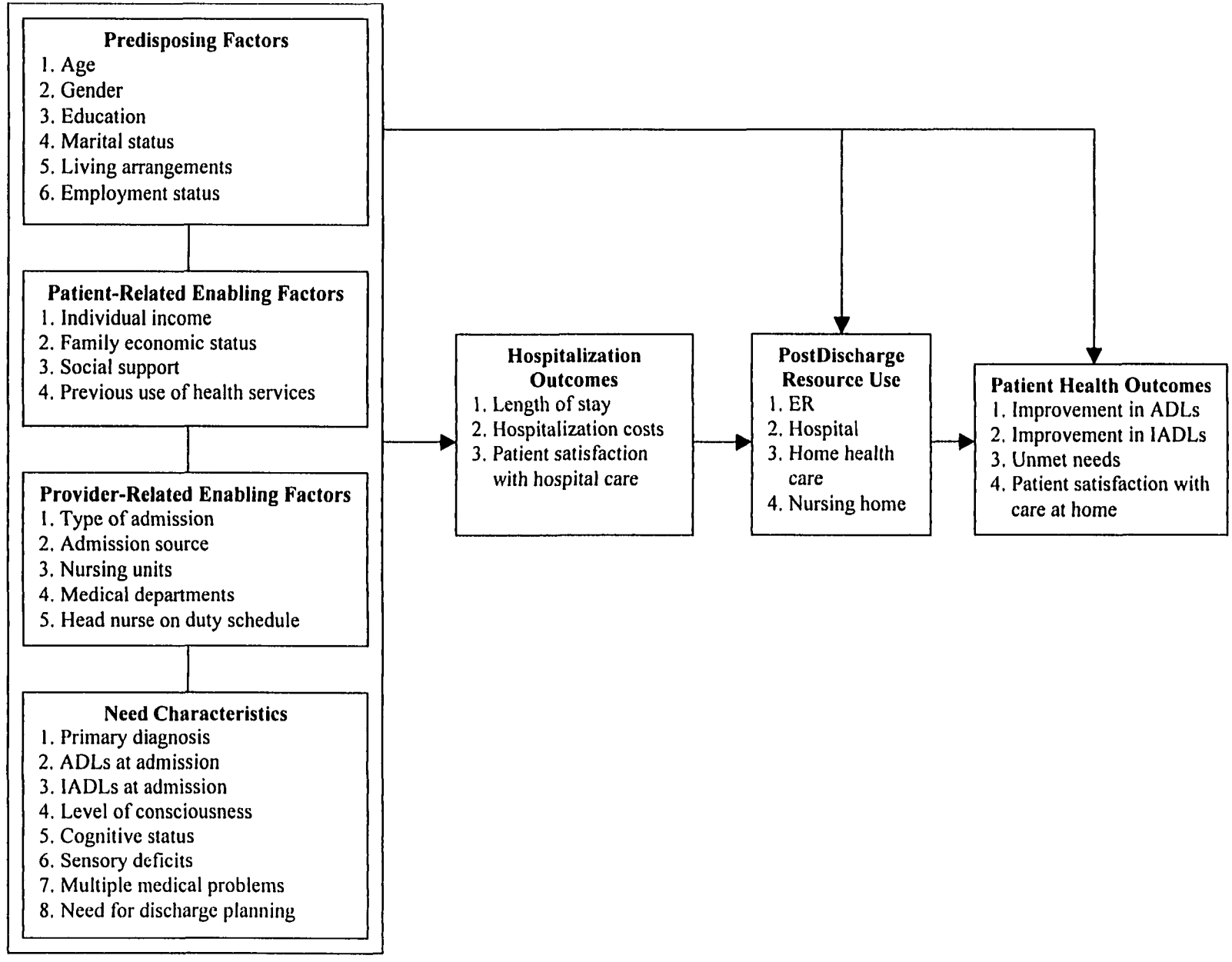
resource use and patient outcomes. The Andersen health behavioral model is an appropriate model for evaluating resource use and patient outcomes, so it has been adopted in this study. According to the Andersen health behavioral model, input from two sources contributes to the evaluation of outcomes. These sources include the individuals' perceptions as well as the clinicians' assessments. The individual's perceptions of outcomes were defined as an individual's perception of their health status and their general descriptions of the care they received, for example, self-reported health status. The clinician's viewpoint of outcomes was defined as a client's health status assessed by health care professionals, for example, a physical assessment. In the current study, the clinician's viewpoint was measured by postdischarge patient outcomes which included improvement in activities of daily living (ADLs) and instrumental activities of daily living (IADLs), and unmet needs. Individual perceptions of outcomes were measured by patient satisfaction with care at home.

According to the Andersen health behavioral model, health behaviors are defined as resource use. In the current study, resource use measured a patient's use of postdischarge resources during the two weeks following discharge from the hospital. Postdischarge resources included utilization of emergency rooms (ERs), hospitals, nursing homes (NH), and home health care (HHC). Since the study population had recently been hospitalized, hospitalization outcomes such as length of stay (LOS), hospitalization costs, and patient satisfaction with hospital care were also measured.

Population characteristics in the Andersen model consisted of three factors: predisposing factors, enabling factors, and need characteristics. Predisposing factors were measured by age, gender, education, marital status, living arrangements, and employment

status. Enabling factors were measured by patient and provider-related enabling factors. Patient-related enabling factors included individual income, family economic status, social support, and use of health services in the past year. Provider-related enabling factors were measured by the admission's process, nursing units, medical departments, and head nurse on duty schedule. Need characteristics included ADLs and IADLs at admission, level of consciousness, cognitive status, sensory deficits, primary diagnosis, multiple medical problems, and need for discharge planning. The modified model used in this study was examined to determine whether or not predisposing, patient and provider-related enabling factors, and need characteristics predict hospitalization outcomes, patient satisfaction with hospital care, postdischarge resource use, and postdischarge patient outcomes as shown in Figure 1.

Figure 1. The Modified Andersen Health Behavioral Model



The Purpose of the Study

The overall purpose of this study was to examine the appropriateness of the Andersen health behavioral model for describing utilization of health care services among Taiwanese older adults. In particular, this study sought to:

1. Examine whether predisposing, patient and provider-related enabling factors, and need characteristics predict hospitalization outcomes and patient satisfaction with hospital care.
2. Examine whether predisposing, patient and provider-related enabling factors, need characteristics, and hospitalization outcomes affect postdischarge resource use.
3. Examine whether predisposing, patient and provider-related enabling factors, and need characteristics affect postdischarge patient outcomes (improvement in ADLs and IADLs, unmet needs, and patient satisfaction with home care).
4. Examine whether the Discharge Planning Screening Instrument used in the university teaching hospital predicts postdischarge resource use and patient outcomes.
5. Examine whether there are relationships between postdischarge resource use and patient outcomes.
6. Suggest patient characteristics which might be necessary to include in a discharge planning screening instrument for Taiwanese elderly patients.

Research Questions

The research questions were described based on the modified Andersen model. The primary research question was "What factors from the Andersen model predict postdischarge resource use and patient outcomes two weeks after discharge in an elderly Taiwanese population?" The following questions were tested:

1. Do predisposing, patient and provider-related enabling factors, and need characteristics predict hospitalization outcomes?
2. Do predisposing, patient and provider-related enabling factors, need characteristics of patients, and hospitalization outcomes predict postdischarge resource use?
3. Do predisposing, patient and provider-related enabling factors, and need characteristics predict postdischarge patient outcomes?
4. Are there relationships between postdischarge resource use and patient outcomes?
5. Is a relationship between postdischarge resource use and health outcomes for patients who did/did not meet hospital criteria for discharge planning?
6. Can information about the relationships of predisposing, patient and provider-related enabling factors, and need characteristics be used to suggest a discharge planning screening instrument that predicts postdischarge resource use?

Human Participants Assurance

The purpose, nature, risks, and benefits of study participation were discussed with each participant and oral consent to participate was obtained by the investigators. Participant compensation in the form of a gift was adopted for this study. Participants were informed they would receive the same quality and quantity of care whether or not they participated in this study. There were no anticipated physical risks to the patient. Any psychological risks associated with the study were likely to be restricted to the degree that the interview process may have focused the patient's attention on the disease process and any limitations they had in caring for themselves. Each participant provided a phone number to the investigators for follow up interviews. Patients' names were not included on the interview guide, only study numbers appeared. The researcher used a code sheet to record patients' names and study numbers to help the researcher track participants. This sheet was kept in a locked cabinet. The proposal of this study was reviewed and approved by the Committee on Human Subjects at Old Dominion University and the Committee on Human Subjects at the university teaching hospital (Appendix D).

Conclusion

In Taiwan, National Health Insurance was developed in 1994 to offer most medical care services at a price affordable to most Taiwanese. Since that time, the disabled elderly with multiple diseases have been able to get better hospital care. However, the lack of post-hospitalization resources, the stigma of nursing home, and the lack of discharge planning services have resulted in inappropriate usage of hospital resources by the disabled elderly. Therefore, postdischarge resource use and patient outcomes should be examined in relation

to these factors. Since the Andersen model is an appropriate model for evaluating resource use and patient outcomes, the purpose of this study and the research questions were created based on the Andersen model. The results of this study can help policy makers, health care professionals, and researchers understand postdischarge resource use and patient outcomes among hospitalized Taiwanese older adults, predict the likelihood of patient postdischarge resource use and patient outcomes at admission, and improve appropriate use of health care resources and patient outcomes. Results may be used to suggest elements which could be added to the discharge planning screening instrument.

CHAPTER 2

LITERATURE REVIEW

The Andersen model served as the theoretical framework for this study and it served as the foundation for this chapter. A description of the Andersen health behavioral model and its application to health care are described. Andersen et al. developed this model to evaluate health behaviors and outcomes. They included four population characteristics to examine patient health behavior and outcomes. In this study health behavior was measured by postdischarge resource use; health outcomes involved improvement of activities of daily living (ADLs) and instrumental activities of daily living (IADLs), unmet needs, and patient satisfaction with care at home. The literature review also includes a discussion of postdischarge resources such as emergency rooms (ER), hospitals, nursing homes (NH), home health care (HHC); and patient health outcomes. Since the study population was drawn from a group of hospitalized elderly patients, hospitalization outcomes which included the length of stay (LOS), hospitalization costs, and patient satisfaction with hospital care are also addressed. Independent variables which have been mentioned in the model are also addressed in this chapter. According to the literature, discharge planing can help patients use postdischarge resources and receive better quality care so determining the success of a discharge planning screening instrument was included in the study.

The Andersen Health Behavioral Model

The Andersen health behavioral model was devised by Andersen and his colleagues (Aday & Andersen, 1974; Andersen, 1968; Andersen & Aday, 1978; Andersen & Newman, 1973). These researchers developed this model to describe access to health care services by

households. They pointed out the importance of the processes in the use of health care services. These processes include health policies, characteristics of the health care system, and population characteristics. Outcomes (i.e. actual utilization of health care services) and consumer satisfaction with these services are also included (Aday & Andersen, 1974). The model has been applied to preventive behavior, health counseling, dental care, mental care, long-term care, and emergency service use in different populations. The Andersen model has become one of the most frequently used frameworks for analyzing utilization of health care services.

The Andersen model describes characteristics which may influence an individual's access to a variety of resources such as health services. For example, previous hospital use, gender, or age may affect an individual's need to use a nursing home. In other words, these factors may either directly or indirectly affect an individual's use of resources. The supply of services available may be another factor in resource use. For example, people who live in a rural area with low physician density, limited hospital services, and few extended care facilities may have difficulties in gaining access to services. They may be more likely to stay at home using home health care or stay in the hospital for a longer length of time.

In a revision of the model done in 1995. Andersen described a feedback loop relationship among four components: environmental factors, population characteristics, health behaviors, and health outcomes (Appendix B). They will be discussed here.

Health Behavior

According to Andersen, health behaviors consisted of two factors: personal health practices and use of health services. Personal health practices are performed by the individual

to maintain or improve health care including appropriate diet and nutrition, exercise, stress reduction, control of alcohol and tobacco use, and self-care (Andersen & Davidson, 1996). Another type of health behavior, use of health care services, was the major factor in predicting health behaviors in the original Andersen model. This use was measured rather broadly as units of physician ambulatory care and hospital inpatient services. However, more specific measures of health services use could be used to describe a particular medical condition or type of service or practitioner, or could be linked to an episode of illness such as number of physician visits (Andersen & Davidson, 1996). Since resource utilization can be measured globally as well as specifically, the Andersen model has been applied in many studies to evaluate the utilization of health care services, which are presented in the section titled the Application of the Andersen Model.

Health Outcomes

According to Andersen, health outcomes included the patient's viewpoint and the health professional's viewpoint. The patient's viewpoint included: their perception of their health status, and their general satisfaction with the care they receive. "Perceived health status" was the judgement of the individual such as self-reported health status or health status reported by others responsible for the individual's welfare. "Consumer satisfaction" describes the individual's degree of satisfaction with the health care he or she received. Satisfaction is judged by rating waiting time, travel time, communication with providers, and technical care received. The professional's viewpoint is a description of the health status of an individual by a health care professional which is based on established clinical standards and state-of-the-art practices.

The Andersen model has been used to evaluate resource use, but few studies have applied this model to evaluate health outcomes. Andersen & Davidson (1996) mentioned that the next generation of health services research should begin to measure the impact of health services utilization on health outcomes. Improving health status is an essential goal of medical care. It is important to ask not only for better availability of health care services, but also for better health outcomes after use of the services. However, it is a challenge to measure variables which represent an outcome of a specific health care service.

Population Characteristics

At the heart of the Andersen model are population characteristics such as age and gender, which may contribute to an individual's health behavior and health outcomes. Population characteristics consist of the following three factors: predisposing, enabling, and need. According to Andersen, predisposing factors can be measured by population demographics, individual social structure, and individual health belief. Demographics are personal biological imperatives, such as age and gender. Social structure is defined as the status of a person in the community such as level of education, occupation, ethnicity, social networks, and social interaction. Health beliefs or culture are attitudes, values, and the knowledge people have about health and health services that influence their subsequent perceptions of need and use of these services. Enabling factors can directly and indirectly make individuals more likely to use health care services or improve outcomes after use of the services. They consist of both community and personal enabling resources. Community-level enabling factors are defined as the quantity and quality of health personnel. Other community enabling factors which might influence people's use of health care services such

as the number of health care facilities available or the number of health care personnel available. These may affect an individual's health behavior, such as utilization of health care services (Andersen & Davidson, 1996). In other words, community-level enabling factors such as availability of physicians in the community are attributes of the community where the individual lives that enable the individual to obtain services. Personal enabling factors are defined as the personal means and know-how to obtain those services such as income, health insurance, a regular source of care, transportation, and acceptable travel and waiting time.

Phillips, Marrison, Andersen, and Aday (1998) emphasized that individual/provider-related variables should be included in the enabling component. The authors defined the individual/provider-related variables as (1) patient factors, which may be influenced by providers and which enable patients to obtain services, such as previous use of services, out-of-pocket price of services, and (2) provider characteristics, which interact with patient characteristics to influence utilization, for example, specialty or gender of physician. Since findings of enabling factors in health outcomes and health behaviors can influence policy makers' decisions, enabling factors have been more of a concern than other population characteristics.

Need characteristics force an individual to use health care resources and may contribute to patient outcomes. For example, patients with heart attacks visit an emergency room. Their functional status at preadmission may affect their performance of activities of daily living after hospitalization and/or resource use after hospitalization. Need characteristics in the Andersen model are defined as a biological imperative that influences

people's search for and consumption of health services. Need characteristics consist of evaluated need and perceived need. "Evaluated need" represents professional judgement and objective measurements about a patient's physical status and need for medical care, for example, blood pressure reading, temperature, blood cell count, symptoms, and diagnoses. "Perceived need" is defined as the individual or his family's perception of the illness or the need for use of health services. Measures of the perceived need have to include the number of days that an individual experiences disability and individual's self-reported health status (Andersen & Newman, 1973; & Andersen & Davidson, 1996). Need characteristics were major factors which influence the hospital care, emergency room visits, and surgical services which people HAVE TO use in a given situation.

Environmental Factors

In the Andersen model, environmental factors include external environmental factors and the health care system. Andersen and Davidson (1996) defined external environmental factors as "variables which affect the health status of individuals within the community." These variables include the economic climate and level of stress and violence, all of which might affect the way society views health and whether access to health care is considered the responsibility of the individual or the community. The health care system is defined as the policies, resources, organizations, and financial arrangements influencing the accessibility, availability, and acceptability of medical care services (Andersen & Davidson, 1996), for example, the Medicaid program. Andersen has mentioned that the influence of these environmental variables on health behaviors and outcomes was more difficult to measure than the influence of other components. For example, it is difficult to say that national health

insurance directly affects length of hospital stay.

Relationships Among Components

According to Andersen, environmental factors and population characteristics directly and indirectly influence utilization of health services, health outcomes, and consumer satisfaction. Additionally, the three factors in population characteristics influence one another such as predisposing factors affect enabling factors and enabling factors affected need characteristics (Appendix B). These present a linear relationship among the components (Aday & Andersen, 1974; Andersen & Newman, 1973). However, Andersen mentioned that the relationships among the components can be a feedback loop (Andersen, 1995; Andersen & Davidson, 1996; Phillips et al., 1998). These multiple influences can occur on health services use and outcomes. Also, outcomes and health services use can influence population characteristics. The authors expected health behaviors to alter people's need for services. Outcomes (i.e., health status and satisfaction) might also result in changes in both health behaviors and population characteristics. The relationships can be simultaneous or reciprocal as well as direct or indirect (Appendix B).

The Application of The Andersen Model in the Related Areas

The Andersen health behavioral model was originally applied to the use of medical services such as, physicians, hospitals, and dental services; it has been extended to many other services, including long-term care institutionalization (Wan & Odell, 1981), nursing home care (Evashwick, Rowe, Diehr, & Branch, 1984), home health care (Bowling, Farquhar, & Browne, 1991; Evashwick et al., 1984; Jones, Densen & Brown, 1989; Kempen & Suurmeijer, 1991; McCallum, Simons, Wilson, Sadler, & Owen, 1996), and informal care

(Bass & Noelker, 1987; Branch, Jette, Evashwick, Polansky, Rowe, & Diehr, 1981; Cafferata, 1987). Researchers have evaluated a variety of health and social services based on the Andersen model (Dansky, Dellasega, Shellenbarger, & Russo, 1996; Mitchell & Krout, 1998).

The Andersen Model in This Present Study

In the current study, the Andersen model has been adopted and modified as shown in Figure 1. Population characteristics, health behaviors, and health outcomes were measured in this study. Population characteristics, which were the independent variables of this study, were examined in association with health behaviors and patient health outcomes. Four components were examined under the population characteristics: predisposing, patient and provider-related enabling factors, and need characteristics. The detailed variables which represented these components have been shown in Appendix E. Health behavior was measured by the utilization of postdischarge resources during the two weeks following discharge. Participants were interviewed about use of ERs, hospitals, nursing homes, and home health care. Patient health outcomes were measured as improvement in activities of daily living (ADLs), improvement in instrumental activities of daily living (IADLs), unmet needs, and patient satisfaction with care at home. The study population was interviewed two weeks after hospital discharge, since hospitalization factors may affect patient postdischarge resource use and health outcomes. Therefore, hospitalization outcomes which included length of stay and hospitalization costs were also included in this study. Another factor, patient satisfaction with hospital care was also examined. The relationship of these components will be analyzed based on a linear relationship which was presented in Figure

1.

Studies related to Postdischarge Resource Use

The Andersen model has served as the basis for a number of studies regarding resource use. Most of them explored the relationships between population characteristics and resource use and involved interviewing subjects. Most of the participants were community dwelling elderly people, who were interviewed once to collect information about population characteristics and the utilization of health care services in order to examine the factors which may have influenced the subjects on health care utilization. Study participants were interviewed about their utilization of health care services during the previous 3 months, 6 months, or 1 year (Bazargan, M., Bazargan, S., & Baker, 1998; Chappell & Blandford, 1987; Chiang, 1989; Ginsberg, Israeli, Cohen, Stessman, 1996; Kempen & Suurmeijer, 1991; Mutran & Ferraro, 1988; Wan & Odell, 1981). Some of the researchers used a longitudinal data set to analyze the relationship between population characteristics and resource use (Evashwick et al., 1984; McCallum et al., 1996; Rudberg, Sager, & Zhang, 1996; Wolinsky & Johnson, 1991).

Other studies examined postdischarge resource use among hospitalized elderly patients, but their research was not based on the Andersen model. Interviews were also used to collect data from participants, and a longitudinal research method was used to evaluate factors which may affect postdischarge resource use (Fethke et al., 1986). These studies will be presented in more detail later in the literature review as individual variables are discussed.

Resource use has been defined in different ways in Andersen and Non-Andersen studies. In this study, postdischarge resource use is defined as the utilization of emergency

rooms (ER), hospital, nursing homes (NH), and home health care (HHC). Details of independent and dependent variables for all the studies described below have been listed in Appendix F.

Emergency Room Services

Utilization of emergency rooms (ERs) after hospitalization is not uncommon among older adults because of unanticipated changes in health status, but sometimes these visits can be prevented if patients receive appropriate referrals to health care services and get better quality care. Three studies which related use of ERs will be mentioned. One study explored the rate of emergency room utilization from the time of discharge from the hospital to two weeks after discharge (Dansky et al., 1996). Two other studies analyzed factors which may affect the use of ER services based on the Andersen model among community dwelling older adults (Bazgargan et al., 1998; Ginsberg et al., 1996).

Dansky, Dellasega, Shellenbarger, & Russo (1996) analyzed the type and number of services used by elderly persons from the time of discharge to two weeks after discharge. The study population (N = 51) consisted of persons age 65 and over who were patients in medical or surgical units at a medium sized urban hospital. Three instruments were used in the study: (1) the Mini-Mental State Exam which was used to test cognitive impairment, (2) the everyday Problem Solving Test, used to screen functional capacity, and (3) the Resource Utilization Checklist which reflects information regarding the client's use of emergency services, visits to the physician, and rehospitalization. The participants were interviewed by telephone two weeks after being discharged from the hospital. The findings showed that 5.9% of participants had emergency room visits following their discharge.

Bazargan, Bazargan, and Baker (1998) used the Andersen model to examine emergency room utilization, hospital admissions, and office-based physician visits among a sample of 998 low-income African American elderly. They interviewed 1,114 African Americans, aged 62 years and older, who resided in New Orleans and were living independently. The study population was randomly selected from 23 senior citizen centers in the city. Participants were interviewed over the phone or in face-to-face interviews. Health services utilization consisted of the number of emergency room utilizations, hospital admissions, and physician visits within a 6-month period prior to the interviews. The authors applied regression coefficients and frequencies to analyze the data. The results showed that emergency room visits were predicted by better social support, a higher accessibility of medical doctors, and poor perceived health status which explained nearly 34% of the variance.

Ginsberg, Israeli, Cohen, and Stessman (1996) explored the relationships of numerous predisposing, enabling, and need factors with ER utilization in a representative cohort study of persons 70 years and older living in the community. The study population (N = 605) was systemically and randomly selected, sorted by month of birth and by polling location of the electoral register of the Ministry of Interior. Information regarding three population characteristics was obtained. The predictors of an ER visit in the past year were self-reported health status, psychiatric problems, diagnosis with asthma, faith in physicians, ability to get out of the house, and ability to self-manage finances.

Only one variable, self-reported health status, was found by both studies to influence emergency room use among community dwelling older adults. Self-reported health status

is a subjective need measurement. Individual studies indicated that heart disease, asthma, ability to get out of the house, and ability to manage finances also had an effect on ER utilization. Surprisingly, limitation of ADLs did not appear to be a factor.

Hospital Admissions

According to the Dansky et al. report, the readmission rate was 5.9% among elderly patients from the time of discharge from the hospital to two weeks after discharge. In another report, Frankl, Breeling, & Goldman (1991) studied whether readmissions within 30 days of discharge were potentially preventable. They prospectively surveyed all readmissions to the medical service of a university teaching hospital during a 4-month period. These reviewers judged that 28 out of 327 readmissions (9%) were potentially preventable. Of the 28 potentially preventable readmissions, 89% occurred within 10 days of discharge. They concluded by reviewing patients who had been readmitted within 10 days of discharge that potentially preventable readmissions could nearly always be detected and that many may be amenable to systematic interventions such as standardized predischarge assessment and better coordination of post-discharge follow-up. Use of hospital services after discharge from hospitals can occur because of a change in the medical condition, but some readmissions are preventable.

The following studies help us recognize factors which affected the use of hospital services among community dwelling elderly. The first two study populations came from the Taiwanese elderly. The remainder came from older Americans. Some other studies which explored use of hospital services but were not based on the Andersen model also will be described.

Chiang (1989) evaluated use of health care services by the elderly in the Taipei area. The study population came from a household survey of non-institutionalized elderly adults living in the Taipei area. A sample of 3,042 elderly adults, aged 65 years and older, was selected in two stages by cluster sampling design. The participants were interviewed in person. The independent variables were subdivided into three factors based on the Andersen model. The use of health care services was measured as use of hospital services. All utilization data referred to the month preceding the interview. The results showed that the use of hospital care was related to insurance coverage, self-perceived health status, and bed disability days. Being male and having more bed disability days were strong predictors of use of hospital services among community dwelling urban Taiwanese older adults with a total variance of 9.9%.

Wu, Liang, Chang, Lin, and Maloy (1994) evaluated health care utilization among older adults in Taiwan. The data came from the 1989 Survey of Health and Living Status of the Elderly in Taiwan. The survey involved a national sample with 4,412 respondents aged 60 and over, selected through a multi-stage probability sampling procedure. Personal interviews were conducted. Overall 4,049 respondents completed interviews which constituted a response rate of 91.8%. After excluding proxy interviews, the remaining 3,846 constituted the total sample. The survey measured utilization of hospital days, western medicine physician visits, Chinese medicine physician visits, western pharmacy visits, and Chinese drug store visits in the past month. Independent variables were subdivided into two components: sociodemographics and need characteristics. Functional status was indexed by ADLs, IADLs, and physical fitness. The results showed that use of hospital days was

significantly affected by functional status and self-reported health status. In other words, the community dwelling Taiwanese older adults with more functional difficulties or poor self-reported health status tended to use hospital services.

Chappell & Blandford (1987) examined the correlates of health care utilization by elderly people in terms of the Andersen model. Data for this study came from two data sets. One, which examined utilization of health care services, included a random sample of 400 persons aged 65 and over who utilized home health care. Another, which addressed the utilization of physician and hospital services, came from a study designed to assess the impact of an Adult Day Care Program (n = 76). The independent variables were categorized as predisposing, enabling, and need factors. Functional disability was measured as the number of activities of daily living that the individual was not able to do alone. The results showed that hospital admissions were predicted by a low functional status, poor perceived health, more education, and being married (R^2 = .34). The variables in the regression model included two variables categorized as need factors, and one variable representing a predisposing factor. No enabling factors were shown in the regression model.

Mutran & Ferraro (1988) examined the medical need and use of services between older men and women based on the Andersen model. The data came from a subsample of the 1973 Survey of the Low-income Aged and Disabled. This subsample consisted of low- and middle-income older people (N = 3160) who were 65 years of age or older. Three population characteristics were obtained. Hospital and physician services were measured as use of services. The authors adopted logistic regression to analyze the data. The results showed that hospital admission was predicted by age, gender, disability, self-assessed health status, and

physician visits ($R^2 = .134$). In other words, people who were older, male, more disabled, had low self-assessed health status, and had more physician visits in the past year were more likely to be hospitalized.

Bazargan, Bazargan, and Baker (1998) evaluated hospital admissions among 998 low income older African Americans. The study population was randomly selected from senior centers in New Orleans City. They were interviewed concerning information related to predisposing, enabling, and need factors, and health status. The results showed that hospital admissions were predicted by internal health locus of control, possession of private insurance, and presence of heart conditions or cancer which explained 26% of the variance. Need factors which were included in the regression model were people with cancer or heart diseases. Other variables (i.e., perceived health status and limitation of daily activities) and other factors (i.e., predisposing & enabling factors) were not included.

The previous studies applied a cross-sectional research method to examine the factors which affected use of hospital services. The following studies which applied a longitudinal cohort research method explored factors affecting use of hospital services among community dwelling elderly.

Eve (1988) studied use of health care services among older women in terms of the Andersen model. The purpose of the study was to examine factors which predicted use of health care services. Data came from a group of older women who participated in the Social Security Administration's Longitudinal Retirement History Survey (N = 1894). Use of health care services in this study was measured as the number of hospitalizations in the past year, the number of physician visits in the past year, and number of nights in the hospital in the

past year. The independent variables were measured in terms of the Andersen model. The results revealed that previous use of health care services was strongly related to current use. In the regression model, the predictors of hospital admission were Medicaid coverage, use of physician services in previous years, being handicapped or having disabilities, low self-reported health status, young age, and lack of living children (R^2 = .11). All need characteristics were included in the regression model for predicting hospital admission.

Wolinsky & Johnson (1991) adopted the Andersen model to determine use of health services by older adults. They used baseline data on the 5,151 respondents surveyed as part of the panel design of the Longitudinal Study on Aging. The sample of patients aged 70 years or more were selected for interviews (by telephone if they had one, or by mail if they did not). The data they collected included three population characteristics. Health services utilization was measured by home health services, number of physician visits, number of hospital nights, and nursing home contacts. They applied the hierarchical ordinary least squares regression to analyze the data. The results showed that utilization of hospital services was predicted by gender, nonkin support, social security dependence, household ADLs, and lower body limitations (R^2 = .107). In other words, older adults who were male, scored lower on household ADLs and had lower body limitations were more likely to be hospitalized.

The studies that have been described above adopted the Andersen model to examine the factors which affected the utilization of hospital services among the community dwelling elderly. One study which will be described did not adopt the Andersen model. The study population was selected from hospitalized elderly patients.

Fethke, Smith, & Johnson (1986) evaluated factors which might affect the probability of readmission. One hundred one patients, 70 years and older, who were discharged to the community from an acute-care hospital were followed for 1 year to isolate risk factors affecting the probability of readmission. The study population was drawn from the daily census of a 1,100-bed university teaching hospital over a 17-month period in which data were collected from the inhospital interview and included sociodemographic and functional status. The postdischarge interviews took place at two weeks, two months, six months, and one year after discharge. Information was gathered on postdischarge location and care arrangements, physical, social, mental, and emotional function and resources of the patient, as well as specific health problems. At this one year point, 47 individuals (46.5%) had experienced at least one unplanned readmission. Logistic regressions were used to study risk factors influencing the probability of readmission. The respondents who were men, and widowed, had a higher weighted severity-of-illness score (previous hospitalizations, length of stay, number of secondary diagnoses, number of medications at discharge, and number of chronic conditions), and low life satisfaction. At one year, factors which could predict the use of hospital services were being widowed, having previous hospitalization, and having low life satisfaction.

Most of these findings showed that (1) what most frequently predicted hospital use was limitations in ADLs; (2) previous use of health care services (enabling factor) was shown many times to predict hospital use; and (3) variables in predisposing factors such as "being a man" and "older age" were most often shown in the prediction of hospital use. Other variables which have been shown to predict hospital use were limitations in IADLs,

certain disease types (diabetes or heart diseases), length of stay, number of medical problems, income, marital status, being widowed, and level of education.

Nursing Home Admissions

According to the Dansky et al. (1996) report, 3.9% of hospitalized elderly patients were admitted to a nursing home within two weeks of being discharged from the hospital. Frequently patients who have been discharged from hospitals still need some kind of skilled nursing care. Also, since many elderly, either community dwelling or recently discharged from a hospital have experienced multiple chronic diseases and functional status decline, they may need some assistance with daily activities. Elderly who were in these situations may be potential residents of nursing homes. These elderly patients should be identified at admission so discharge planners can provide appropriate suggestions to the patients and families. Patients would then be able to get the most appropriate postdischarge care. The following two studies described factors which affected patient nursing home admissions among older adults.

A study which was written by Wolinsky & Johnson (1991) evaluated use of nursing homes among community dwelling older adults. Data came from the Longitudinal Study on Aging. The study sample, aged 70 years or more, were selected for interviews. Three population characteristics were collected via interviews which have been discussed in the previous section. The authors applied hierarchical ordinary least squares regression to analyze the data. The results showed that nursing home utilization was predicted by age, nonkin support, and limitation of ADLs. In other words, people who were older, without kin support, and had more limitations in basic ADLs tended to be admitted to a nursing home

($R^2 = .054$).

Rudberg, Sager, and Zhang (1996) studied nursing home admissions using a longitudinal cohort research method without adopting the Andersen model. They examined the risk factors for nursing home admission at hospital discharge and nursing home use at three months following hospital discharge among a group of older adults. The sample was a subgroup of older persons who were enrolled at five hospitals participating in the Hospital Outcomes Project for the Elderly. The total study population was 1,265 older adults who were not residing in a nursing home prior to the hospitalization and who were admitted to the hospital for acute medical illness. The data were collected at three time points: at hospital admission, at hospital discharge, and at three months after hospital discharge. All data were obtained from the subjects by trained interviewers. The authors used logistic regression to analyze the data. The independent risk factors for nursing home admission right after hospital discharge were: increasing age, being Caucasian, living alone, urban/rural hospital location, more limitation in ADLs in the hospital, longer length of stay (LOS), and decline in ADLs. The independent risk factors for residing in a nursing home (NH) three months post-hospital discharge were increasing age, living alone, a primary diagnosis of digestive disorder, greater limitations in ADLs at hospital discharge, a higher score on mini-mental state examination (MMSE) at admission, and a longer LOS.

In these two studies, getting older and having more limitations in ADLs were strong predictors of nursing home admissions. Two factors which predicted nursing home admission among hospitalized elderly patients were LOS and living alone. Mini-mental state examination scores could predict nursing home admission three months after hospital

discharge. Enabling factors were not included in the prediction models of nursing home admission in these two studies.

Use of Home Health Care

People who are discharged from a hospital may need home health care because they may still require either skilled nursing care or help with daily activities. According to Jones, Densen & Brown's study (1989), 19% of 737 hospitalized elderly were referred to community service agencies after being discharged from the hospital. Although the number of referrals to home health agencies has increased in recent years, many frail elderly individuals still return to their homes without a referral for home health care. This may be because health care providers are unaware of patient's high-risk status, or because there are not enough home care agencies to meet the needs of all the patients. Studies which discussed use of the home health care adopted the Andersen model. With the exception of one study, all the study populations were community dwelling elderly (McCallum et al., 1996).

Chappell & Blandford (1987) examined the correlation between health care utilization and population characteristics among community dwelling elderly people. Data for this study came from two data sets (N = 475). The study population and the independent variables were discussed in a previous section of the chapter. Utilization of home care services was examined in terms of total number of home care services currently received. The results showed that the number of home health care services used was predicted by greater functional disability, poor perceived health, higher number of chronic conditions, older age, living alone, singleness, fewer number of relatives, and lower income ($R^2 = .36$).

Kempen & Suurmeijer (1991) applied the Andersen model to evaluate professional

home care of the elderly aged 60 years or older. Within a period of 5 months the authors interviewed 101 noninstitutionalized elderly (60 years of age and older) who were new users of professional home care services. The participants were interviewed in their homes. Information was gathered pertaining to three population characteristics based on the Andersen model. For the assessment of disability, a scale had been developed comprising 18 ADLs and IADLs with three possible answers per item; the scores ranged from 18 to 54. The amount of professional home care was calculated using an index which had three components: the number of days in a week the older adults received professional home health care, the number of ADLs and IADLs for which assistance was received and the number of home care institutions involved (i.e., home help services and/or district nursing). They used hierarchical multiple regression analysis of need, enabling, and predisposing variables on the amount of professional home care use. The results showed that problems with ADLs/IADLs and social support predicted professional home care use. The total amount of explained variance rose up to 60%.

These two studies applied a cross-sectional research method to evaluate the prediction of home health care utilization. The results showed that functional status, social support, and income were predictors of use of home health care among community dwelling elderly. Two studies which used a longitudinal research method will be described.

Evashwick, Rowe, Diehr, & Branch (1984) applied the Andersen model to predict use of home care. A total of 8,614 households were selected. All individuals age 65 or older were interviewed. Residents of nursing homes or other institutions were not recruited. Two interviews took place. Participants were interviewed in 1974 about personal characteristics.

The participants were reinterviewed 15 months later. The sample of 1,317 elderly persons completed both interviews. The information in the second interview related to the utilization of health care services between the first interviews and the second interviews. The survey instrument focused on the participants' ability to perform the basic activities of daily living with or without assistance, current use of health and social services, and perceived need for social support and health care. The independent variables were subdivided into three factors: predisposing factors, enabling factors, and need characteristics. A detailed description of variables is listed in Appendix E. The findings showed that although the predisposing and enabling factors were predictors of home care services, need characteristics were the major predictor of the use of home care services (R^2 = 11.9%).

Wolinsky & Johnson (1991) adopted the Andersen model to determine the use of home health services by older adults. They used baseline data on the 5,151 respondents surveyed as part of a panel design of the Longitudinal Study on Aging (LSOA). A sample of older adults aged 70 years or more was selected. The authors applied hierarchical ordinary least squares regression to analyze the data. The results showed that home health services were predicted by the absence of a multigenerational family, Medicaid coverage, and difficulties with basic ADLs and household ADLs (R^2 = .136).

It is difficult to have an overall concept about the factors which can predict use of home health care based on the results of these two articles, because one study only analyzed three components: predisposing, enabling, and need (Evashwick et al., 1984), and the other determined factors which affected the utilization of home health care based on individual variables (Wolinsky & Johnson, 1991).

One additional study which was written by McCallum, L Simons, J Simons, Wilson, Sadler, & Owen (1996) examined utilization of home health care among hospitalized elderly patients. The data were derived from the population of noninstitutionalized older people in Dubbo, Australia (N = 2,805). Baseline data were collected by interviews and medical examinations over 15 months. The potential study populations were tracked and 263 participants who were discharged from the hospital were interviewed over the phone 12 weeks after discharge to provide information about their use of health care services based on the Andersen model. The dependent variables were use of home care which included home nursing, meals-on-wheels, day care, transportation, housekeeping, respite, personal care, home modifications, and other services. The results showed that a quarter of older people (24%) received some type of home and community care service in the 12 weeks after discharge and two thirds of these received only one type of service. Regression analysis showed that patients living alone, owning private homes, and having a disability were more likely to use home health care, which explained 9% of the total variance.

In summary, the most common variables which predict use of home health care were living arrangements (predisposing factor), social support and income (enabling factors), and a limitation in ADLs (need characteristic). The variables which also appeared in some of these studies to predict home health care use were number of chronic conditions, a regular physician source, multigenerational family, Medicaid enrollment, private home owners, age, and marital status.

Studies Related to Postdischarge Patient Outcomes

Postdischarge patient outcomes were measured by improvement in functional status, unmet needs, and patient satisfaction with care at home. Improvement in functional status measured changes in ADLs and IADLs from hospital admission to two weeks after discharge. Unmet needs were defined as patients who needed help with ADLs and IADLs but did not get enough help. Patient satisfaction with care at home was measured by asking patients "Are you satisfied with the care you receive at home at this time?" Studies related to these three factors will be mentioned below.

Improvement of Functional Status

Functional status included ADLs and IADLs. Changes in functional status after hospitalization as a result are common and costly in economic and human terms. These changes have many important consequences for the patient, family, and health care system. Older patients who experience functional decline may also experience the loss of independence and self-esteem when they are forced to rely on others for basic care. Families who have a disabled older adult at home often need to make adjustments to their work schedule or adapt to increased medical costs. Patients who have a functional decline may use more resources and have a longer length of hospital stay and receive expensive rehabilitation therapies. After discharge from the hospital, these patients tend to require home health care, nursing home admission, or have a hospital readmission, and are increased at risk for falls. The costs of this post-hospital care are a large part of national health care expenditures. Since older patients who are at high risk for functional decline can be identified on admission, it is better for health care professionals to provide care during hospitalizations to enhance

functional status and minimize unnecessary cost later (Sager & Rudberg, 1998; St. Pierre, 1998).

Since researchers have defined functional status in different ways and measurements were various, the measurements of functional status in the following studies have been listed in Appendix G. Additionally, researchers have studied the relationship between changes in functional status and patient characteristics. These studies will be described.

Sager, Franke, Inouye, Landefeld, Morgan, Rudberg, Siebens, and Winograd (1996) studied the functional status of older adults with acute medical illnesses and hospitalizations. The study population consisted of 1,206 noninstitutionalized patients aged 70 years and older who were hospitalized for an acute medical illness in five hospitals. The participants were interviewed three times during the study period: admission, discharge, and three months after discharge. The information included demographics, a retrospective assessment of preadmission function obtained at admission based on six ADLs, seven IADLs, and the Mini-Mental State Examination (MMSE). The results showed that 10% of participants' ADLs were improved from preadmission to discharge and at three months after discharge. Fifty nine percent were the same and 29% of the participants' ADLs were worse. Factors that predicted the loss of ADL function at discharge included old age, female gender, lower preadmission IADL score, a diagnosis of cancer, and longer hospital stay. Factors that predicted the loss of ADLs three months after discharge were being 85 years of age and older, preadmission IADL score, admission MMSE, and rehospitalization. In other words, patients who had increased age, preexisting IADL disability, lower cognitive functioning, and rehospitalization were more likely to experience a loss of ADL function three months

after discharge. Factors that predicted loss of IADL function three months after discharge were being 70 - 74 years of age, lower admission MMSE score, and hospitalization.

Wu, Damiano, Lynn, Alzola, Teno, Landefeld, Desbiens, Tsevat, Mayor-Oakes, Harrell Jr. and Knaus (1995) developed a model estimating the probability of an adult patient having severe functional limitations two months after being hospitalized with one of nine serious illnesses. The study population was selected from five teaching hospitals. Participants (N = 1,746) were interviewed at admission and 2 months after discharge over the phone. The dependent variable was functional status two months after admission categorized by absence or presence of severe functional limitations. Severe functional limitation was defined as a Sickness Impact Profile score ≥ 30 or an ADLs score ≥4. Predictors of patients with severe functional limitations at two months after admission were more limitations in ADLs two weeks before admission, higher Duke activity status index, poor quality of life, age greater than 60, diagnosis of congestive heart failure, higher Glasow coma score (coma patients), and previous hospitalization.

Winogard, Lindenberger, Chavez, Mauricio, Shi, and Bloch (1997) examined the risk factors of decline in physical performance among older adults 1 year after hospitalization. The sample came from a larger study of predictors of adverse health outcomes in a cohort study of older veterans admitted to a tertiary care hospital. Eligible patients were male, English-speaking veterans aged 65 years or older. Of the 799 potentially eligible patients, 507 (63%) were recruited into the study, and 292 (37%) refused to participate. The independent variables included patient characteristics and health status. The data were collected from three sources: (1) patient interviews and performance tests (i.e., physical

function); (2) the medical record (demographic data); and (3) the VA data system (i.e., the principal discharge diagnosis). Chi-square tests and *t* tests were applied in analyzing the data. The results showed that patients with the greatest risk for decline of physical performance had moderate self-reported limitations of physical functioning.

Factors that contributed to the change of functional status were varied in these two studies. However, factors which were related to changes of functional status after discharge included age, gender, previous use of a hospital, consciousness level, cognitive status, impairment in ADLs and IADLs at hospital admission, longer hospital stay, and rehospitalization. In other words, people who were older, female, previously admitted to a hospital, comatose, had impaired cognitive status, impaired ADLs or IADLs at hospital admission, were hospitalized for a longer time, and who were readmitted to a hospital might more likely suffer a functional decline after hospital discharge.

Unmet Needs

The following studies showed the kinds of unmet needs elderly patients may have and factors which influence unmet needs. Not all of these studies adopted the Andersen model, and only one interviewed elderly patients two weeks after their discharge from the hospital (Dansky et al., 1996). Only one applied a longitudinal research method (Tenntedt, Mckinlay, and Kasten, 1994).

de Veer and de Bakker (1994) surveyed unmet needs among community dwelling elderly. A sample of 594 patients was asked to participate. The response rate was 56%, and the number of final participants who provided full information was 311 individuals. The sample consisted of noninstitutionalized elderly people 55 and older with a chronic illness

and disability in one or more ADLs. The respondents were interviewed by telephone. The instrument consisted of six subscales. Each subscale refers to an area of possible care needs. ADLs and IADLs were included. The participants were asked whether they could perform various activities independently and easily, independently but with difficulty, whether they were often dependent on others, or always dependent on others. If an individual had difficulty performing the activity, it was considered as a need for help. An unmet need was defined as the respondent needing help, if no help was received, this item reflected an unmet need. The results showed that 96% of the respondents had an unmet need with ADLs. The most often mentioned items were walking up/down stairs (81%), care of feet/nails (76%), moving outdoors (69%), and arising from a chair (60%). Additionally, 94% of the respondents had an unmet need related to IADLs. The most frequently cited items were heavy house-cleaning (88%), shopping (75%), bed making (69%), and ironing clothes (62%).

Dansky, Dellasega, Shellenbarger, & Russo (1996) analyzed the unmet needs of elderly persons from the time of discharge to two weeks after discharge. The study population (N = 51) was all persons age 65 and over who were inpatients on medical or surgical units at a medium sized urban hospital. They measured cognitive impairment and functional capacity. Participants were interviewed over the phone two weeks after discharge. The findings showed that 35.3% had some kind of problem with daily activities and 39.2% of them reported unmet needs.

According to these two studies, the percentage of unmet needs with daily activities among disabled elderly people ranged from one third to nine tenths. The following two studies examined factors which influenced the prevalence of unmet needs.

Tennstedt, McKinlay, and Kasten (1994) explored unmet needs among community dwelling disabled elders. The purpose of the study was to evaluate factors which might affect unmet needs. The study population was a randomly stratified sample from the Massachusetts Elder Health Project. Adults aged 70 and over were drawn in two stages from the local census lists of 19 cities and towns in Massachusetts. The subsample consisted of 235 disabled community residents who participated in both baseline and follow-up interviews. A person was considered disabled if he or she reported one of the following situations: (1) difficulty with at least two IADLs; (2) difficulty with one IADL task and either use of a walker, four-pronged cane, or wheelchair; or (3) any one of the areas above and either difficulty with dressing, limitation of normal activity, or restricted mobility outside the home. Three follow-up phone interviews were conducted with the respondents at 15-month intervals. If the respondents were not able to be interviewed by phone, then personal interviews took place. Data were collected regarding sociodemographics, mobility and functional capabilities, types and sources of assistance with ADLs, and characteristics of up to four informal caregivers. To determine level of functional capabilities, respondents were asked if, because of poor health or physical limitation, they had difficulty performing 6 personal activities of daily living (PADLs), 8 IADLs, and walking unassisted (stamina). Unmet needs referred to the reporting of substantial physical difficulty with a specific area of activity, and no receipt of assistance from another person in this specific activity. The results showed that (1) there was no significant difference in unmet needs either PADLs or IADLs, between the group of respondents admitted to nursing homes and those disabled elders who continued to live in the community; (2) two thirds of the community-residing

elders had no problems with unmet needs at either time point, about one third had experienced unmet needs at one point or the other; (3) unmet IADL needs were more likely for younger elderly, those with fewer caregivers, and those not living with a caregiver; and (4) unmet PADL needs were predicted only by a higher level of functional disability.

Chen and Wilkins (1998) examined social and economic differences in the prevalence of needs and unmet needs for health-related personal assistance among the household population aged 65 and older and the sources from which they received support. Data were collected from the 1991 Health and Activity Limitation Survey (HALS). Information was collected regarding gender, marital status, living arrangements, education, and household income. The results showed that 30% of seniors living in private households had needs for health-related personal assistance. Three-quarters of them required help only with IADLs; the remainder needed help with basic ADLs. The prevalence of needs and unmet needs was higher among women than men, was inversely related to household income and education, and was relatively high among formerly married seniors and those living alone.

According to these studies, living alone was a strong predictor of unmet needs. Disabled elderly who lived alone were more likely to have unmet needs in daily activities. The remainder which included younger elderly, those with few caregivers available, lower household income and education and being married were also predictors of unmet needs in these two studies. Most of these predictors were predisposing factors. Only two variables were enabling factors, and need characteristics were not included in these studies.

Patient Satisfaction

Patient satisfaction was defined as an outcome variable in the Andersen model (Aday

and Andersen, 1974). The evaluation of patient satisfaction was established by the Health Care Financing Administration (HCFA) as an outcome measure. HCFA includes monitoring patient satisfaction for Medicare reimbursement whereby hospitals have to measure patient satisfaction levels. This information provides an understanding of how elderly people evaluate care and what they value as related to hospital care.

Most current studies are less interested in correlations between patient characteristics and satisfaction and more focused on improving the quality of care and service delivery to patients and health plan members. Many studies evaluated programs in terms of patient satisfaction. For example, some studies adopted the Andersen model, but they investigated different health care services such as dental care (Reifel, Rana, & Marcus, 1997), and primary care (Patrick, Scrivens, & Charlton, 1983). Some studies surveyed patient satisfaction among all ages such as aged 18 years and over (Cohen, 1996; Fox & Storms, 1981; Hall & Dornan, 1990). These studies will not be discussed in this section. Studies related to elderly patient satisfaction will be addressed in this section.

Patient satisfaction is a complicated phenomenon that is linked to patients' expectations, health status, and personal characteristics, as well as health care characteristics. Personal characteristics are an important factor in influencing patient satisfaction, therefore, understanding correlations between them should not be disregarded. For example, Messner and Lewis (1996) pointed out factors that might affect satisfaction with care including age, gender, health status, socioeconomic factors, educational level, and support system. In other words, elderly patients were more likely to express greater satisfaction with health care than their younger counterparts. Females were more likely to report greater satisfaction than

males. Patients with failing health or chronic illness were often less satisfied. Patients with low income may tend to have lower satisfaction with health care. Higher education empowers people with a greater sense of control and understanding of health and illness. Patients with greater support from family were more likely to have higher satisfaction with care than people who did not have enough family support. Therefore, patient characteristics were examined for their influence on patient satisfaction. The following three studies discussed relationships between patient characteristics and patient satisfaction. None of them included the Andersen model in their studies.

Lee and Kasper (1998) evaluated the effect of personal characteristics on elderly people's satisfaction with medical care. Data were taken from 1991 Medicare Current Beneficiary Survey of 8,859 persons age 65 and over living in the community. A multistage sampling procedure was involved. Nursing home residents were excluded from the study population. The number of study participants who were 65 and older was 8,859. The independent variables included sociodemographic characteristics, health status, functioning, and features of care utilization. A series of eight items was used to measure patient satisfaction with care received from doctors or hospitals within the past year using a 4-point Likert scale ranging from very satisfied to very dissatisfied. The dependent variables of different satisfaction dimensions were dichotomized into highly satisfied and other. The results showed that age, education, annual income, and self-reported health status were the predictors of patient satisfaction with medical care. Gender and number of limitations in ADLs and IADLs were not included in the predictive model. In other words, people's high satisfaction was related to being younger elderly, having more education, a higher income,

and a better health status.

Hall, Feldstein, Fretwell, Rowe, and Epstein (1990) examined the relationship of older patients' satisfaction with medical care. All enrollees 70 years of age or older in a large HMO in Providence, Rhode Island, were eligible for this study. Of the 600 who agreed to participate, 532 completed the data. These participants were interviewed in person in their own home. Information regarding sociodemographic characteristics, social contacts, emotional status, functional status, cognitive function, and satisfaction was obtained in the interviews. Satisfaction was defined as the patients' opinions of all the health care which they had received over the preceding 2 - 3 months from doctors, nurses, and social workers at the HMO or elsewhere. The results showed that physical function was related to patient satisfaction. The authors did not examine whether sociodemographics affected patient satisfaction or not. The results showed that greater satisfaction was significantly associated with better physical function, and more social activity, but was not related to number of diagnoses, and cognitive function.

According to these three studies, education and income presented a positive relationship with patient satisfaction. The remaining factors were gender, better physical function, more social activity, no chronic diseases, and family support. In other words, respondents who were female, had higher education, higher income, better physical function, more social activity, no chronic diseases, and more family support had higher patient satisfaction. The findings of these three studies showed that age had an inconsistent relationship with patient satisfaction. In all, patient satisfaction demonstrated relationships with sociodemographics. However, sociodemographics were not predictors of patient

satisfaction in the Lochman's study (1983). Two variables which were studied but did not show a relationship with patient satisfaction were diagnosis and cognitive status.

Studies Related to Length of Stay and Patient Costs

Health care consumption which includes hospital costs and length of stay (LOS) has been a major concern for consumers, health care providers, and payors. Policy makers, insurers, health care providers, and researchers are trying to figure out ways to reduce hospitalization costs through different research approaches. One of the approaches is to examine factors which might predict the LOS and hospitalization costs. According to these findings, health care providers can assess patients at admission to help patients be discharged safely and earlier from the hospital when they might be at risk for longer LOS.

Hospitalization costs and LOS are related to each other, as patients who stay in the hospital longer tend to be charged more. Many studies have investigated the relationship between these two factors. Six studies explored relationships among population characteristics, LOS, and hospitalization costs. One of these studies explored LOS based on the Andersen model and applied a longitudinal research method among community dwelling older adults (Wolinsky et al., 1994). Another five studies did not adopt the Andersen model, they used a cross-sectional research method to evaluate LOS. Two of the studies included hospitalization costs as a dependent variable.

One study which adopted a longitudinal research method was done by Wolinsky, Culler, Callahan, and Johnson (1994). They examined hospital resource consumption among older adults. The authors applied a 7-year longitudinal data set (Longitudinal Study on Aging) (N = 7,527) to analyze LOS and hospitalization costs based on the Andersen model.

Information was gathered from administrative records and interview data. The dependent variables in this study, LOS and hospitalization costs, were derived from Medicare reimbursement records from 1984 to 1990. The authors used logistic regression analysis to determine factors which predict LOS and hospitalization costs. The results showed factors which predicted LOS were old age, less non-kin support, perceived poor health, difficulties with lower body functions, more physician visits, prior hospitalization, and a diagnosis of coronary heart disease, angina, or diabetes. High hospitalization costs were predicted by less non-kin support, perceived poor health, absence of Alzheimer's disease, fewer difficulties with advanced ADLs, more hospital contacts, more physician visits, and specific diagnoses such as coronary heart disease, angina, and diabetes.

The five studies which did not apply the Andersen model in their research will now be mentioned. Narain, Rubenstein, Wieland, Rosbrook, Strome, Pietruszka, and Morley (1988) evaluated factors which may affect LOS. Patients who were aged 70 years and older and admitted to acute-care beds on the medical service units of a Veterans Administration hospital (N = 396) were recruited in the study. Participants were interviewed within two days of admission about demographics. Information regarding diagnoses, prescription medications, ADLs (a 7-point scale including the six Lawton ADL items plus transferring), and mental status (10-point Kahn scale) was gathered from patient charts. A stepwise logistic regression was used to explore the relationship of admission factors to outcomes. The results showed that factors which predicted LOS were old age, taking more medication, decreased functional status, living location, and decreased mental status.

Pompei, Charlson, Ales, MacKenzie, and Norton (1991) studied patient

characteristics at the time of admission to predict outcomes of hospitalization. The purpose of the study was to examine whether patient characteristics affect LOS and charges. The study population consisted of 604 patients admitted to the medical service of New York Hospital during a one month period in 1984. Patient attributes such as illness severity, comorbidity, and functional status were selected to determine the relationship between LOS and charges. Severity of illness, functional status, and stability were estimated by the resident physician. The functional ability of patients was estimated by asking the admitting physician: "assuming that the patient leaves the hospital, how functional do you think she or he will be?" Ancillary charges were obtained from the hospital bill. These patient charges included laboratory, pharmacy, radiology, blood bank, respiratory therapy, electrocardiography, electroencephalography, rehabilitation services, and miscellaneous fees. The results showed that illness severity and functional status were associated with LOS and charges. In other words, average LOS and charges increased with increasing severity of illness ($p < .001$) and decreasing functional status ($p < .01$).

Incalzi, Gemma, Capparella, Terranova, Porcedda, Tresalti, & Carbonin (1992) studied predictors of LOS. The study population was taken from a 1,800-bed university hospital. Patients who were aged 70 and over were recruited in the study (N = 308). Information was collected regarding sociodemographic, functional status, and medical history. The authors defined a long hospital stay as patients with a LOS greater than 26 days. Scores for ADLs were categorized as three levels: independent in all ADLs, dependent in 1 to 5 ADLs, and dependent in all ADLs. The results showed that age, ADL score, MMSE score, score on the Geriatric Depression Scale, and amount of prescribed medications was

related to LOS. However, in logistic regression analyses, a long hospital stay was only predicted by more than 5 prescribed medications and more than 3 additional diagnoses. The ADL score was not included in the regression model of LOS.

Reiley & Howard (1995) examined the factors which affect LOS in elderly patients with congestive heart failure. This study was conducted at a 504-bed teaching hospital affiliated with Harvard Medical School. All patients aged 65 and over with a diagnosis of congestive heart failure were eligible for inclusion in the study. The independent variables included sociodemographics, functional status, and severity of illness. The results showed that sensory impairment and functional status were significantly associated with LOS. In multivariate regression, only functional status was a predictor of LOS when age, gender, and sensory impairment were controlled ($R^2 = .095$).

McClaran, Berglas, and Franco (1996) studied factors that affected LOS among 495 hospitalized elderly patients. The study population was taken from Montreal General Hospital, a tertiary care university hospital in Canada. Participants excluded from the study were patients with unstable medical conditions that prevented them from being interviewed and patients admitted to critical care. The participants aged 65 years and older were interviewed at admission. The participants provided sociodemographic information. The service of admission, diagnosis, date of admission, and date of discharge were obtained from the hospital information system. The authors defined a long hospital stay as patients who remained in the hospital 45 or more days (This cutoff was selected because Canada's Quebec Ministry Guidelines suggest that an acute stay should not exceed 45 days). The results showed that (1) 32.9% stayed in the hospital 45 days or more, and (2) relative risks for long

hospital stay were adjusted according to whether or not the patients' children lived in Montreal. In other words, elderly patients who had no children in the local area, and with a neurologic or mental diagnosis were more likely to stay in the hospital longer.

Functional status was mentioned most frequently in relationship with LOS. Age, mental status, and medical condition also frequently showed a relationship with LOS. The other factors which have been shown to predict LOS in a study were living arrangements (predisposing factor), family support, economic status, no children around, previous hospital contacts, and physician visits (five enabling factors), and severity of illness and number of medical problems (two need characteristics). Functional status was a strong indicator of hospitalization costs, but the results in these two studies were different. Pompei et al. (1991) reported that people with more limitation of functional status cost more in hospital ancillary charges. Wolinsky et al. (1994) indicated that people who had less difficulty with advanced ADLs had higher hospitalization costs. The remaining factors which included severity of illness, less non-kin support, and previous hospital contacts and physician visits also showed relationships with total patient costs.

Studies Related to Predisposing Factors, Enabling Factors, and Need Characteristics

The independent variables in the current study were subdivided into four components based on the Andersen model. The four components included predisposing, patient and provider-related enabling factors, and need characteristics. Many studies adopted three of these four components (except provider-related enabling factors) to evaluate LOS, hospitalization costs, postdischarge resource use, improvement in ADLs and IADLs, unmet

needs, and patient satisfaction in their studies. A number of studies also examined relationships among variables without applying the Andersen model. All of them will be described.

Predisposing Factors

Studies which related to the six predisposing factors--age, gender, education, marital status, living arrangements, and employment status--are addressed below.

Age. Although one study did include age, it did not show a relationship with use of the ER (Bazargan et al., 1998). Age was examined in eleven studies for use of hospital services. Two studies showed a positive relationship with hospital admissions (Eve, 1988, Mutran & Ferraro, 1988). Age was not related to hospital admissions in the other six studies. Age was evaluated for a relationship with nursing home admissions (Rudberg et al., 1996; Wolinsky & Johnson, 1991). The findings showed a positive relationship in both studies. Age was evaluated in the relationship with use of homes health care services (Chappell & Blandford, 1987; Kempen & Suurmeijer, 1991; Wolinsky & Johnson, 1991). A significant positive relationship was seen in only one study (Chappell & Blandford, 1987). The others did not show a relationship. Four studies examined the relationship between age and improvement in functional status. It showed a negative relationship in two studies (Sager et al., 1996; Wu & Chu, 1995), but was not significant in the Winograd et al. study. Age was examined in two studies for a relationship with unmet needs. Only one study showed a negative relationship (Tennstedt et al., 1994), another did not (Chen & Wilkins, 1998). In patient satisfaction, only one study examined the relationship with age and showed a positive relationship (Lee & Kasper, 1998). The relationship between age and LOS was examined in

five studies. Three studies reported a positive relationship (Incalzi et al., 1992; Narain et al., 1998; Wolinsky et al., 1994), the others did not (Reiley & Howard, 1995; McClaran et al., 1996). One study examined the relationship between age and hospital charge and presented a positive relationship (Wolinsky et al., 1994).

Gender. One study included gender in evaluating the relationship with use of the ER, but the findings did not show a significant association (Bazargan et al., 1998). Gender was included in many studies to determine the relationship with hospital admissions among older adults. Some studies had a positive relationship with hospital admissions (Chiang, 1989; Fethke et al., 1986; Mutran & Ferraro, 1988; & Wolinsky & Johnson, 1991), in other words, being an older male was a risk to being admitted to the hospital. Yet some of the studies did not show a relationship between age and hospital admissions (Chappell & Blandford, 1987; Bazargan et al., 1998; Wu et al., 1994). One study included gender in evaluating patient characteristics and unmet needs and it showed that females were more likely to have unmet needs (Chen & Wilkins, 1998). Many studies examined the relationship between gender and functional status, ER use and nursing home admissions, use of home health care, and LOS; the findings did not demonstrate a significant relationship.

Education. Education was examined for its relationship and ability to predict resource use and patient outcomes. However, only one study showed a positive relationship with hospital admissions (Chappell et al., 1987). In other words, people who had a higher education were more likely to use hospital care resources.

Marital status. Marital status had a positive relationship with hospital admissions and use of home health care (Chappell et al., 1987). There were no relationships between marital

status and functional status, nursing home admissions, and ER admissions in these studies.

Living arrangements. Living alone had a positive association with nursing home admissions (Rudberg et al., 1996; Wolinsky & Johnson, 1991), and use of home health care (Chappell & Blandford, 1987; McCallum et al., 1996). Yet ER use and hospital admissions, LOS, and functional status did not show a relationship with living arrangements.

Employment status. Five studies measured employment status of the study population, however, no study demonstrated any relationship with resource use or patient outcomes. One examined the relationship with the use of the ER (Ginsberg et al., 1996). Three studies explored the relationship with hospital admissions (Chiang, 1989; Chappell & Blandford, 1987; Eve, 1988). One study looked for a relationship with use of home health care (Chappell & Blandford, 1987). None of them showed a significant relationship.

Patient-Related Enabling Factors

Three factors are described as patient-related enabling factors: income, family support, and use of health care services in the past year. Income was measured by individual income and family economic status. Use of health care services was measured by prior hospitalization, ER use, nursing home admission, and home health care visits in the past year. Studies related to these variables are described.

Income. Income was negatively related to use of home health care (Chappell & Blandford, 1987). Nursing home and ER admissions, and functional status did not show a relationship with income.

Family support. There were no relationships between family support and ER use, hospitalization, NH admissions, and use of HHC. When no children were available to assist

with care, there was a relationship with LOS (McClaran et al., 1996) and hospital admission (Chappell & Blandford, 1987).

Previous utilization of health care services. Prior hospitalization presented a negative relationship with functional status (Sager et al., 1996; Wu et al., 1995). Use of physician services in the previous year presented a positive relationship with current hospital use (Eve, 1988). Prior hospital contact had a positive effect on LOS and hospitalization costs (Wolinsky et al., 1994).

Provider-Related Enabling Factors

Provider-related enabling factors were measured by the admissions process, nursing units, medical departments, and head nurse duty schedule in this study. However, in the literature review, few studies examined postdischarge resource use and patient outcomes in terms of these four factors. These environmental factors may affect patients' resource use and outcomes. Only one study which examined a relationship between hospital service and postdischarge resource use is described.

Evans and Hendricks (1993) investigated postdischarge use of health care services. Eight hundred thirty five participants were selected from a medical center. A quasi-experimental research design was applied in the study. The researchers included medical departments (Medical, Surgical and Neurology) as an independent variable to determine the effects of use of health care services. A statistically significant relationship ($p = .001$) was found. In other words, patient location during the hospitalization made a significant difference on postdischarge use of health care services.

Need Characteristics

Seven factors were included under need characteristics. These included functional status (ADLs and IADLs), consciousness level, cognitive status, sensory deficits, primary diagnosis, multiple medical problems, and need for discharge planning. Studies related to these variables are described below.

Functional status. A score on an ADLs or IADLs assessment instrument at admission suggested positive relationships with functional status at or after discharge (Sager et al., 1996; Wu et al., 1995). Gindberg et al. found that people who could not get out of their home and who were unable to manage financially were more likely to be admitted to ER. A high score for ADLs also had a relationship with hospital admissions (Chappell & Blandford, 1987, Eve, 1988; Mutrun & Ferraro, 1988; Wu et al., 1994), nursing home admissions (Rudberg et al., 1996; Wolinsky & Johnson, 1991), use of home health care (Chappell & Blandford, 1987; Kempen & Suurmeijer, 1991; McCallum et al., 1996; Wolinsky & Johnson, 1991), and LOS (Incalzi et al., 1992; Pompei et al., 1991; Reiley & Howard, 1995; Wolinsky et al., 1994; Narain et al., 1988). Functional status was most frequently related to the dependent variables.

Level of consciousness. Consciousness status had a positive relationship with functional status (Wu et al., 1995). Patients who were comatose were more likely to have a lower functional status.

Cognitive Status. Cognitive status presented a positive relationship with functional status (Sager & Rudberg, 1998), nursing home admissions (Rudberg et al., 1996), and LOS (Incalzi et al., 1992). People who had lower mental status were more likely to have a lower

functional status and to be admitted to a nursing home. There were no relationships with ER and hospital admissions, and use of home health care.

Primary Diagnosis. The measure of primary diagnosis was different from researcher to researcher. It is difficult to assume comparable information. However, primary diagnosis might be a factor to affect the dependent variables in these studies. People with a diagnosis of heart disease or asthma were more likely to have an ER admission (Ginsberg et al., 1996). People with a diagnosis of digestive diseases were more likely to have nursing home admissions (Rudberg et al., 1996). People with a diagnosis of neurological diseases were more likely to have a longer LOS (Wolinsky et al., 1994). Diagnosis demonstrated a relationship with LOS (McClaran et al., 1996; Narain et al., 1988). Primary diagnosis was not related to functional status, or the use of home health care in these studies.

Multiple medical problems. Multiple medical problems were related to relationships with hospital admissions (Fethke et al., 1986), use of HHC (Chappell & Blandford, 1987), and LOS (Incalzi et al., 1992). Multiple medical problems were not related to relationships with functional status, ER use or nursing home admissions.

The Discharge planning screening instruments (Need for discharge planning). Five studies explored factors which included discharge planning screening instruments to predict patients' discharge planning needs at admission. Some of these instruments were as complicated as a ten-page long assessment instrument, others included only three questions in the instrument. These authors adopted different research methods and statistics to analyze the data. Most of the respondents in these studies were patients who were admitted to general medical units. Only one of these studies collected information from patients aged 65 and

over who were admitted to any unit in the hospital, excluding the psychiatric unit (Westra et al., 1998). None of them adopted the Andersen model. These studies will be mentioned.

Inui, Stevenson, Plorde, and Murphy (1981) evaluated three instruments to determine which was the best to predict postdischarge placement. The study was conducted at a 305-bed urban short-term hospital. The study population was assessed in terms of three measures within 28 hours of admission. A sample of 279 patients who were admitted to the hospital were recruited. The three measures were an 11-interval linear scale for nurses who rated projected "patient dependency at discharge," a 10-interval scale for rating "probability of nursing home placement after this hospitalization," and the CAAST index. The CAAST is an objective clinical index which has five parameters of a patient's condition: continence, ambulation, age, social background, and thought process. Each parameter was scaled from 0 to 2. A composite score of 0 to 10 was determined (higher scores imply higher degree of disposition difficulty). The results showed the following. (1) All three instruments were related to patient disposition ($p < .001$). (2) Use of a critical score of 3 on the CAAST index yielded the highest sensitivity (0.78) and would maximize the identification of patients needing early discharge planning for special disposition arrangements. (3) Nurses' rating of "dependency at discharge" with a critical score of 4 yielded the highest predictive power of the positive test (0.81). The authors concluded that use of this instrument would minimize the number of inappropriate (false positive) referrals for early discharge planning, but would not achieve maximum identification of patients truly needing such assistance. And (4) no critical values were found for "nurse rating of probability of nursing home placement."

Evans, Hendricks, Lawrence, and Bishop (1988) studied factors which could

discriminate patients at risk at admission for nursing home placement, long hospital stay, or rehospitalization. The study population consisted of patients who were admitted to medical, neurological, and surgical units (N = 727) in the VA Medical Center in Seattle. One-fourth of the participants (n = 177) were randomly assigned to a validation group. Data were collected from patient interviews and medical chart reviews. To identify factors which influenced outcomes, discrimination analysis was completed with 532 patients in the analysis group. A dependent variable was defined as patients who had any of the following items: readmission within 60 days, placement in a NH directly from the hospital, or a stay longer than the geometric mean in the hospital. Independent variables were categorized into dichotomous responses to aid in the development of a risk screening index. The results showed that being age 75 or over, unmarried, living alone/nursing home, prior admission, dependent ambulation, with two or more chronic conditions, poor mental status, and psychiatric comorbidity were factors which predicted the dependent variable. The eight selected criteria variables were used to develop a risk index by summing the number of indicators, resulting in indices scoring from 0 to 8. Using a critical score of four (4 or more, and less than 4) resulted in a less sensitive (sensitivity = 0.42), but more specific (specificity = 0.93) index which targeted 26% of patients as being 'at risk' (phi = 0.28, $p < .001$).

Blaylock & Cason (1992) developed the Blaylock Risk Assessment Screen (BRASS) to reflect the needs of the elderly as well as to identify those patients who might experience extended LOS, and need discharge planning services and resources. Content validity and interrater reliability ® = .84) were assessed. Each item had numerical value options that represented the degree to which the characteristics affected the need for discharge planning.

Total scores, computed by summing all items, ranged from 0 to 40. Low scores (less than 10) indicated that the patient had few needs for discharge planning and a low demand for discharge planning resources. A score of 10 to 19 suggested that the patient's problems were more complicated and required extensive discharge planning resources, probably without institutionalization. A score greater than 19 suggested that the patient's problems were vast, required extensive discharge planning resources, and probably would involve institutionalization or rehabilitation. The BRASS required about 15 minutes for nurses to complete. The results showed that BRASS had a correlation with LOS.

Fairchild, Hickey, Cook, McCarthy, Rossi, Timmons, Mangione, and Lee (1998) developed a screening tool and incorporated it into the routine hospital admission assessment that could facilitate discharge planning by identifying patients who were more likely to need postdischarge medical services at the time of admission. The study population was taken from the general medical service of an urban teaching hospital in Boston. The authors collected data in two phases, a derivation phase (n = 381) and a validation phase (n = 329). Follow-up was performed by telephone in the derivation phase, and by a mailed questionnaire followed in two weeks by telephone contact. For the validation phase, telephone interviews were conducted. Information included Medical Outcomes Study 36-Item Short Form Health Survey (SF-36), medical condition, social support, employment status, and health status. Participants were also contacted 1 month after discharge over the phone to determine use of nonphysician medical services during the 30 days after hospital discharge. They defined use of postdischarge medical services (a dichotomous variable) as patients who used the following medical services at postdischarge: visiting nurse or physical

therapy, medical equipment, or placement in a rehabilitation or long-term care facility. The results showed that (1) some medical conditions (stroke, hip fracture, peptic ulcer, emotional or stress-related illness), the number of active illnesses, race, caregiver at home, health insurance, employment status, marital status, and age had relationships with use of medical services after hospital discharge; and (2) three variables predicted use of medical services after discharge: age, SF-36's physical function, and social function score. The authors generated a prediction rule in the form of a scoring system: age 65 or older (1 point), SF-36 social function score of 15 or less (1 point), and SF-36 physical functional score of 15 or less (2 points). Higher scores indicate a greater likelihood of using postdischarge medical services. Patients were grouped into three categories representing risk of using postdischarge medical services: low (score of 0), intermediate (score of 1), and high (score of 2 to 4). Postdischarge medical services were used by 68%, 23%, and 14% of the patients in the high, intermediate, and low-risk categories, respectively.

Westra, Holland, Aufenthie, Cullen, Finley, Griebenow, Hess, Jacobson, Kennebek, McHale, McMyler, Ohland, Ryan, and Wollan (1998) examined the Uniform Needs Assessment Instrument (UNAI) to determine whether it was a good instrument to predict postdischarge resource use by the hospitalized elderly. The UNAI was developed by the Health Care Financial Administration (HCFA) to be used for discharge planning with older adults by a national multidisciplinary panel of 30 experts. Definitions for the 200 UNAI items were created based on existing nationally recognized definitions, research instruments, or textbooks. The purpose of this study was to determine the reliability, effectiveness, and feasibility of using the UNAI in a clinical setting. Patients aged 65 or older, hospitalized

longer than 24 hours, and residing in Olmsted County were recruited for the study. The 103 participants were divided into two groups. The first 57 participants in Group 1, represented patients who received regular discharge planning. For Group 1, results from the UNAI were not shared with those responsible for discharge planning. The next participants, Group 2, represented patients whose data were made available to those responsible for their discharge planning. For Group 2, the results of the UNAI were shared also with the staff. Data were collected within 24 to 48 hours of admission and again within 24 to 48 hours prior to discharge. Within 10 to 14 days after discharge, an investigator telephoned patients and collected data on actual needs and how these needs were met during the two weeks after discharge. Effectiveness of the UNAI was measured by sensitivity and specificity. Sensitivity was determined by calculating the percent agreement of needs which the participants reported as existing after discharge compared with those identified by using the form just prior to discharge. Specificity was determined by calculating the percent agreement of needs which did not exist during the 2 weeks after hospitalization with those not expected to exist by the discharge data collection. The results showed that (1)interrater reliability was greater than .85. (2) The overall sensitivity and specificity of the UNAI for detecting continuing care needs were high (> 85%). (3) The amount of time required to complete the UNAI was 45 to 75 minutes.

As described above, a discharge planning screening can consist of only a few items, or it can be a very complete assessment tool that involves physical health, psychological health, social health, functional health, and environmental health. The population characteristics which were tested by the researchers for the discharge planning screening

instrument were varied. However, the most frequently cited variables which predicted postdischarge resource use were older age, prior admission, living alone/nursing home, poor mental status, lower functional status, and having two or more chronic conditions. The variables which also showed significant relationships with postdischarge resource use were being unmarried, having a lower income, sensory deficits, the number of drugs, and being comatose. The researchers defined the dependent variable, postdischarge resource use, in various ways. However, a longer length of hospital stay was commonly present as a dependent variable. Placement in a long-term care facility was another. The remaining variables, which included home health care (visiting nurses), readmission, patient satisfaction, and use of physical therapy and medical equipment also have been measured in these studies.

Summary of the Literature

The literature has been described based on the Andersen model. According to the literature, although many studies discussed resource use, patient outcomes, and discharge planning screening instruments, these three variables were never integrated in one study. Although many of the studies in this chapter adopted the Andersen model, most did not include provider-related enabling factors. None of the studies integrated patient health outcomes with a discharge planning screening instrument. Few studies described previously included a longitudinal method to predict patient outcomes. Community dwelling older adults were sampled in most of these studies. Few of these studies sampled the hospitalized elderly even though this group has a high demand for health care services.

The Andersen model has been adopted in the current study to test both health

behavior and patient health outcomes as well as provider-related enabling factors to have a whole picture of postdischarge resource use and patient health outcomes. The hospitalized Taiwanese older adults sampled in this study were interviewed both at admission and two weeks after discharge so that the comparison of functional status could be addressed. Suggestions for a discharge planning screening instrument will also be provided based on the results of this study.

Since Andersen pointed out that population characteristics were major factors in describing health behavior and in predicting health outcomes, population characteristics were adopted in this study. Population characteristics included four components: predisposing, patient and provider-related enabling factors, and need characteristics. The variables which comprised each component have been listed in Appendix E. Postdischarge resource use was identified as a patient health behavior. Improvement in ADLs, improvement in IADLs, unmet needs, and patient satisfaction with care at home served as patient health outcomes. The study population was adopted from hospitalized elderly patients, therefore, LOS, hospitalization costs, and patient satisfaction with hospital care were included. The major hypothesis derived from the Andersen model states that population characteristics will influence a patient's health behavior and health outcomes as well as influence hospitalization outcomes. The specific hypotheses tested by the Andersen model will be described in Chapter Three.

CHAPTER 3

METHODS

This chapter addresses research design and hypotheses which were generated from the Andersen model. An explanation of the study population, instrumentation, and study variables and operational definitions will be described. The process of data collection and data analysis will also be addressed.

Research Design: An Overview

A longitudinal research design was selected for this study. The purpose of this study was to explore the relationships among population characteristics, postdischarge resource use, and patient outcomes in terms of the Andersen model. These constructs were measured via a survey developed for the purpose of this study. The five-phase plan for data collection which included interviews and document reviews will be described.

1. Elderly patients age 65 and older and admitted for medical problems were assessed by investigators based on the Discharge Planning Screening Instrument (Appendix C) used in the university teaching hospital (UTH). Patients who qualified using the following criteria were recruited into the study: patients who had a score greater than one on the Discharge Planning Screening, lived within the local area, were not in critical condition, and stayed in the hospital longer than three days. Patients were asked for an oral agreement to participate in this study.
2. Patient admission interviews took place within 48 - 72 hours after admission. The investigators assessed participants' health status within 48 - 72 hours after admission including functional status, cognitive status (The Short Portable Mental Status

Questionnaire), consciousness level, and sensory deficits. Patients were also interviewed about demographics and previous utilization of health services.

3. Inpatient chart reviews were done by the investigators within 48 - 72 hours after admission. Information concerning gender, address, and telephone number were obtained from the charts.

4. The postdischarge interviews took place two weeks after discharge from the hospital. The participants were interviewed about postdischarge resource use, functional status, unmet needs, and patient satisfaction.

5. Medical records were reviewed two weeks after discharge. Information concerning LOS, hospitalization costs, and head nurse on duty schedule were collected.

Statements of Hypotheses

A. Predisposing factors, patient and provider-related factors, and need characteristics will affect hospitalization outcomes (LOS and hospitalization costs).

A1. Participants who were older, male, married, and living alone will be more likely to have longer hospital stays and higher hospitalization costs.

A2. Participants who had little family support, low income, low family economic status, and/or previous utilization of hospital and physician services will be more likely to have longer hospital stays and higher hospitalization costs.

A3. Participants who were admitted to the hospital when the head nurse was off duty and through the emergency room will be more likely to have longer hospital stays and higher hospitalization costs.

A4. Participants who had functional impairments, low levels of consciousness,

poor cognitive status, more than one medical problem, and need discharge planning services will have longer hospital stays and higher hospitalization costs.

B. Multivariate hypotheses for hospitalization outcomes

B1. Functional status, consciousness level, cognitive status, and multiple medical problems will be the strongest predictors of length of hospital stays when other predisposing and enabling factors, and need characteristics are controlled.

B2. Functional status, consciousness level, cognitive status, and multiple medical problems will be the strongest predictors of hospitalization costs when other predisposing and enabling factors, and need characteristics are controlled.

C. Predisposing factors, patient and provider-related factors, and need characteristics will affect patient satisfaction with hospital care.

C1. Participants who were older, female, well educated, and married will be more likely to have high scores of patient satisfaction with hospital care.

C2. Participants who had family support, and higher individual income will be more likely to have high scores of patient satisfaction.

C3. Participants who stayed in different nursing units during their hospitalization will be more likely to have different scores of patient satisfaction.

C4. Participants who had functional impairments, multiple medical problems, and needed discharge planning services will be more likely to be satisfied with hospital care.

D. Multivariate hypotheses for satisfaction with hospital care

D1. Age, income, family support, head nurse on duty schedule, functional status, multiple medical problems, and hospitalization costs will be the strongest predictors of satisfaction with hospital care when other predisposing and enabling factors, need characteristics, and hospitalization outcomes are controlled.

E. Postdischarge resource use will be affected by the predisposing factors, patient, and provider-related enabling factors, and need characteristics.

E1. Participants who were older, living with others, or not married will be more likely to use postdischarge resources.

E2. Participants who had low-income, no family support, and prior hospitalization will be more likely to use postdischarge resources.

E3. Participants who were admitted from other institutions via the ER at a time the head nurse is off duty will be more likely to use postdischarge resources.

E4. Participants who had a heart and/or neurological illness, low functional status, consciousness impairment, cognitive impairment, sensory deficits, or multiple medical problems will be more likely to use postdischarge resources.

F. Postdischarge resource use will be affected by hospitalization outcomes (LOS and hospitalization costs).

F1. Participants who had longer hospital stays and higher hospitalization costs will be more likely to use postdischarge resources.

G. Multivariate hypotheses for postdischarge resource use

G1. Age, prior hospitalization, multiple medical problems, LOS, functional impairment, cognitive impairment, and consciousness impairment will be the strongest predictors of postdischarge resource use when other variables: predisposing, enabling, and need factors and hospitalization costs are controlled.

H. Predisposing, patient, and provider-related enabling factors, need characteristics, and hospitalization outcomes will impact improvement in ADLs and IADLs.

HI. Participants who were older will be more likely not to show improvement in ADLs and IADLs.

H2. Participants with no family support will be more likely not to show improvement in ADLs and IADLs.

H3. Participants who had a prior hospitalization will be more likely not to show improvement in ADLs and IADLs.

H4. Participants who had functional, cognitive, and consciousness impairment, and sensory deficits will be more likely not to show improvement in ADLs and IADLs.

I. Predisposing, patient, and provider-related enabling factors, need characteristics, and hospitalization outcomes will impact unmet needs.

I1. Participants who were older will be more likely to have unmet needs.

I2. Participants who had low individual income, no family support, and had prior hospitalization will be more likely to have unmet needs.

I3. Participants who were admitted to the hospital when the head nurse of the

unit was off duty will be more likely to have unmet needs.

I4. Participants who had a poor functional status and sensory deficits will be more likely to have unmet needs.

J. Predisposing, patient, and provider-related enabling factors, need characteristics, and hospitalization outcomes will impact patient satisfaction with care at home.

J1. Participants who were older will be more likely to be satisfied with care at home.

J2. Participants who had higher individual income and better family support will be more likely to be satisfied with care at home.

J3. Participants who did not need discharge planning services will be more likely to be satisfied with care at home.

J4. Participants who stayed in different nursing units during their hospitalization will have different scores of patient satisfaction.

J5. Participants who had a higher functional status and no multiple medical problems will be more likely to be satisfied with care at home.

K. Multivariate hypotheses for postdischarge patient health outcomes

K1. Age, family support, the previous utilization of hospitals, functional status, consciousness level, sensory deficits, primary diagnosis, and multiple medical problems will be the strongest predictors of improvement in ADLs and IADLs when other predisposing, enabling, and need factors, and hospitalization outcomes are controlled.

K2. Age, family support, functional status, and cognitive status will be the

strongest predictors of unmet needs when other predisposing, patient and provider-related enabling factors, need characteristics, and hospitalization outcomes are controlled.

K3. Age, family support, individual income, family economic status, functional status, and multiple medical problems will be the strongest predictors of patient satisfaction with care at home when other predisposing, enabling, and need factors, and hospitalization outcomes are controlled.

Study Population--Elderly

Sample Schedule

The target population for this study was patients who used the services of an 800-bed nonprofit, acute care teaching university teaching hospital in Taiwan. The hospital currently serves about 5,000 outpatients and over 900 inpatients every day. For this study, the criteria for being a participant will be described.

1. All patients aged 65 and older who were admitted by general medical physicians to the university teaching hospital
2. These patients were assessed by the Modified Discharge Planning Screening Instrument (Appendix C) to determine whether they could be a participant in this study or not. The modified Discharge Planning Screening Instrument only included 8 items. Assessment of nutritional status--albumin value--was eliminated as this information was not available in the first two days of hospitalization. The Discharge Planning Screening Instrument was used to assess patients as independent (refer to score 0 for each item), needs help (refer to score 1 for each item), or dependent (refer

to score 2 for each item). The criteria for participants in this study were patients who needed help or were dependent in one or more of these 8 items. In other words, only patients who were independent in all the items were excluded from the study.

3. Participants who did not live within the local area were excluded. Owing to the need for postdischarge interviews in the participants' own homes, the study area could not be too broad geographically.
4. Participants who were in critical condition during the first three days of hospitalization were not recruited.
5. Participants who could not be reached by telephone after discharge were excluded.
6. Participants who stayed in the hospital less than 3 days were excluded.
7. Patients with cognitive impairments were recruited in this study. When patients could not speak clearly, their informal primary caregivers answered the questions for them.

Of a total of 389 admissions 109 elderly patients who met the above criteria were recruited for this study between August 1 and September 4, 1998 (Table 1). Two patients refused to participate, so the initial response rate was 98%. Eighty-five participants completed the postdischarge interviews. Seven patients who received discharge planning were excluded from the study because receiving discharge planning services might affect patient postdischarge resource use. In total, seventy eight participants were included in the study. In the end, the participation rate was 71.6%.

Sample Characteristics

Table 2 addressed patient predisposing characteristics. A majority of participants

were female (61.5%), aged from 65 and 84 years (97%) with an average age of 74.94 (*SD* = 5.92), and half of them were widowed (50%). The participants ranged in years of education from 0 to 16 years, with a mean of 4.44 (*SD* = 4.49) years; 41.3% did not have any formal education. Approximately ninety percent of the participants lived with family (89.6%), only 10.4% lived alone or lived with others. Less than one tenth (6.3%) of the participants currently held a job, and 41% of the participants never had a job in their life. The great majority of those (88.5%) were female.

As shown in Table 3, nearly all participants (94.9%) had family support when they became sick. Nearly one tenth (9.1%) of them did not have any individual income, 53.2% of them had an income less than NT$9,999 (US$288) per month, and 37.7% had an income greater than NT$10,000. According to the Social Welfare Policy in Taiwan, participants with income less than NT$10,000 per person per month are qualified to apply for the low-income subsidy from the government. Approximately half of the participants (46.2%) were low-income, based on the policy. In previous use of health care services, more than half of the participants had visited an emergency room or a hospital in the past year, and only 2.6% have lived in a nursing home. Only 6.6% had been visited by a home health care nurse. Nearly nine tenths (88.5%) had visited a physician in the past year.

Provider-related enabling factors were described in Table 4. Seven tenths (70.5%) were admitted to the hospital from the emergency room, and 29.5% from the out-patient department. Approximately nine tenths (89.7%) were admitted from their home, and 10.3% from other facilities. Approximately half of the patients (48.6%) were admitted while the head nurse of the unit was on duty.

Need characteristics of the participants were described in Table 5. One quarter of the participants had circulatory diseases. In general, participants had an average score of 3.8 (*SD* = 2.3) for impairment in ADLs , and an average score of 4.4 (*SD* = 1.8) for impairment in IADLs. The items that most patients had problems with were bathing and toileting in ADLs, and riding the bus, walking, and shopping in IADLs (Table 6). Almost three quarters (74.6%) of the participants were alert. In terms of cognitive status, over one half (56.4%) of the participants had no cognitive impairment, 44.6% had some kind of cognitive impairment. Over three quarters (78.9%) of them did not have visual or hearing deficits. Only one third (37.2%) of the participants had only one illness, most of them (62.8%) had more than one medical problem. Nearly two tenths of the participants (18.4%) needed discharge planning.

Table 1

Study Population: Reasons for Non-participation

Characteristics	% (n)
Patients who were qualified in this study (N = 109)	
Completed admission interview	98.2 (107)
Refused to participate	1.8 (2)
Patients who were not qualified in this study (N = 272)	
Patients lived out-of local area	59.6 (162)
Patient's condition was critical within 48 hrs after admission	8.5 (23)
Score on the discharge planning screening less than 1	28.3 (77)
Hospitalization less than three days	3.7 (10)
Patients who completed admission interview (N = 107)	
Completed post-discharge interview	79.4 (85)
Reasons patients did not complete post-discharge interview (N = 22)	
Cannot be reached	18.2 (4)
Readmission	27.3 (6)
Died	54.5 (12)
Patients who completed admission and post-discharge interview (N = 85)	
Patients who received discharge planning	7
Patients who did not receive discharge planning **(Population of the present study)**	**78**

Table 2

Descriptions of Patient Predisposing Factors (N = 78)

Variables	%(n)
Age	
65 - 74 Years	48.7 (38)
75 - 84 Years	49.2 (36)
≥ 85 Years	3.1 (4)
Gender	
Female	61.5 (48)
Male	38.5 (30)
Marital Status	
Single	1.3 (1)
Married	48.7 (38)
Widowed	50.0 (39)
Years of Education	
None	41.3 (31)
1-6 Years	49.3 (37)
> 6 Years	9.3 (7)
Living Arrangements	
Alone	5.2 (4)
Spouse Only	16.9 (13)
Spouse and Children	14.3 (11)
Spouse, Children & Grandchildren	58.4 (45)
Other	5.2 (4)
Employment Status	
Never Had a Job	41.3 (26)
Retired	52.4 (33)
Working	6.3 (4)

Table 3

Descriptions of Patient-Related Enabling Factors (N = 78)

Variables	% (n)
Social Support	
Family	94.9 (74)
Other	5.1 (4)
Individual Income Status	
None	9.1 (7)
< 9,999 NT	53.2 (41)
≥ 10,000 NT	37.7 (29)
Family Economic Status (n = 56)	
Low	46.2 (24)
Median	11.5 (6)
High	42.3 (22)
Previous Use of Health Care Services	
ER Visits	53.2 (41)
Hospital	55.1 (43)
Nursing Home Admission	2.6 (2)
Home Health Care	6.6 (5)
Physician Visits	88.5 (69)

Table 4

Descriptions of Provider-Related Enabling Factors (N = 78)

Variables	%(n)
Type of Admission	
ER	70.5 (55)
OPD	29.5 (23)
Admission Source	
Home	89.7 (70)
Other	10.3 (8)
Nursing Units	
Unit A	10.3 (8)
Unit B	12.8 (10)
Other Unit	76.9 (66)
Medical Departments	
Internal Medicine Department	6.4 (5)
Cardiology Department	14.1 (11)
Respiratory Department	20.5 (16)
Gastrointestinal Department	11.5 (9)
Nephrology Department	20.5 (16)
Metabolic Department	10.3 (8)
Neurologic Department	11.5 (9)
Other	5.1 (4)
Head Nurse on Duty Schedule	
Yes	51.4 (38)
No	48.6 (36)

Table 5

Descriptions of Need Characteristics (N = 78)

Variables	% (n)
Primary Diagnosis	
Neoplasms	7.9 (6)
Circulatory	25.0 (19)
Respiratory	14.5 (11)
Digestive	11.8 (9)
Genitourinary	18.4 (14)
Other	22.4 (17)
Activities of Daily Living (ADLs)	
Totally independent	16.7(13)
Dependent in 1 -5 ADLs	48.7(38)
Totally dependent in 6 ADLs	34.6(27)
Mean number of ADLs (SD)	3.8 (2.3)
Instrumental Activities of Daily Living (IADLs)	
Totally independent	6.4(5)
Dependent in 1 -5 IADLs	60.3(47)
Totally dependent in 6 IADLs	33.3(26)
Mean number of IADLs (SD)	4.4 (1.8)
Level of Consciousness	
Alert	84.6 (66)
Lethargic	6.4 (5)
Obtunded	7.7 (6)
Stupor/Comatose	1.3 (1)
Cognitive Status	
No Cognitive Impairment	56.4 (31)
Mild Impairment	25.5 (14)
Moderate Impairment	14.5 (8)
Severe Impairment	3.6 (2)
Sensory Deficits	
None	78.9 (56)
Hearing	5.6 (4)
Visual	7.0 (5)
Both	8.5 (6)
Multiple Medical Problems	
No	37.2 (29)
Yes	62.8 (49)
Need for DP	
Yes	18.4 (14)
No	81.6 (62)

Table 6

Descriptions of Participants Who Need Help/Dependent on Each Item of ADLs and IADLs at Admission (N=78)

Variables	%(n)
Activities Daily Living (ADLs)	
Eating	47.4(37)
Bathing	76.9(60)
Toileting	70.5(55)
Transferring	65.4(51)
Incontinent	54.5(42)
Dressing	65.4(51)
Needing Help in any ADLs	83.1(65)
Mean Number of ADLs (SD)	3.8 (2.3)
Instrumental Activities Daily Living (IADLs)	
Cooking	79.5(62)
Handling Medication	55.1(43)
Handling Finances	41.6(32)
Grocery Shopping	85.9(67)
Walking	87.2(68)
Riding Bus	88.0(66)
Needing Help in any IADLs	97.2(69)
Mean Number of IADLs (SD)	4.4 (1.8)

As shown in Appendix H, participants and non-participants were similar in most population characteristics ($p > .05$), except ADLs, IADLs, consciousness level, and prior nursing home admissions ($p \leq .05$). Not surprisingly, it was difficult to keep track of seriously ill patients. Some of the patients could not be followed as they were readmitted to the hospital or expired.

Instrumentation

Various instruments (Appendix I) were developed by the researcher for the purpose of this study. They related to interviews and medical record reviews which will be described.

1. Preliminary Assessment

   After the patients' date of birth was obtained, they were assessed with the discharge planning screening instrument to determine whether or not they met the criteria for this study. If the patients met the criteria, investigators read an agreement to them to ensure that they were willing to participate in this study.

2. Admission Interview

   An interview was conducted within 48 - 72 hours after admission. Information was obtained about demographics, health status, and previous utilization of health care services.

3. Admission Inpatient Chart Review

   Admission inpatient charts, which included the date of admission, patient's gender, admission source, nursing units, and medical departments were reviewed within 48 hours after admission.

4. Postdischarge Interview

The postdischarge interview included postdischarge resource use (ER, hospital, nursing home, and home health care), functional status, unmet needs, and patient satisfaction with care at home.

5. Postdischarge Medical Record Review

Postdischarge medical records which included primary discharge diagnosis, hospitalization costs, and head nurse duty schedule were reviewed after discharge.

The instrument consisted of the five elements mentioned above. The instrument has been developed by the researcher based on a literature review (Closs & Tierney, 1993; Mamon et al., 1992; McKeenhan & Coulton, 1985). The pretest, validity, and reliability that were evaluated in this study will be described.

Pretest

A pretest of the instruments and the process was completed by Taiwanese registered nurses who hold master's degrees. Twelve participants for the pretest were selected from six nursing units of the university teaching hospital. The participants had to meet the criteria for this study. The pretest investigators followed the process of data collection and wrote down, immediately after completing each step, the time it took to complete the survey, as well as any problems that she had with each step. The instrument and the process were modified based on those comments.

Validity

Face validity and content validity were completed for this instrument. The final instrument was modified based on comments.

1. Face Validity

The instrument was sent to people who have experience in research, elderly care, or public health in the USA as well as Taiwan to get their feedback.

2. Content Validity

The instrument was sent to people who are experts in elderly care either in hospitals, nursing homes, or home health care settings as well as statisticians and experts in public health.

Reliability

Investigators were hired to interview participants and review records. They all have had a background in nursing. They took a 12-hour training program (Appendix J). The investigators were trained to understand the study and conduct the official method of data collection.

Study Variables and Operational Definitions

In the context of the modified Andersen theoretical framework, the study consisted of seven constructs: predisposing, patient-related enabling factors, provider-related enabling factors, need characteristics, hospitalization outcomes, postdischarge resource use, and patient outcomes. The predisposing factors included patient demographics and social demographics. Patient-related enabling factors were measured by individual income, family economic status, social support, and previous utilization of health care services. Provider-related enabling factors included the admission process, nursing units, medical department, and head nurse on duty schedule. Need characteristics were measured by functional status, cognitive status, sensory deficits, and need for discharge planning. These four components

served as independent variables. The dependent variables in this study were postdischarge resource use and patient outcomes. Postdischarge resource use included use of the ERs, the hospitals, the nursing homes, and home health care during the two weeks after discharge. Patient outcomes included improvement in functional status, unmet needs, and patient satisfaction with care at home.

For bivariate and multivariate analyses, some variables were recategorized because of the low number of participants in certain groups. Age, education, marital status, living arrangements, employment status, individual income, family economic status, nursing units, medical departments, ADLs and IADLs at admission, level of consciousness, cognitive status, and sensory deficits were recategorized. The variables in this study will be described.

PREDISPOSING FACTORS

1. Age

Type: Independent Variable/ Predisposing Factors /Ratio

Definition: This variable addressed the patient's age in years. Age was a ratio variable. For bivariate and multivariate analyses, it was dichotomized as 65 - 74 and 75+.

Source: A medical record review within 48 hours after admission.

2. Gender

Type: Independent Variable/ Predisposing Factors/Nominal

Definition: This variable addressed the patient's gender.

Source: A medical record review within 48 hours after admission.

3. Years of Education

Type: Independent Variable/ Predisposing Factors/Ratio

Definition: This variable addressed how many years the participant has been educated in formal institutions. The participants were categorized as no education, one to six-year education, and more than six years of education. For bivariate and multivariate analyses, it was dichotomized to 2 levels: 0 to 6 years and 7+ years

Source: A patient interview within 48 hours after admission

4. Marital Status

Type: Independent Variable/ Predisposing Factors /Nominal

Definition: This variable addressed patients' marital status. It was dichotomized to "married" and "single or widowed."

Source: A patient interview within 48 hours after admission

5. Living Arrangements

Type: Independent Variable/ Predisposing Factors /Nominal

Definition: This variable addressed patient's living placement before admission. The question for participants was "Who do you live with?" The possible answers were "living alone," "with spouse only," "with spouse and children," "with spouse, children, and grandchildren," and "other." For bivariate and multivariate analyses, living arrangements were dichotomized as lived with other elders, spouse, or alone, and lived with spouse and/or families.

Source: A patient interview within 48 hours after admission.

6. Employment Status

Type: Independent Variable/ Predisposing Factors/Nominal

Definition: This variable addressed patient's employment status before admission. The question for participants was "Did you have a job before you were admitted to the hospital?" If patients answered "no," a follow up question was asked "have you ever had a job in your life?" The possible answers for these two questions were yes or no. The variable was categorized to three levels: never had a job, retired, and working. For bivariate analyses, it was dichotomized as never had a job and have/had ever worked. This variable did not participate in the multivariate analyses because employment status was highly related to gender ($p < .005$) and 88% of females had never worked.

Source: A patient interview within 48 hours after admission.

PATIENT-RELATED ENABLING FACTORS

1. Individual Income

Type: Independent Variable/Patient-Related Enabling Factor/Ordinal

Definition: This variable addressed the Taiwanese elderly patient's individual income, which included salary, pension, rental, and interest. The patient was asked the question "How much income such as pensions, interests, rental do you have as an individual have in a month?" The possible answers were none, less than 9,999 NT, 10,000 - 19,999 NT, 20,000 - 29,999 NT, 30,000 - 39,999 NT, 40,000 - 49,999 NT, 50,000 - 59,999 NT, and more than 60,000 NT. For bivariate and multivariate analyses, it was dichotomized to two levels: ≤ 9,999 NT and > 10,000 NT.

Source: A patient interview within 48 hours after admission.

2. Family Economic Status

Type: Independent Variable/Patient-Related Enabling Factor/Nominal

Definition: According to the Social Welfare Policy in Taiwan, people whose income is less than NT$10,000 per month per person are qualified to apply for a low-income subsidy. All the participants provided their household income and the number of people in the household. For this variable, household income was divided by the number of people in the household. Low family economic status was defined as participant's household income per person less than NT$10,000. Median family economic status was defined as participant's household income per person just equal to NT$10,000. High family economic status was defined as participant's household income per person was more than NT$10,000. For bivariate and multivariate analyses, it was dichotomized as low and median/high status.

Source: An interview two weeks after discharge

3. Social Support

Type: Independent Variable/Patient-Related Enabling Factor/Nominal

Definition: This variable addressed patient's social support when they are sick. The question for participants was "Who can help you at home when you are sick?" The possible answers were no one, family support, friends and other support. The variable was not included in the bivariate and multivariate analyses because of an insufficient number of participants who did not have

family support (5.1%).

Source: A patient interview within 48 hours after admission.

4. Previous use of Health Care Services

Type: Independent Variable/Patient-Related Enabling Factor/Nominal

Definition: This variable addressed previous utilization of health care services, which included ER, hospitals, nursing homes, home health care, and physician visits. The five questions for the participants were: Have you been admitted to an ER in the past year for physical health problems? Have you been admitted to a hospital in the past year for physical health problems? Have you been admitted to a nursing home in the past year for physical health problems? Have you been visited by home health care nurses in the past year for physical health problems? Have you visited a physician in the past year for physical health problems? The possible answers were yes or no for each question. Yet, use of nursing home in the past year was not included in the bivariate and multivariate analyses, because of the insufficient number of participants who had been in a nursing home in the past year (2.2%).

Source: A patient interview within 48 hours after admission

PROVIDER-RELATED ENABLING FACTORS

1. Type of Admission

Type: Independent Variable/Provider-Related Enabling Factors/Nominal

Definition: This variable addressed the way patients were admitted to the hospital. The possible answers were the emergency room and the outpatient department.

Source: An inpatient chart review within 48 hours after admission

2. Admission Source

Type: Independent Variable/Provider-Related Enabling Factors/Nominal

Definition: This variable addressed the places from which the patients were admitted. The possible answers were the patient's own home, and other places which included nursing homes and other hospitals.

Source: An inpatient chart review within 48 hours after admission

3. Nursing Units

Type: Independent Variable/Provider-Related Enabling Factors/Nominal

Definition This variable addressed the ward where a patient stayed during the hospitalization. Six units were included. For bivariate analyses, it was recategorized into three levels: Unit A, Unit B, and other unit. As shown in Appendix K, Unit A had a greater performance--a 100% discharge planning training rate and a 0% nurse turnover rate, unit B had a worse performance--a low discharge planning training rate (58.3%) and a high nursing turnover rate (16.6%), and other units were not so different. For multivariate analyses, this variable was recoded into two dummy variables, other units served as the reference group.

Source: An inpatient chart review within 48 hours after admission.

4. Medical Departments

Type: Independent Variable/Provider-Related Enabling Factors/Nominal

Definition: This variable addressed the medical care departments of the hospital to which

patients were admitted by physicians of the department. The medical care departments in the university teaching hospital included departments of internal medical diseases, cardiology diseases, respiratory diseases, gastrointestinal diseases, nephrotic diseases, metabolic diseases, neurological diseases, and other diseases. For bivariate and multivariate analyses, the variable, medical departments, was categorized into four levels: department of metabolic diseases, department of neurological diseases, department of respiratory diseases, and other departments.

Source: An inpatient chart review within 48 hours after admission

5. Duty Schedule of Head Nurse

Type: Independent Variable/Provider-Related Enabling Factors/Nominal

Definition: This variable addressed whether or not the head nurse of the unit was on duty while the patient was admitted. The possible answers were yes or no.

Source: A medical record review after discharge

NEED CHARACTERISTICS

1. Functional status at admission

Type: Independent Variable/Need characteristics/Ratio

Definition: The participants were assessed by the investigators to determine whether they were independent in activities of daily living (ADLs) or instrumental activities of daily living (IADLs), independent in ADLs or IADLs with equipment assistance, or dependent in ADLs or IADLs. The questions included 6 items for ADLs and 6 items for IADLs. Participants who were

independent in each item received a score of 0. Participants who were dependent in one of the 12 items or needed help received a score of 1 for each item. The score ranged from 0 to 6 for ADLs, and 0 to 6 for IADLs. Participants who received a higher score had a lower functional status. ADLs were categorized as totally independent, dependent in 1 - 5 ADLs, and totally dependent. For bivariate and multivariate analyses, ADLs at admission was dichotomized as dependent in 0 - 5 ADLs and dependent in all 6 ADLs. IADLs were dichotomized likewise.

Source: An admission assessment within 48 hours after admission.

Others: A 6-item daily activity score was adopted from Katz's Index of Independence in activities of daily living. Katz developed this instrument to measure the physical functioning of elderly and chronically ill patients. It has been used as a predictor of the course of illness, needs for care and functional /sociobiological outcomes of chronic diseases. Little formal reliability and validity testing has been reported. Only the Guttman analysis on 100 patients in Sweden yielded coefficients of scalability ranging from 0.74 to 0.88, suggesting that the index forms a successful cumulative scale. In this study, people who needed help or were dependent would receive a score of 1, people who were totally independent received a score of 0.

Instrumental activities of daily living were evaluated with an instrument developed by the researcher in terms of literature for fitting in Taiwanese culture (McDowel & Newell, 1996). Six items of IADLs included

meal preparation, grocery shopping, walking, responsible for own medication administration, handling own finances, and bus riding. "Bus riding" was modified from "transportation" because riding the bus, walking, and taxi riding were the major means of transportation in Taiwan. IADLs were scored in the same manner as ADLs.

2. Level of Consciousness

Type: Independent Variable/Need characteristics/Ordinal

Definition: The investigators assessed patients' consciousness level in terms of a textbook definition (Jarvis, 1996). The possible answers for this were 0-alert, 1-lethargic, 2-obtunded, 3-stupor/semi-coma, and 4-comatose. For bivariate and multivariate analyses, level of consciousness was dichotomized as alert and conscious impairment.

Source: An admission assessment within 48 hours after admission

Other: The definition of consciousness level was adopted from Jarvis (1996). The author defined the consciousness level as five levels. Alert: Awake or readily aroused, oriented, fully aware of external and internal stimuli and responds appropriately, conducts meaningful interpersonal interaction. Lethargic (or Somnolent): Not fully alert, drifts off to sleep when not stimulated, can be aroused to name when called in normal voice but slowly responds appropriately to questions or commands but thinking seems slow and fuzzy, inattentive, loses train of thought, spontaneous movements are decreased. Obtunded: Sleeps most of time, difficult to arouse--needs loud shout or

vigorous shake, acts confused when is aroused, converses in monosyllables, speech may be mumbled and incoherent, requires constant stimulation for even marginal cooperation. Stupor or semi-coma: Spontaneously unconscious, responds to vigorous shake or pain; has appropriate motor response; otherwise can only groan, mumble, or move restlessly; reflex activity persists. Coma: Completely unconscious, no response to pain or to any external and internal stimuli (e.g., when suctioned, does not try to push the catheter away).

3. Cognitive Status: The Short Portable Mental Status Questionnaire (SPMSQ)

Type: Independent Variable/Need characteristics/Ordinal

Definition: SPMSQ addressed participants' cognitive impairment status. Patients were interviewed through ten open-ended questions that covered short-long-term memory, orientation to surroundings, knowledge of current events, and ability to perform mathematic tasks. For example, date, the day of the week, the name of the place, telephone number, age, birthday, president of Taiwan, maiden name, and mathematics. Patients answered questions by themselves. The final score was obtained in terms of the years of education the participant had and the number of errors the participant made in the SPMSQ. The score was categorized to four levels: no cognitive impairment, mild impairment, moderate intellectual impairment, and severe impairment. For bivariate and multivariate analyses, cognitive status was dichotomized as no cognitive impairment and cognitive impairment.

Source: A patient interview within 48 hours after admission

Other: SPMSQ was intended to offer a rapid screen for cognitive deficits. The SPMSQ was modeled on the Mental Status Questionnaire (MSQ). Ten questions were drawn from the MSQ and other tests. The SPMSQ was administered by a clinician in approximately two minutes. The number of errors was counted, with unanswered items treated as errors. For respondents with some high school education, the following criteria were established: 0 to 2 errors = no cognitive impairment, 3 to 4 errors = mild impairment, 5 to 7 = moderate intellectual impairment,, and 8 to 10 errors = severe impairment. Pfeiffer, Johnson, Chiofolo (1981) reported that a critical value "more than four errors" as indicative of " significant impairment." One more error is allowed if the respondent has only a grade school education, and one less error is allowed for those with education beyond high school. Test-retest reliability was between 0.82 and 0.85 in different samples. Criterion Validity was done, the correlation .84 to 0.88 with MSQ. SPMSQ may not be successful in correctly classifying people with mild levels of impairment. This instrument has been translated into Chinese. Cronbach's alpha was 0.81. Test-retest reliability was 90%. The construct validity was also high (Chiu, Chen, Mo, Hsian, Liu, & Huang, 1997).

4. Sensory Deficits

Type: Independent Variable/Need characteristics/Nominal

Definition: This variable addressed patients' hearing and visual ability. The investigator

asked patients "Do you have a hearing problem?" "Do you have visual problems?" The possible answers were none, hearing deficit, visual deficit, and both hearing and visual deficits. For bivariate and multivariate analyses, this variable was dichotomized as no sensory deficits or sensory deficits.

Source: An admission interview within 48 hours after admission.

5. Primary Discharge Diagnosis

Type: Independent Variable/Need characteristics/Nominal

Definition: This variable addressed the primary diagnosis that patients had when they were discharged from the hospital. The ICD-9 code (Appendix L) was adopted to categorize the type of disease (Puckett, 1997). The diagnoses were categorized as neoplasms, circulatory, respiratory, digestive, genitourinary, and other.

Source: A medical record review at discharge

6. Multiple Medical Problems

Type: Independent Variable/Need characteristics/Nominal

Definition: This variable addressed multiple medical problems the patient currently had such as eye disorders, cardiovascular disease, cancer, hearing disorders, gastrointestinal disorders, infectious diseases, pulmonary diseases, cerebrovascular disease, genitourinary disorders, arthritis, alcoholism, diabetes, fractures, hypertension, psychiatric disorders, renal disease, and skin disease. The participants explained how many of these medical problems they had. The answers were categorized as "only one disease" and "more than

one disease."

Source: A patient interview within 48 hours after admission.

7. Need for Discharge Planning

Type Independent Variable/Need characteristics/Nominal

Definition: This variable addressed whether the patient qualified for discharge planning (DP) in terms of the assessment by the primary nurses. The primary nurses assessed patient needs for discharge planning services based on the Discharge Planning Screening Instrument used in the university teaching hospital. This variable was coded yes or no.

Source: A medical record review at discharge

Other: The Discharge Planning Screening Instrument (Appendix C) was developed by the Nursing Department at the university teaching hospital. Primary nurses used this tool to determine if a patient has risks or needs for discharge planning services. The items included in the Screening were: consciousness, daily activities, eating, incontinence, respiratory style, needs for oxygen, nutrition, pressure sore, and pain levels. Patients who were independent in one of these items obtained a low score--0. Patients who were dependent in one of these items obtained the highest score--2. Patients who were dependent in one of these items met the criteria to be transferred to the discharge planner. Patients who had a score of 2 were in need of discharge planning. Additionally, patients who had a trachea tube also qualified for discharge planning services.

HOSPITALIZATION OUTCOMES

1. Length of Stay (LOS)

Type: Intermediate Variable/Hospitalization Outcomes/Ratio

Definition: This variable addressed the number of days that the participant stayed in the hospital. The investigators collected the date of admission and date of discharge from the medical record. The length of hospital stay was calculated by subtracting the day of admission from the day of discharge and adding 1. However, LOS in the university teaching hospital was calculated by subtracting the day of admission from the day of discharge. Therefore, LOS in this study among this study group could be as short as two days based on the hospital's formula. Since LOS was not a normal distribution, the log transformation was adopted instead of original LOS for multivariate analyses.

Source: A medical record review at discharge

2. Hospitalization Costs

Type: Intermediate Variable/Hospitalization Outcomes/Ratio

Definition: Six variables represented hospitalization costs such as total hospitalization costs, average daily hospitalization costs, hospitalization costs paid by the patient, average daily costs paid by the patient, hospitalization costs paid by the government, and daily average hospitalization costs paid by the government. Three types of charges were pulled out from the hospital computer system: hospitalization costs paid by the government, 10% of copayment, and out-of-pocket. For counting total hospitalization costs, the

sum of these three numbers was implemented. For counting average daily hospitalization costs, total hospitalization costs divided by length of stay was calculated. For counting hospitalization costs paid by the patient, sum of 10% copayment and out-of-pocket was implemented. For counting the average daily hospitalization cost paid by the patient, the hospitalization costs paid by patient divided by LOS was implemented. For counting the average hospitalization cost paid by the government, the hospitalization costs paid by the government divided LOS was implemented. The average daily hospitalization cost paid by the government was applied for bivariate and multivariate analyses. The hospitalization costs paid by the patient were applied in multivariate analyses for postdischarge resource use and patient satisfaction with hospital care. All these costs were converted to US dollars by the conversion rate in August 1998. The concerted rate was 34.6876 (International Financial Statistics, 1998).

Participants who had extremely low average daily hospitalization costs (less than U.S. $100) were omitted when running the bivariate and multivariate analyses related to this variable--hospitalization costs. Four participants' average daily hospitalization cost was lower than $100 US dollars. However, the average daily hospitalization cost can not possibly be lower than $100 dollars based on the sum of fees of room, treatment, physician, nursing care, and others. Therefore, four participants were excluded. Finally, 74 participants were included to run statistics related to

this variable.

Source: A medical record review after discharge

PATIENT SATISFACTION WITH HOSPITAL CARE

1. Patient Satisfaction with Hospital Care

Type Intermediate Variable/Patient satisfaction with hospital care/Ratio

Definition: Patient satisfaction addressed the patient's perception and statement about quality of care received while in the hospital. This was documented on a Likert-type scale with "5" being "strongly satisfied" and "1" being "strongly dissatisfied." Patients were asked to complete this 8-item scale two weeks after discharge. Total score for patient satisfaction was calculated by summing all the 8 questions and dividing by eight. The score ranged from 0 to 5. The higher the score a patient had, the greater the satisfaction the patient had. The score for patient satisfaction was categorized to two levels. Patients who had a score less than four were categorized as "not satisfied." Patients who had a score greater than or equal to four were categorized as "satisfied."

Source: A patient interview two weeks after discharge.

POSTDISCHARGE RESOURCE USE

1. Postdischarge Resource Use

Type: Dependent Variable/Postdischarge Resource Use/Nominal

Definition: This variable addressed utilization of health care services, which included ERs , hospitals, nursing homes (NH), and home health care (HHC). Patients were asked to answer the question "Did you use the following health care

services during the two weeks after discharge?" If the patients answered "yes" to one of these four items, the patient was categorized as a user of postdischarge resources. Participants who hired an assistant to help them in daily activities were categorized as a user of home health care.

Source: A postdischarge interview two weeks after discharge

POSTDISCHARGE PATIENT OUTCOMES

1. Improvement in ADLs and IADLs

Type: Dependent Variable/Postdischarge patient outcomes/Ratio

Definition: The items on the functional status scale were the same as the ones used in the admission interview which were described in the Need Characteristics of this section. The same questions were asked to the participants again two weeks after discharge. The researcher summed all ADLs together to achieve a total score of 0 to 6. Participants who had higher scores were considered more impaired in ADLs. Additionally, improvement in ADLs was the score of ADLs at admission subtracted from the score of ADLs two weeks after discharge. This variable was categorized as "improved," "the same," and "worse." For bivariate and multivariate analyses, improvement in ADLs was dichotomized as not improved (including worse and the same) and improved. Improvement in IADLs was dichotomized likewise.

The participants who were totally independent in ADLs were excluded from multivariate logistic regression analyses for improvement in ADLs. Therefore, the number of study population in running multivariate

analyses related this variable was 64. The participants who were totally independent in IADLs were excluded from multivariate logistic regression analyses. Therefore, the total number to run multivariate analyses for this variable was 69.

Source: A patient interview two weeks after discharge.

2. Unmet Needs

Type: Dependent Variable/Postdischarge patient outcomes/Nominal

Definition: This variable addressed patients' unmet needs in daily activities during the two weeks following discharge. The question for this variable was "Do you have someone to help you in the following items when you need help?" The items included 15 items: eating, bathing, toileting, incontinent, transferring, walking, climbing stairs, dressing, taking medication, meal preparation, financial management, bus riding, shopping, obtaining skilled nursing care, and receiving information about care. The 15 items were categorized as ADLs needs, IADLs needs, or other needs. The possible answers for these items were: 1-without help most of the time, 2-without help sometimes, 3-with some help, and 4-always enough help. If a patient answered "without help most of the time" or " without help sometimes" to one of the ADLs, IADLs, and other needs, the patient was referred to as a participant who had unmet needs. This variable was dichotomized as "yes" - participants who had unmet needs in one of these 15 activities, or "no" - participants who did not have any unmet needs.

Source: A patient interview two weeks after discharge.

3. Patient Satisfaction with Care at Home

Type Dependent Variable/Postdischarge patient outcomes/Ordinal

Definition: Patient satisfaction addressed the patient's perception and statement about the care received at home. The question was "Are you satisfied with the care you received at home at this time?" This was documented on a Likert-type scale with "5" being "strongly satisfied" and "1" being "strongly dissatisfied." The higher the score a patient had, the greater the degree of satisfaction the patient had. Owing to the weakness of the measurement, this variable was excluded from bivariate and multivariate analyses.

Source: A patient interview two weeks after discharge.

Data Collection

Data collection involved two interviews. Four investigators who have been educated in nursing were hired to interview the participants. Two investigators did admission interviews, and the other two investigators interviewed participants two weeks after discharge. The postdischarge investigators visited patients together. All of them took a training program which included an introduction to the study, interview skills, and practice interviewing. The detailed description of the investigator training program has been shown in Appendix J.

The investigators went to each unit and reviewed the admission board on Monday, Wednesday, and Friday at 9:00 A.M. to identify patients who were aged 65 years and older in the previously mentioned units. The investigators visited the participants at their bed side

and assessed them based on The Modified Discharge Planning Screening Instrument. If the patient met the criteria for discharge planning services, the investigator read the purpose of the study to them, and asked for their oral agreement. After recruiting the participants, the investigators started to interview the participants about their health status, the previous use of health care services, and demographics. The interviews were completed within 48 hours after their admission. If a patient was admitted on a weekend, the preliminary interviews were as late as 72 hours after admission. Investigators also reviewed the participant's inpatient records to determine the participant's health status from a professional's view point. Then the investigators tracked the participant to know when the participant was discharged. The data collection schedule for each participant was shown in Table 7.

Table 7

Data Collection Schedule per Instrument

Time	Assessment & Interview	Inpatient Chart reviews	Medical Record Reviews
Within 48 - 72 hours after admission	X	X	
Two weeks after discharge	X		X

The investigators called the participants or informal primary caregivers to set a time for interviewing the participants at home approximately two weeks after discharge. Information regarding postdischarge resource use, functional status, unmet needs, and patient satisfaction was obtained. If the participant and the informal primary caregiver could not be

interviewed two weeks after discharge, the interview was conducted as soon as possible. The longest delay was four weeks after discharge. If participants were not able to answer the questions because of physical and mental problems, the informal primary caregiver answered the questions for the participant.

All of the investigators were monitored in the first three cases to ensure the questions were asked similarly to each participant. Ten percent (n = 10) of participants were called after postdischarge interviews to make sure that the participants were visited for this interview. All of these cases said "yes" and they were happy with the interviews. Among the potential participants, only two refused to be interviewed and were dropped from the study.

Data Analyses

Statistical Package for Social Sciences (SPSS) was used for data analyses. First, the data were cleaned to handle missing data and extreme data by univariate analyses. The characteristics of variables were described with frequency distributions. For nominal and ordinal level variables the frequencies were applied to discuss the variables. For ratio level variables the mean, median, mode, standard deviation, and ranges were used to describe the variables (Daniel, 1996).

To test the hypotheses which have been generated to determine the relationships among variables the statistics used were based upon the characteristics of the variables described as follows. Bivariate statistics were used to test the relationships between two variables. If both variables are nominal or ordinal level, a Chi-square test was performed, such as, examining the association between marital status (2-level) and improvement in ADLs (2-level) If one variable is a 2-level nominal or ordinal variable and another variable

is a ratio variable, an independent two samples t-test was performed, such as examining the relationship between living arrangements (a 2-level variable) and length of stay (a ratio variable). If one variable is a 3-level nominal or ordinal variable, one-way ANOVA was performed, to examine the relationship between medical departments (a 4-level variable) and the average daily hospitalization cost paid by the government (a ratio variable).

Multivariate analyses were implemented to examine the relationship between more than two variables. The multivariate models can explore the relationship between an independent variable and a dependent while controlling for the other variables. To use a logistic regression model, the dependent variable was dichotomized and the independent variables were either a 2-level nominal variable or a ratio variable. If the independent variable is a nominal or ordinal variable with more than two levels, the variable was either dichotomized into a 2-level variable or created several dummy variables. For example, an independent variable–nursing units was a 3-level nominal variable. For multivariate analyses, this variable was categorized as two dummy variables. The dependent variable improvement in ADLs was a 3-level ordinal variable. It was dichotomized into a 2-level nominal variable. To use multiple linear regressions, dependent variables were ratio variables and independent variables were either a ratio variable or a 2-level nominal variable. For example, to examine the relationship between LOS and independent variables a multiple linear regression model was applied. LOS (a ratio variable) was a dependent variable. Since it was not normally distributed, a log transformation was applied. Independent variables could be age, ADLs at admission, and a prior hospitalization. Age was a ratio variable for running this multiple linear regression model. ADLs at admission were dichotomized into a 2-level variable.

A prior hospitalization was a 2-level nominal variable.

Correlation was applied to examine the relationship between two ratio variables, such as LOS and the average daily hospitalization costs paid by the government. Correlation was applied either a Pearson's correlation (if normal distribution) or Spearman's correlation (if not normally distributed) depending on the distribution of the variables.

Limitations

1. Self-reported measures were limited to what individuals knew about their situation and what they were willing to disclose.
2. Recall problems might have occurred in this study. Since this was a retrospective study, the patient might not remember all the issues properly.
3. The study population included patients aged 65 and older who had a general medical problem. They were drawn from only one urban university hospital. Participants and the hospital were not selected randomly. The results could not be generalized to all hospitals, all ages, and all patients. A bigger sample size drawn from several hospitals would be more representative.
4. Since data collection for this study required two chart reviews and two patient interviews, patients were tracked from admission to two weeks after discharge. Some patients were lost in the process. Therefore, although it took four months to collect data, the sample size was still very small.
5. Participants were only selected during one month, there may be seasonal fluctuations.

CHAPTER 4

RESULTS

The analyses and results that will be described in this chapter are stated in terms of the hypotheses generated from the Andersen model (Andersen & Newman, 1973; Andersen, 1995; Andersen & Davidson, 1996). Andersen identified population characteristics and environmental factors in order to describe the health behaviors and patient outcomes that served as the foundation of this study. He mentioned that environmental factors, predisposing and enabling factors, and need characteristics can predict a patient's decision to seek health care services, which also directly and indirectly affect health outcomes. Following the analyses of dependent variables, relationships between independent and dependent variables will be described. Multivariate analyses have been implemented to explore the relationships between independent variables and the dependent variables, such as length of stay (LOS), hospitalization costs, patient satisfaction with hospital care, postdischarge resource use, improvement of ADLs, improvement of IADLs, unmet needs, and patient satisfaction with care received at home. The hypotheses identified in Chapter Three have been tested to determine whether the research findings support them. The alpha level for all the hypotheses is set at the .05 level of significance.

The Description of Dependent Variables

Hospitalization Outcomes

Hospitalization outcomes were measured by LOS and hospitalization costs. Four participants who had extremely low hospitalization costs (< U.S. $100 per day) were dropped from analyses. The results are shown in Table 8, the mean LOS in this study population was

13.8 days, with a standard deviation of 13.7. The longest hospital stay was 79 days. The average total hospitalization cost of each admission was U.S. $2,576.9 (*SD* = 3,262.8). The average daily hospitalization cost was U.S. $192.9 (*SD* = 125.2; range = 63.7 to 703.2). The mean hospitalization cost paid by the patient was U.S. $453.8 (*SD* = 558.1; range = 1.01 to 3,214.1), or 17.6% of total hospitalization costs. In other words, the government paid 82.4% of total hospitalization costs for the patient.

Patient Satisfaction with Hospital Care

Patient satisfaction with hospital care was measured by asking patients eight questions regarding hospital care. The questionnaire used was administered to patients during an interview in their homes two weeks after discharge. Satisfaction was measured on a 5-point Likert scale, 1 = total dissatisfaction and 5 = total satisfaction. The mean score for patient satisfaction was 3.7 (*SD* = .5). In other words, the mean degree of patient satisfaction was found between "no opinion" and "somewhat satisfied" (Table 8). However, when patient satisfaction was dichotomized to two levels--a "satisfied" score of greater than or equal to four points and a "not satisfied" score less than four points--only 36.1% of the participants were satisfied with their hospital care. As shown in Table 9, three items of patient satisfaction related to postdischarge care were scored low by participants. The statements used were: "the nurse cared about your questions during the hospitalization regarding your concerns about staying at home after discharge," "the nurse showed you how to take care of yourself at home," and "the nurses showed you how to manage your medications when you were ready to go home."

Table 8

Description of Hospitalization Outcomes and Patient Satisfaction with Hospital Care (N = 74)

Variables	M (SD)	Median	Mode	Range
Length of Stay in Days	13.8 (13.7)	8.5	6.0	2-79
Total Hospitalization Costs[a]	2576.9 (3262.8)	1359.3	150.8	150.8 - 18,490.5
Average Daily Hospitalization Cost[b]	192.9 (125.2)	155.6	96.2	63.7- 703.2
Total Hospitalization Costs Paid by the Patient[c]	453.8 (558.1)	272.4	1.01	1.01-3,214.1
Average Daily Hospitalization Cost Paid by the Patient[d]	36.0 (27.0)	44.1	0.2	.1 - 97.4
Total Hospitalization Costs Paid by the Government	2,123.1 (326.5)	1,067.1	135.2	135.2 - 15,276.4
Average Daily Hospitalization Cost Paid by the Government[e]	145.2 (86.8)	118.2	47.0	47.0 - 443.3
Patient Satisfaction with Hospital Care	3.7 (.5)	3.8	4.0	2.4 - 5.0

[a] Total hospitalization costs = hospitalization costs paid by government + 10% copayment + out-of-pocket

[b] Average daily hospitalization cost = total hospitalization costs / length of stay

[c] Total hospitalization costs paid by the patient = 10% copayment + out-of-pocket

[d] Average daily hospitalization cost paid by the patient = total hospitalization costs paid by the patient/ LOS

[e] Average daily hospitalization costs paid by the government = total hospitalization costs paid by the government/ LOS

Table 9

Frequencies of Each Item of Patient Satisfaction with Hospital Care (N = 72)

Items of Patient Satisfaction	M (SD)	Rank	Satisfied %(n)
Total Patient Satisfaction with Hospital Care[a]	3.7(.5)	---	36.1 (26)
1. The way the nurses showed you how to manage your medications when you were ready to go home.	3.7 (.7)	3	66.2 (47)
2. The nurses showed you how to take care of yourself at home (e.g., diet, follow-up care).	3.6 (.8)	4	62.5 (45)
3. The nurses cared about your questions during the hospitalization regarding your concerns about staying at home after discharge.	3.4 (.8)	5	52.8 (38)
4.You feel you were pushed by the hospital staff to be discharged from the hospital.	3.8 (.9)	2	79.2 (57)
5. Primary nurses understood when you shared your problems	3.8 (.8)	2	77.5 (55)
6. Overall, your pain and other symptoms were reduced during the hospitalization.	3.8 (.8)	2	83.3 (60)
7. Overall, you received the care that you needed during the hospitalization.	3.9 (.5)	1	91.7 (66)
8. Overall, were you satisfied with hospital care?	3.9 (.6)	1	84.7 (61)

[a] Patient satisfaction with hospital care has been defined as the sum of eight items of patient satisfaction divided by 8

Postdischarge Resource Use

Postdischarge resource use was measured as the use of health care services, such as emergency room visits, hospital and nursing home admissions, and home health care use during the two weeks following discharge. Participants who had used one of these services were defined as users of postdischarge services. The results showed that nearly three tenths of the participants (28.6%) used at least one of these health care services during the two weeks after discharge (Table 10). The most frequently used service was home health care which included professional nursing care by home health care agencies or daily care by private assistants.

Postdischarge Patient Health Outcomes

Postdischarge patient health outcomes were measured by improvement in ADLs and IADLs, unmet needs, and patient satisfaction with home care. Improvement in ADLs has been defined as the number of impairments in ADLs two weeks after discharge subtracted from the number of impairments in ADLs at admission to determine the change in the number of impairments in ADLs. The answers were categorized as worse, the same, or better. The definition of improvement in IADLs was the same as improvement in ADLs. Approximately seven tenths (68.8%) of the participants' had improved ADLs, and 40.3% showed improvement in IADLs (Table 11). The individual items of ADLs and IADLs were shown in Table 12. Between 20% to 50% of the participants needed some kind of help in ADLs. The most frequent impairment in ADLs was bathing (50%). Half of the participants needed help and even depended on someone for bathing. The least frequent impairment in ADLs among this population was eating (21.8%). Between 50% to 80% of the participants

needed some kind of help in IADLs. The most frequent impairment in IADLs was cooking (78.2%), followed by bus riding (71.8%) and grocery shopping (68.4%). Over seven tenths of the participants also reported that they needed help in climbing stairs (Table 12). Overall, the participants had more difficulty in IADLs than ADLs.

Unmet needs were defined as patients who needed help in one of the 15 items, but did not receive enough help. The 15 items included 6 items of ADLs, 6 items of IADLs, and 3 items of other needs. The findings showed that 15.7% of participants had an unmet need (Table 11). As shown in Table 12, sixty percent of participants needed help in ADLs and 85.5% needed help in IADLs. The mean number of ADLs with which participants needed help was 2.0; and the mean number of IADLs was 3.8 items. "Other needs" which participants felt they required help with were climbing stairs (71.4%), skilled nursing care (31.6%), and information regarding self-care (16.0%).

The results of this study showed that four items were identified as unmet needs--bathing, climbing stairs, skilled nursing care, and information regrading self-care. In terms of ADLs, most participants received enough help with all activities. However, 2.4% of the participants did not receive enough help in bathing. In terms of IADLs, all the participants received enough help. No one reported that they had any unmet needs in IADLs. Patients with "other needs" that were unmet included (1) 6.7% of the participants who had unmet needs in climbing stairs, (2) 9.1% of the participants who had unmet needs with skilled nursing care, and (3) 75% of the participants who had unmet needs in information about self-care. Most participants felt that they needed more information to know how to take care of themselves.

Table 10

Postdischarge Resource Use during the Two Weeks After Discharge (N = 78)

Variables	% (n)
Emergency Room	12.8 (10)
Hospital	6.4 (5)
Nursing Home[a]	7.7 (6)
Home Health Care[b]	16.9 (13)
Any Postdischarge Resource Use[c]	**28.6 (22)**

[a] Some participants stayed in a nursing home two weeks after discharge

[b] Participants/families who hired assistants to take care of participants treated as using of home health care

[c] Participants who used any one of above services were defined as a user of a postdischarge resource

Table 11

Frequencies of Postdischarge Patient Health Outcomes

Variables	% (n)
Improvement in ADLs (N = 64)	
Worse	10.9 (7)
Same	20.3 (13)
Better	68.8 (44)
Improvement in IADLs (N = 67)	
Worse	23.9 (16)
Same	35.8 (24)
Better	40.3 (27)
Unmet Needs (N = 70)	15.7 (11)
Patient Satisfaction with Care at Home[a] (N = 72)	
Not Satisfied	26.4 (19)
Satisfied	73.6 (53)

[a] The degree of patients' satisfaction with care they received at home during the two weeks after discharge

Table 12

Frequencies of the Participants who Needed Help/Depend on Each Item of Functional Status Two Weeks after Discharge (N = 78)

Variables	% (n)
Activities of Daily Living (ADLs)	
Eating	21.8 (17)
Bathing	50.0 (39)
Toileting	32.1 (25)
Transferring	29.5 (23)
Incontinent	30.8 (24)
Dressing	38.5 (30)
Needing Help in any ADLs	60.3 (47)
Mean number of ADLs (SD)	2.0 (2.3)
Instrumental Activities of Daily Living (IADLs)	
Cooking	78.2 (61)
Handling Medication	58.4 (45)
Handling Finances	60.3 (47)
Walking	47.4 (37)
Riding Bus	71.8 (56)
Grocery Shopping	68.4 (52)
Needing Help in any IADLs	85.5 (65)
Mean number of IADLs (SD)	3.8 (2.3)
Others	
Climbing Stairs	71.4 (55)
Skilled Nursing Care	31.6 (24)
Information[a]	16.0 (12)

[a] Participants felt that they needed information about ways to take care of themselves

Patient satisfaction with care at home was defined as the degree of satisfaction with care received after being discharged home. The 5-point Likert scale was adopted for this variable. As described in the previous sections, 1 = very dissatisfied and 5 = very satisfied. Participants who rated their satisfaction less than four points were categorized as "not satisfied," and those who rated satisfaction greater than or equal to four points were categorized as "satisfied." The findings showed that almost three quarters of the participants (73.6%) were satisfied with the care they received after being discharged (Table 11).

Relationships Among Dependent Variables

As shown in Table 13, the relationships of the eight dependent variables are addressed. The LOS had a significant relationship with postdischarge resource use ($p \leq .001$). In other words, participants who stayed in the hospital longer were more likely to use postdischarge resources. Daily hospitalization costs paid by the government also showed a significant positive relationship with patient satisfaction with care at home ($p \leq .05$). In other words, participants were more likely to be satisfied with care at home when the government paid more for their hospitalization.

Relationships among patient health outcomes are shown in Table 13. Patient satisfaction with hospital care was significantly related to patient satisfaction with care at home ($p \leq .005$). In other words, participants who were more satisfied with hospital care tended to be more satisfied with care at home. Improvement of ADLs and improvement of IADLs showed a significant relationship ($p \leq .001$). Participants who improved in ADLs were also more likely to show improvement in IADLs. Improvement of ADLs and IADLs did not show relationships with LOS, daily hospitalization costs paid by the government,

Table 13

Relationships among Dependent Variables

Daily hospital charge	ns[1]						
Patient satisfaction with hospital care	ns[2]	ns[2]					
Postdischarge resource use	***[2] (+)	ns[2]	ns[3]				
Improvement of ADLs	ns[2]	ns[2]	ns[3]	ns[3]			
Improvement of IADLs	ns[2]	ns[2]	ns[3]	ns[3]	***[3] (+)		
Unmet need	ns[2]	ns[2]	ns[3]	ns[3]	ns[3]	ns[3]	
Patient satisfaction with care at home	ns[2]	*[2] (+)	**[3] (+)	ns[3]	ns[3]	ns[3]	ns[3]
Variables	Length of stay	Daily costs paid by NHI	Patient satisfaction with hospital care	Post-discharge resource use	Improvement of ADLs	Improvement of IADLs	Unmet need

* $p < .05$; ** $p < .005$; *** $p < .001$; ns: no statistical significance

[1] a Pearson's correlation coefficient was applied

[2] a t - test was applied

[3] a Chi square test was applied

(+) a positive relationship

unmet needs, or patient satisfaction ($p > .05$).

Relationships of Independent Variables and Hospitalization Outcomes (Hypothesis A)

Bivariate Analysis - Predisposing Factors and Hospitalization Outcomes

Hospitalization outcomes included two variables: length of stay (LOS) and the average daily hospitalization cost paid by the government. As shown in Table 14, only one variable--age--showed a significant negative relationship with LOS ($p \leq .05$). In other words, participants who were 75 and older stayed in the hospital less time than participants aged 65 to 74 years. Additionally, one variable--gender--was significantly related to daily hospitalization cost paid by the government. The government paid more hospitalization costs for females than males. Hypothesis A1 (participants who were older, male, married, and living alone will be more likely to have longer hospital stays and higher daily hospitalization costs) was rejected.

Bivariate Analysis - Patient-Related Enabling Factors and Hospitalization Outcomes

To understand relationships between patient-related enabling factors and hospitalization outcomes, *t* - tests and one-way ANOVA tests were used. Two variables were not included in the bivariate analyses because of the small number of participants in the groups. For example, only 5.1% of the participants did not have family support, and only 2.1% had been admitted to a nursing home in the past year. Individual income was recategorized from three levels to two levels because of the few number of participants (9.1%) who did not have any income. Therefore, individual income was categorized into two levels for bivariate and multivariate analyses. Family economic status was also recategorized

from three to two levels, since only a few participants (11.5%) achieved median family economic status.

As shown in Table 15, three patient-related enabling factors showed significant relationships with LOS, these were family economic status, prior hospitalization in the past year, and physician visits in the past year ($p \leq .05$). Participants who had median/high family economic status, who were not admitted to a hospital in the past year, and had not visited a physician in the past year were more likely to stay longer in the hospital. In terms of daily hospitalization costs as shown in Table 15, none of the patient-related enabling factors showed a significant relationship ($p \leq .05$). Hypothesis A2 (participants who had little family support, low income, previous utilization of hospital and physician services will be more likely to have longer hospital stays and higher daily hospitalization costs) was partially rejected.

Bivariate Analysis - Provider-Related Enabling Factors and Hospitalization Outcomes

For bivariate and multivariate analyses, two provider-related enabling factors were created as dummy variables. The variable nursing units was recoded into two dummy variables (Unit A & Unit B); "other unit" served as the reference group. The variable medical departments was recoded into three dummy variables (metabolic, respiratory, and neurologic department), "other department" served as the reference group.

As shown in Table 16, only one variable--type of admission--showed a statistical significance with LOS ($p \leq .05$). Participants who were admitted to the hospital via the emergency room had a longer LOS than participants who were admitted from the out-patient department. The other provider-related enabling factors did not show a statistically

significant relationship with LOS.

Two variables, admission source and medical departments, were significantly related to daily hospitalization costs. Participants who were admitted from their own home and by the department of metabolic diseases were more likely to have lower daily hospitalization costs paid by the government. Hypothesis A3 (participants who were admitted to the hospital through the emergency room when the head nurse was off duty will be more likely to have longer hospital stays and higher daily hospitalization costs) was not fully supported by the findings. The variable, type of admission, did have a significant relationship with LOS.

Bivariate Analysis - Need Characteristics and Hospitalization Outcomes

As shown in Table 17, LOS had a significant relationship with four need characteristics: ADLs and IADLs at admission, level of consciousness, and need for discharge planning (DP). Participants who needed help in all six ADLs or IADLs, had consciousness impairment, and need for DP were more likely to have a longer LOS ($p \leq .05$). In terms of daily hospitalization costs paid by the government, ADLs and IADLs at admission and sensory deficits were significant ($p \leq .05$). In other words, participants who were dependent in 0 - 5 ADLs and IADLs and did not have sensory deficits were more likely to have higher daily hospitalization costs. Hypothesis A4 (participants who had functional impairments, low levels of consciousness, poor cognitive status, multiple medical problems, and need for DP services will have longer hospital stays and higher daily hospitalization costs) was not fully supported by the findings. Regarding LOS, the findings supported most of the hypotheses, except cognitive status and multiple medical problems. Average daily hospitalization cost paid by the government, consciousness level, cognitive status, and

multiple medical problems did not have statistically significant relationships with daily hospitalization costs ($p > .05$).

In all, nine independent variables--age (one predisposing factor), family economic status, the use of hospital in the past year, physician visits in the past year (three patient-related enabling factors), type of admission (one provider-related enabling factor), ADLs and IADLs at admission, the level of consciousness, and need for DP (four need characteristics)--had significant relationships with LOS. Six independent variables had relationships with daily hospitalization costs. They were the following: gender (one predisposing factor), admission source, medical departments (two provider-related enabling factors), the level of consciousness, sensory deficits, and need for DP (three need characteristics). None of the patient-related enabling factors had significant relationships with average daily hospitalization costs paid by the government.

Table 14

Relationships of Predisposing Factors with Length of Stay and Daily Hospitalization Costs Paid by the Government (N = 74)

Variables	Length of Stay M (SD)	Daily Hospitalization Costs M (SD)
Age		
65 - 74 years	16.6 (16.5)*	137.8 (70.0)
≥75 years	11.2 (9.9)	152.2 (100.6)
Gender		
Male	12.9 (10.1)	116.4 (52.4)*
Female	14.3 (15.4)	161.8 (98.1)
Marital Status		
Married	13.4 (15.0)	138.4 (80.0)
Widowed & Single	14.2 (12.6)	151.4 (93.0)
Education		
0 - 6 Years	13.5 (13.6)	150.4 (90.6)
> 6 years	7.4 (1.7)	102.9 (52.1)
Living Arrangements		
With Elders or Alone	15.4 (12.8)	144.7 (81.7)
With Families	13.1 (13.8)	148.1 (92.4)
Employment Status		
Never Had a Job	13.4 (17.0)	151.0 (71.7)
Retired or Working	14.1 (12.7)	134.1 (85.9)

* $p \leq .05$ by t - tests were applied

Table 15

Relationships Among Patient-Related Enabling Factors with Length of Stay and Daily Hospitalization Cost Paid by the Government (N = 74)

Variables	Length of Stay M(SD)	Daily Hospitalization Costs M(SD)
Individual Income		
< 9,999 NT	14.1 (14.1)	151.1 (90.8)
≥ 10,000 NT	13.7 (14.0)	137.5 (81.9)
Family Economic Status		
Low	8.6 (4.6)*	143.2 (98.5)
Median & High	12.8 (10.0)	138.0 (82.0)
Use of Emergency Room in the Past Year		
No	16.1 (16.4)	142.7 (84.6)
Yes	12.0 (10.3)	149.4 (90.0)
Use of Hospitals in the Past Year		
No	17.1 (17.2)*	138.4 (75.1)
Yes	11.1 (9.4)	150.7 (95.6)
Use of Home Health Care in the Past Year		
No	14.4 (14.1)	142.3 (85.3)
Yes	7.8 (4.7)	202.8 (106.8)
Use of Physician Services in the Past Year		
No	21.3 (19.8)*	123.2 (44.9)
Yes	12.8 (12.5)	148.3 (90.9)

* $p \leq .05$ by t - tests

Table 16

Relationships Among Provider-Related Enabling Factors with Length of Stay and Average Daily Hospitalization Costs Paid by the Government (N = 74)

Variables	Length of Stay M (SD)	Daily Hospitalization Cost M (SD)
Type of Admission[a]		
ER	15.5 (15.7)**	147.3 (89.3)
OPD	10.1 (6.2)	140.7 (82.6)
Admission Source[a]		
Home	13.3 (13.7)	138.5 (77.7)*
Other	17.8 (13.3)	200.8 (135.7)
Nursing Units[b]		
Unit A	17.9 (11.0)	146.2 (81.0)
Unit B	15.1 (24.4)	130.9 (101.5)
Other Unit	13.1 (11.8)	154.3 (117.9)
Medical Departments[b]		
Metabolic Department	9.6 (4.4)	95.5 (21.6)*
Neurologic Department	10.3 (12.0)	110.5 (42.3)
Respiratory Department	10.1 (5.2)	109.8 (46.6)
Other	16.5 (16.4)	172.9 (100.2)
Head Nurse Duty Schedule[a]		
No	14.5 (12.8)	137.2 (85.8)
Yes	10.6 (9.3)	151.9 (93.0)

* $p \leq .01$; ** $p \leq .005$

[a] a *t* - test has been applied

[b] a one-way ANOVA has been applied

Table 17

Relationships Among Need Characteristics with Length of Stay and Daily Hospitalization Costs Paid by the Government (N = 74)

Variables	Length of Stay M (SD)	Daily Hospitalization Costs M (SD)
Primary Diagnosis[b]		
Neoplasms	16.5 (18.3)	189.2 (111.0)
Circulatory	7.9 (4.4)	174.7 (115.4)
Respiratory	10.9 (5.6)	95.1 (44.6)
Digestive	16.3 (25.8)	139.2 (47.7)
Genitourinary	20.2 (14.6)	149.9 (79.0)
Other	14.3 (12.6)	125.7 (73.6)
ADLs at Admission[a]		
Dependent in 0 - 5 ADLs	11.2 (8.9)****	154.8 (101.2)***
Totally Dependent in 6 ADLs	19.4 (19.4)	125.3 (38.1)
IADLs at Admission[a]		
Dependent in 0 - 5 IADLs	12.2 (9.6)***	149.6 (95.2)*
Totally Dependent in 6 IADLs	17.4 (19.7)	135.5 (64.9)
Level of Consciousness[a]		
Alert	12.4 (11.2)*	148.6 (92.6)
Impairment of Consciousness	22.0 (22.3)	125.9 (35.9)
Cognitive Status[a]		
No impairment	12.6 (9.3)	159.6 (103.1)
Cognitive Impairment	13.2 (14.5)	147.2 (93.3)
Sensory Deficits[a]		
None	13.2 (12.2)	156.9 (99.1)*
Visual and/or Hearing Impairment	8.7 (4.4)	119.4 (35.8)
Multiple Medical Problems[a]		
No	15.2 (17.9)	122.7 (66.3)
Yes	13.1 (11.1)	156.7 (94.1)
Need for Discharge Planning[a]		
No	12.2 (11.1)**	147.5 (94.2)
Yes	23.0 (22.5)	131.3 (37.1)

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .005$; **** $p \leq .001$

[a] a *t* - test has been applied

[b] a one-way ANOVA has been applied

Multivariate Analysis - Independent Variables and Hospitalization Outcomes (Hypothesis B)

Length Of stay. Since length of stay (LOS) was not normally distributed, the log was adopted to transform LOS. One predisposing factor--employment status--was removed from multivariate analyses because the employment status was collinear with gender. The process of building a multiple linear regression model was based on the results of the bivariate analyses. Additionally, each component was put in the regression model to determine if a variable could predict LOS within the component. The results showed that only one variable--ADLs at admission--was a positive predictor of LOS (Table 18). This variable also participated in building linear regression models of LOS. The variables that were hypothesized for the regression model on LOS were also included in building a regression model. These variables were ADLs and IADLs at admissions, the level of consciousness, cognitive status, and multiple medical problems (Hypothesis B1). Owing to multicollinearity, four variables were not put in the model at the same time. They were ADLs and IADLs at admission, the level of consciousness, and need for DP. Because of the small sample, only five independent variables were included in each regression model.

Tables 19, 20, and 21 show three linear regression models of LOS. Three variables--ADLs, IADLs, and need for DP--were included in the models individually. The highest adjusted R^2 (19.5%) was shown in Table 19. Four variables--age, prior hospitalization, the department of neurologic diseases, and ADLs at admission--were the negative predictors of LOS. As shown in Table 21, the need for DP was also a significant predictor of LOS. Yet only three variables showed significance and the adjusted R^2 was 14.1%. Age showed a

marginally significant relationship to LOS. As shown in Table 20, IADLs at admission were not a significant predictor of LOS. Additionally, only two variables showed significance and the *p* value for the entire model was greater than 0.05.

Overall, five variables--age, prior hospitalization, medical department, ADLs at admission, and need for DP--were predictors of LOS. Age, any prior hospitalization, and medical departments were negative predictors of LOS. Participants age 65 to 74 who did not have any hospitalization during the previous year, and were admitted via non-neurologic departments were more likely to have a longer LOS. ADLs at admission and need for DP were positive predictors of LOS. Participants who were totally dependent in all six ADLs and who needed DP were more likely to have a longer LOS. Hypothesis B1 was not fully supported. Only variable--ADLs at admission--was a predictor of LOS.

Average Daily hospitalization costs paid by the government. Since the average daily hospitalization cost paid by the government was not normally distributed, the log of daily hospitalization costs was used for building a multiple linear regression model. The variable medical departments was recoded into three dummy variables, with the "other department" used as the reference group. To build a regression model of daily hospitalization costs paid by the government, each component was put in the regression model individually. The findings showed that one variable, medical departments, was significantly related to the costs (Table 18). The six independent variables which showed significant relationships with the costs in the bivariate analyses were included in building the regression models. The variables included in Hypothesis B2 were ADLs and IADLs at admission, level of consciousness, cognitive status, and multiple medical problems. These were adopted in building the

regression models. The variables were checked for multicollinearity.

The findings are shown in Tables 22, 23, and 24. Medical departments and multiple medical problems were the predictors of daily hospitalization cost paid by the government when gender, sensory deficits, and ADLs at admission were controlled (Table 22). The Taiwanese government paid lower hospitalization costs for participants who were admitted by the department of metabolic diseases, the department of neurologic diseases, and the department of respiratory diseases, and had only one medical problem. The model accounts for 23% of the variability which explains the prediction of daily hospitalization costs paid by the government.

As shown in Table 23 & 24, when IADLs or need for DP were included in the models instead of ADLs at admission, the adjusted R^2 became low, and only one variable--medical departments--was the predictor. The variables included in Hypothesis B2 were functional status, the level of consciousness, cognitive status, and multiple medical problems. Only one variable, multiple medical problems, was supported by the findings (Table 21).

Table 18

Significant Variables for Each Component in Multivariate Analyses

Variables	Predisposing Factors	Patient-Related Enabling Factors	Provider-Related Enabling Factors	Need Characteristics
LOS	None	None	None	**ADLs**
Costs paid by government	None	None	**Medical departments**	None
Patient satisfaction with hospital care	None	None	**Nursing units**	None
Postdischarge Resource Use	**Age (+)**	**ER visits (+)**	None	None
Improvement in ADLs	None	None	**Type of admission** **Admission source** **Medical departments** **Head nurse duty schedule**	**IADLs**
Improvement in IADLs	**Age (-)**	None	**Medical departments**	**Cognitive**
Unmet Needs	None	None	**Medical departments** **Nursing units**	None

Table 19

Multivariate Linear Regression Analysis for LOG Length of Stay (N = 74) (I)

Independent Variables	B (SE)	CI(95%)	Beta	*p*
Age[a]	-.01 (.01)	-.03 ~ -.00	-.23	.033
Use of Hospital in the Past Year[b]	-.23 (.08)	-.38 ~ -.08	-.34	.003
Medical Departments[c]				
Metabolic Department	-.10 (.13)	-.36 ~ .15	-.10	.418
Neurologic Department	-.34 (.12)	-.58 ~ -.11	-.33	.005
Respiratory Department	-.14 (.10)	-.33 ~ .04	-.17	.124
ADLs at Admission[d]	.26 (.08)	.10 ~ .41	.35	.002
Constant	1.91 (.48)	.95 ~ 2.86		.000

[a] Age is measured in years

[b] Use of the hospital in the past year has been dichotomized as 0 = no, 1= yes

[c] Medical departments have been categorized in four levels: 0 = other; 1 = metabolic department; 2 = Neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other departments served as a reference category.

[d] ADLs at admission has been dichotomized as 0 = dependent in 0 - 5 ADLs; 1 = dependent in all 6 ADLs

Adjusted R Square = .195; F = 3.95; Significant F = .002

Table 20

Multivariate Linear Regression Analysis for LOG Length of Stay (N = 74) (II)

Independent Variables	B (SE)	CI(95%)	Beta	*p*
Age[a]	-.01 (.01)	-.02 ~ .01	-.17	.141
Use of Hospital in the Past Year[b]	-.21 (.08)	-.38 ~ -.05	-.31	.010
Medical Departments[c]				
Metabolic Department	-.12 (.14)	-.43 ~ .15	-.10	.383
Neurologic Department	-.28 (.13)	-.53 ~ -.03	-.27	.031
Respiratory Department	-.12 (.10)	- .32 ~ .07	-.15	.211
IADLs at Admission[d]	.08 (.08)	- .09 ~ .25	.10	.372
Constant	1.83 (.53)	.79 ~ 2.88		.001

[a] Age is measured in years

[b] Use of the hospital in the past year has been dichotomized as 0 = no, 1= yes

[c] Medical department has been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other departments served as a reference category.

[d] IADLs at admission have been dichotomized as 0 = dependent in 0 - 5 IADLs; 1 = dependent in all 6 IADLs

Adjusted R Square = .079; F = 2.05; Significant F = .071

Table 21

Multivariate Linear Regression Analysis for LOG Length of Stay (N = 74) (III)

Independent Variables	B (SE)	CI(95%)	Beta	*p*
Age[a]	-.01 (.01)	-.03 ~ .00	-.20	.084
Use of Hospital in the Past Year[b]	-.20 (.08)	-.36 ~ -.04	-.29	.016
Medical Departments[c]				
Metabolic Department	-.10 (.13)	-.37 ~ .17	.09	.451
Neurologic Department	-.30 (.12)	-.55 ~ -.05	.29	.018
Respiratory Department	-.11 (.10)	-.30 ~ .08	.13	.261
Need for DP[d]	.24 (.11)	.02 ~ .46	.25	.031
Constant	2.03 (.51)	1.01 ~ 3.04		.000

[a] Age is measured in years

[b] Use of the hospital in the past year has been dichotomized as 0 = no, 1= yes

[c] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other departments served as a reference category.

[d] Need for discharge planning has been dichotomized as 0 = no; 1 = yes

Adjusted R Square = .141; F = 2.94; Significant F = .013

Table 22

Multivariate Linear Regression Analysis for LOG Hospitalization Cost Paid by the Government (N = 74) (I)

Independent Variables	B (SE)	CI(95%)	Beta	*p*
Gender[a]	.09 (.06)	-.02 ~ .21	.20	.116
Medical Departments[b]				
Metabolic Department	-.25 (.10)	-.45 ~ -.05	-.31	.013
Neurologic Department	-.15 (.08)	-.30 ~ .01	-.23	.063
Respiratory Department	-.16 (.08)	-.31 ~ -.01	-.27	.043
Multiple Medical Problems[c]	.12 (.06)	2.6E-05 ~ .25	.25	.050
ADLs at Admission[d]	-.10 (.07)	-.25 ~ .04	-.19	.148
Sensory Deficits[e]	.05 (.08)	-.12 ~ .21	.08	.563
Constant	2.07 (.12)	1.83 ~ 2.31		.000

[a] Gender coded as 0 = male; 1 = female.

[b] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other departments served as a reference category.

[c] Multiple medical problems have been dichotomized as 0 = no; 1 = yes

[d] ADLs at admission has been dichotomized as 0 = dependent in 0 - 5 ADLs; 1 = dependent in all 6 ADLs

[e] Sensory deficits has been dichotomized as 0 = no deficits; 1 = hearing/vision deficits

Adjusted R Square = .230; F = 3.56; Significant F = .003

Table 23

Multivariate Linear Regression Analysis for LOG Hospitalization Cost Paid by the Government (N = 74) (II)

Independent Variables	B (SE)	CI(95%)	Beta	*p*
Gender[a]	.08 (.06)	-.03 ~ .20	.18	.159
Medical Departments[b]				
Metabolic Department	-.24 (.10)	-.46 ~ -.04	-.30	.018
Neurologic Department	-.18 (.08)	-.33 ~ -.02	-.27	.026
Respiratory Department	-.16 (.08)	-.32 ~ -.01	-.29	.037
Multiple Medical Problems[c]	.10 (.06)	-.02 ~ .22	.20	.109
IADLs at Admission[d]	-.04 (.07)	-.18 ~ .10	-.08	.550
Sensory Deficits[e]	.04 (.09)	-.14 ~ .22	.06	.682
Constant	2.04 (.13)	1.78 ~ 2.29		.000

[a] Gender coded as 0 = male; 1 = female.

[b] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other departments served as a reference category.

[c] Multiple medical problems have been dichotomized as 0 = no; 1 = yes

[d] IADLs at admission have been dichotomized as 0 = dependent in 0 - 5 IADLs; 1 = dependent in all 6 IADLs

[e] Sensory deficits have been dichotomized as 0 = no deficits; 1 = hearing/vision deficits

Adjusted R Square = .204; F = 3.20; Significant F = .007

Table 24

Multivariate Linear Regression Analysis for LOG Hospitalization Cost Paid by the Government (N = 74) (III)

Independent Variables	B (SE)	CI(95%)	Beta	*p*
Gender[a]	.08 (.06)	-.05 ~ .20	.16	.212
Medical Departments[b]				
Metabolic Department	-.24 (.10)	-.45 ~ -.03	-.29	.024
Neurologic Department	-.18 (.08)	-.34 ~ -.02	-.28	.029
Respiratory Department	-.16 (.08)	-.32 ~ -.01	-.29	.042
Multiple Medical Problems[c]	.09 (.06)	-.03 ~ .22	.19	.127
Need for DP[d]	.02 (.10)	-.19 ~ .22	.02	.866
Sensory Deficits[e]	.01 (.08)	-.16 ~ .18	.01	.911
Constant	2.00 (.12)	1.77 ~ 2.24		.000

[a] Gender coded as 0 = male; 1 = female

[b] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other departments served as a reference category.

[c] Multiple medical problems have been dichotomized as 0 = no; 1 = yes

[d] Need for discharge planning has been dichotomized as 0 = no; 1 = yes

[e] Sensory deficits has been dichotomized as 0 = no deficits; 1 = hearing/vision deficits

Adjusted R Square = .193; F = 2.99; Significant F = .011

Relationships of Independent Variables and Patient Satisfaction with Hospital Care (Hypothesis C)

Bivariate Analysis - Predisposing Factors and Patient Satisfaction with Hospital Care

As shown in Table 25, only one predisposing factor, gender, had a significant relationship with patient satisfaction with hospital care ($p \leq .05$). In other words, females were more dissatisfied than males. Other predisposing factors did not show a statistically significant relationship in terms of patient satisfaction with hospital care. Hypothesis C1 (participants who were older, female, well educated, and married will be more likely to have high scores of patient satisfaction with hospital care) was rejected.

Bivariate Analysis - Patient Related Enabling Factors and Patient Satisfaction with Hospital Care

As shown in Table 26, none of the patient-related enabling factors showed a significant relationship in terms of patient satisfaction with hospital care. Hypothesis C2 (participants who had social support, and higher income will be more likely to have high scores of patient satisfaction) was not supported by the findings.

Bivariate Analysis - Provider-Related Enabling Factors and Patient Satisfaction with Hospital Care

Only one provider-related enabling factor--medical departments--had a statistically significant relationship with patient satisfaction with hospital care ($p \leq .05$). Specifically, participants who were admitted by the department of metabolic diseases were more satisfied than participants who were admitted by other departments (Table 27). The other provider-related enabling factors were not related to patient satisfaction with hospital care. Hypothesis

C3 (participants who stayed in different nursing units will be more likely to have different scores of patient satisfaction) was rejected.

Bivariate Analysis - Need Characteristics and Patient Satisfaction with Hospital Care

For bivariate and multivariate analyses, three need characteristics (the level of consciousness, cognitive status, and sensory deficits) were recategorized from four levels to two levels because of the few participants in certain groups. As shown in Table 28, none of the need characteristics was related to patient satisfaction with hospital care. Hypothesis C4 (participants who had functional impairments, multiple medical problems, and need for DP services will be more likely to be satisfied with hospital care) was not supported by the findings.

In all, two independent variables were significantly related to patient satisfaction with hospital care ($p \leq .05$)--gender (predisposing factor) and medical departments (provider-related enabling factor). Other independent variables were not significantly related to patient satisfaction with hospital care.

Multivariate Analysis - Independent Variables and Patient Satisfaction with Hospital Care (Hypothesis D)

To build logistic regression models of patient satisfaction with hospital care, each component was put in the regression model to determine whether a variable could predict patient satisfaction with hospital care within the component. The results showed that only one variable--the nursing unit--was a predictor of patient satisfaction with hospital care (Table 18). The variables (e.g., gender and medical departments) which emerged as significant in the bivariate analyses were also adopted in the regression model. The variables

which were hypothesized for the regression model on patient satisfaction with hospital care were also included in building logistic regression models of patient satisfaction with hospital care. These variables were age, individual income, head nurse on duty schedule, ADLs, IADLs, multiple medical problems, and daily hospitalization costs (Hypothesis D1). Since ADLs and IADLs at admission had a significant relationship with each other, only one of them was put in the model at a time because of multicollinearity. The other two pairs of variables also have this problem--ADLs and need for DP, and IADLs and need for DP. Owing to the size of the study population, only five independent variables were included in each regression model.

The dependent variable--patient satisfaction with hospital care--was dichotomized as satisfied and not satisfied. As shown in Tables 29, 30, and 31, variables emerging as significant were gender and nursing units when LOS, hospitalization costs paid by the patient, ADLs and IADLs at admission, and need for DP were controlled. In other words, male participants were approximately four times more satisfied with hospital care than female participants, and participants who stayed in Unit B were approximately nine times more satisfied than participants who stayed in the other units during hospitalization. Hypothesis D1 was rejected.

Table 25

Relationships among Predisposing Factors and Patient Satisfaction with Hospital Care

(N = 78)

Variables	Not Satisfied %(n)	Satisfied %(n)
Age		
65 - 74 years	58.8 (20)	41.2 (14)
75 years	68.4 (26)	31.6 (12)
Gender*		
Female	73.8 (31)	26.2 (11)
Male	50.0 (15)	50.0 (15)
Marital Status		
Married	59.5 (22)	40.5 (15)
Widowed & Single	68.6 (24)	31.4 (11)
Education		
0 - 6 Years	65.1 (41)	34.9 (22)
> 6 years	71.4 (5)	28.6 (2)
Living Arrangements		
With Elders or Alone	62.5 (10)	37.5 (6)
With Families	63.5 (33)	36.5 (19)
Employment Status		
Never Had a Job	72.7 (16)	27.3 (6)
Retired or Working	52.8 (19)	47.2 (17)

* $p \leq .05$ by using Chi square test

Table 26

Relationships Among Patient-Related Enabling Factors and Patient Satisfaction with Hospital Care[a]

(N = 78)

Variables	Not Satisfied %(n)	Satisfied %(n)
Individual Income		
< 9,999 NT	68.2 (30)	31.8 (14)
≥ 10,000 NT	55.6 (15)	44.4 (12)
Family Economic Status		
Low	54.2 (13)	45.8 (11)
Median & High	64.3 (18)	35.7 (10)
Use of ER in the Past Year		
No	59.4 (19)	40.6 (13)
Yes	69.2 (27)	30.8 (12)
Use of Hospitals in the Past Year		
No	58.1 (18)	41.9 (13)
Yes	68.3 (28)	31.7 (13)
Use of Home Health Care in the Past Year		
No	65.2 (43)	34.8 (23)
Yes	60.0 (3)	40.0 (2)
Use of Physician Services in the Past Year		
No	57.1 (4)	42.9 (3)
Yes	64.6 (42)	35.4 (23)

[a]No significant relationships between any predisposing factors and patient satisfaction with hospital care by using Chi square tests.

Table 27

Relationships Among Provider-Related Enabling Factors and Patient Satisfaction with Hospital Care (N = 78)

Variables	Not Satisfied	Satisfied
Type of Admission		
ER	62.0 (31)	38.0 (19)
OPD	68.2 (15)	31.8 (7)
Admission Source		
Home	65.2 (43)	34.8 (23)
Other	50.0 (3)	50.0 (3)
Nursing Units		
Unit A	66.7 (4)	33.3 (2)
Unit B	33.3 (3)	66.7 (6)
Other Unit	68.4 (39)	31.6 (18)
Medical Departments*		
Metabolic Department	12.5 (1)	87.5 (7)
Neurologic Department	55.6 (5)	44.4 (4)
Respiratory Department	68.8 (11)	31.3 (5)
Other	74.4 (29)	25.6 (10)
Head Nurse Duty Schedule		
No	66.7 (22)	33.3 (11)
Yes	61.1 (22)	38.9 (14)

* $p \leq .01$ by using Chi square tests

Table 28

Relationships between Need Characteristics and Patient Satisfaction with Hospital Care[a] (N= 78)

Variables	Not Satisfied %(n)	Satisfied %(n)
Primary Diagnosis		
Neoplasms	33.3 (2)	66.7 (4)
Circulatory	72.2 (13)	27.8 (5)
Respiratory	81.8 (9)	18.2 (2)
Digestive	62.5 (5)	37.5 (3)
Genitourinary	54.5 (6)	45.5 (5)
Other	56.3 (9)	43.8 (7)
ADLs at Admission		
Dependent in 0 - 5 ADLs	60.0 (30)	40.0 (20)
Totally Dependent in 6 ADLs	72.7 (16)	27.3 (6)
IADLs at Admission		
Dependent in 0 - 5 IADLs	60.8 (31)	39.2 (20)
Totally Dependent in 6 IADLs	71.4 (15)	28.6 (6)
Level of Consciousness		
Alert	63.5 (40)	36.5 (23)
Conscious Impairment	66.7 (6)	33.3 (3)
Cognitive Status		
No Impairment	61.3 (19)	38.7 (12)
Cognitive Impairment	66.7 (14)	33.3 (7)
Sensory Deficit		
None	61.1 (33)	38.9 (21)
Visual and/or Hearing Deficits	75.0 (6)	25.0 (2)
Multiple Medical Problems		
No	63.0 (17)	37.0 (10)
Yes	64.4 (29)	35.6 (16)
Need for Discharge Planning		
No	63.3 (38)	36.7 (22)
Yes	60.0 (6)	40.0 (4)

[a] No significant relationships between any need characteristics and patient satisfaction with hospital care by using Chi square tests.

Table 29

Logistic Regression Analysis for Patient Satisfaction with Hospital Care[a] (I) (N = 74)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Gender[b]	1.43 (.60)	4.16 (1.30 - 13.38)	.016
Nursing Units[c]			
Unit B	2.27 (.98)	9.71 (1.43 - 65.72)	.020
Unit A	-.32 (1.01)	.72 (.10 - 5.27)	.749
ADLs at Admission[d]	.80 (.68)	2.24 (.60 - 8.42)	.234
Length of Stay[e]	1.09 (.85)	3.00 (.57 - 15.92)	.197
Hospitalization Costs paid by The Patient[f]	.57 (.66)	1.76 (.49 - 6.40)	.390

[a] Patient satisfaction with hospital care has been dichotomized as 0 = not satisfied; 1 = satisfied

[b] Gender coded as 0 = female; 1 = male

[c] Nursing units have been categorized as 3 levels: 0 = other; 1 = Unit B; and 2 = Unit A. It has been recategorized as two dummy variables. Zero severed as a reference category.

[d] ADLs at admission has been dichotomized, 0 = depended on 0 - 5 ADLs; 1 = totally dependent in all six ADLs

[e] Length of stay has been dichotomized as 0 = less than 20 days; 1 = more than 21 days

[f] Hospitalization costs paid by the patient has been dichotomized as 0 = more than $455 US; 1 = less than $454 US

* Significant at $p \leq .05$

Table 30

Logistic Regression Analysis for Patient Satisfaction with Hospital Care (II) (N = 74)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Gender[b]	1.43 (.59)	4.18 (1.31 - 13.33)	.016
Nursing Units[c]			
Unit B	2.20 (.96)	9.00 (1.38 - 58.50)	.022
Unit A	-.15 (1.02)	.86 (.11 - 6.28)	.884
IADLs at Admission[d]	.85 (.72)	2.34 (.58 - 9.51)	.234
Length of Stay[e]	1.10 (.86)	3.01 (.56 - 16.18)	.198
Hospitalization Costs Paid by The Patient[f]	.68 (.66)	1.96 (.54 - 7.20)	.308

[a] Patient satisfaction with hospital care has been dichotomized as 0 = not satisfied; 1 = satisfied

[b] Gender coded as 0 = female; 1 = male

[c] Nursing units have been categorized as 3 levels: 0 = other; 1 = Unit B; and 2 = Unit A. It has been recategorized as two dummy variables. Zero severed as a reference category.

[d] IADLs at admission has been dichotomized, 0 = depended on 0 - 5 IADLs; 1 = totally dependent in all six IADLs

[e] Length of stay has been dichotomized as 0 = less than 20 days; 1 = more than 21 days

[f] Hospitalization costs paid by the patient has been dichotomized as 0 = more than $455 US; 1 = less than $454 US

* Significant at $p \leq .05$

Table 31

Logistic Regression Analysis for Patient Satisfaction with Hospital Care[a] (III) (N = 74)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Gender[b]	1.49 (.61)	4.42 (1.35 - 14.48)	.014
Nursing Units[c]			
Unit B	2.13 (.96)	8.46 (1.30 - 55.03)	.026
Unit A	-.36 (1.05)	.70 (.08 - 5.46)	.730
Need for DP[d]	.04 (.94)	1.04 (.17 - 6.55)	.968
Length of Stay[e]	.90 (.85)	2.47 (.47 - 13.10)	.288
Hospitalization Costs paid by The Patient[f]	.60 (.66)	1.82 (.50 - 6.69)	.367

[a] Patient satisfaction with hospital care has been dichotomized as 0 = not satisfied; 1 = satisfied

[b] Gender coded as 0 = male; 1 = female

[c] Nursing units have been categorized as 3 levels: 0 = other; 1 = Unit B; and 2 = Unit A. It has been recategorized as two dummy variables. Zero severed as a reference category.

[d] Need for discharge planning has been dichotomized as 0 = no; 1 = yes

[e] Length of Stay has been dichotomized as 0 = less than 20 days; 1 = more than 21 days

[f] Hospitalization costs paid by the patient has been dichotomized as 0 = more than $455 US; 1 = less than $454 US

* Significant at $p \leq .05$

Relationships Among Independent Variables and Postdischarge Resource Use (Hypothesis E- G)

Bivariate Analysis - Predisposing Factors, Patient and Provider-related Enabling Factors, and Need Characteristics with Postdischarge Resource Use (Hypothesis E)

Two predisposing factors--age and employment status–were significantly related to postdischarge resource use (Table 32). In other words, participants who were older than 75 years were more likely to use postdischarge resources ($p \leq .005$), and participants who never had a job were more likely to use postdischarge resources ($p \leq .05$). The findings supported a portion of Hypothesis E1. The variables which included living status and marital status in Hypothesis E1 were significantly related to postdischarge resource use ($p > .05$).

As shown in Table 33, only one patient-related enabling factor, the use of the ER in the past year, showed a significantly positive relationship with postdischarge resource use ($p \leq .05$). In other words, participants who had visited the ER in the past year were more likely to use postdischarge resources. Other patient-related enabling factors did not show relationships with postdischarge resource use. The findings did not support Hypothesis E2 (participants who had low incomes, no social support, and prior hospitalization will be more likely to use postdischarge resources). Social support was not tested because of the low number of participants without family support.

As shown in Table 34, none of the provider-related enabling factors was significantly related to postdischarge resource use. Hypothesis E3 (participants who were admitted from other institutions via the ER when the head nurse was off duty at that time will be more likely to use postdischarge resources) was rejected.

Two need characteristics--IADLs at admission and need for DP–were significantly related to postdischarge resource use (Table 35). In other words, participants who were dependent in all six IADLs were more likely to use postdischarge resources ($p \leq .01$). Participants who needed discharge planning were more likely to use postdischarge resources ($p \leq .05$). The findings supported a portion of Hypothesis E4. Other variables in Hypothesis E4 did not show significant relationships with postdischarge resources such as primary diagnosis, ADLs at admission, cognitive status, sensory deficits, and multiple medical problems.

Bivariate Analysis - Hospitalization Outcomes and Postdischarge Resource Use (Hypothesis F)

Hospitalization outcomes showed relationships with postdischarge resource use (Table 13). Participants who had a longer LOS were more likely to use postdischarge resources ($p \leq .001$). Participants who had lower daily hospitalization costs paid by the government were more likely to use postdischarge resources. Hypothesis F1 (participants who had longer hospital stays and higher daily hospitalization costs will be more likely to use postdischarge resources) was not fully supported. The relationship between LOS and postdischarge resource use was supported by the findings.

In total, five independent variables and LOS were significantly related to postdischarge resource use. These five variables included age, employment status (two predisposing factors), the use of ER in the past year (one patient-related enabling factor), IADLs at admission, and need for discharge planning (two need characteristics). Other independent variables did not show relationships with postdischarge resource use.

Multivariate Analysis - Independent Variables and Postdischarge Resource Use (Hypothesis G)

The dependent variable, postdischarge resource use, was dichotomized as either yes or no. Variables which were included in the logistic regression model were based on the results of bivariate analyses and Hypothesis G1. The results of the bivariate analyses which showed that significant variables were age, employment status, the use of the ER in the past year, IADLs at admission, and need for DP (Table 32 to 35). The variables which were hypothesized included age, the use of the hospital in the past year, functional status, the level of consciousness, cognitive status, multiple medical problems, and LOS (Hypothesis G1). All variables were checked for multicollinearity.

As shown in Table 36, age and LOS were the predictors of postdischarge resource use when the use of ER, ADLs at admission, and hospitalization costs paid by the patient were controlled. The other model (Table 37) showed that age, IADLs, and LOS were the significant predictors of postdischarge resource use when the use of the ER and the average daily hospitalization cost paid by the patient were controlled. Another model as shown in Table 38, four variables--age, use of ER, need for DP, and LOS--were the significant predictors when the hospitalization costs paid by the patient were controlled.

In total, as shown in Table 36 to 38, five variables were significant predictors of postdischarge resource use: age, IADLs at admission, and LOS when the hospitalization costs paid by the patient were controlled. The use of ER showed a marginal significance in Table 37. Need for DP was significant in Table 38. In other words, participants who were totally dependent in all six IADLs at admission were 7.34 times more likely to use

postdischarge resources than participants who were not totally dependent. Participants who needed DP were 6.90 times more likely to use postdischarge resources than participants who did not meet the criteria for DP. The findings supported a part of Hypothesis G1, age and LOS were the predictors of postdischarge resource use.

Table 32

Relationships Among Predisposing Factors with Postdischarge Resource Use (N = 78)

Variables	No %(n)	Yes %(n)
Age**		
65 - 74 years	84.2 (32)	15.8 (6)
75 years	59.0 (23)	41.0 (16)
Gender		
Female	70.2 (33)	29.8 (14)
Male	73.3 (22)	26.7 (8)
Marital Status		
Married	68.4 (26)	31.6 (12)
Widowed & Single	74.4 (29)	25.6 (10)
Education		
0 - 6 Years	73.1 (49)	26.9 (18)
> 6 years	57.1 (4)	42.9 (3)
Living Arrangements		
With Elders or Alone	76.5 (13)	23.5 (4)
With Families	72.7 (40)	27.3 (15)
Employment Status*		
Never Had a Job	52.0 (13)	48.0 (12)
Retired or Working	75.7 (28)	24.3 (9)

* $p \leq .05$, ** $p \leq .005$ by using Chi square test

Table 33

Relationships Between Patient-Related Enabling Factors and Postdischarge Resource Use (N = 78)

Variables	No %(n)	Yes %(n)
Individual Income		
< 9,999 NT	78.7 (37)	21.3 (10)
≥ 10,000 NT	62.1 (18)	37.9 (11)
Family Economic Status		
Low	79.2 (19)	20.8 (5)
Median & High	71.4 (20)	28.6 (8)
Use of ER in the Past Year*		
No	83.3 (30)	16.7 (6)
Yes	60.0 (24)	40.0 (16)
Use of Hospitals in the Past Year		
No	74.3 (26)	25.7 (9)
Yes	69.0 (29)	31.0 (13)
Use of Home Health Care in the Past Year		
No	72.9 (51)	27.1 (19)
Yes	60.0 (3)	40.0 (2)
Use of Physician Services in the Past Year		
No	66.7 (6)	33.3 (3)
Yes	72.1 (49)	27.9 (19)

* $p \leq .05$ by using Chi square tests

Table 34

Relationships Among Provider-Related Enabling Factors and Postdischarge Resource Use (N = 78)

Variables	No %(n)	Yes %(n)
Type of Admission		
ER	68.5 (37)	31.5 (17)
OPD	78.3(18)	21.7 (5)
Admission Source		
Home	72.5 (50)	27.5 (19)
Other	62.5 (5)	37.5 (3)
Nursing Units		
Unit A	75.0 (6)	25.0 (2)
Unit B	70.0 (7)	30.0 (3)
Other Unit	71.2 (42)	28.8 (17)
Medical Departments		
Metabolic Department	87.5 (7)	12.5 (1)
Neurologic Department	88.9 (8)	11.1 (1)
Respiratory Department	75.0 (12)	25.0 (4)
Other	63.6 (28)	36.4 (16)
Head Nurse Duty Schedule		
No	77.8 (28)	22.2 (8)
Yes	64.9 (24)	35.1 (13)

[a] No significant relationships between any provider-related enabling factors and postdischarge resource use by Chi square tests

Table 35

Relationships Among Need Characteristics and Postdischarge Resource Use (N= 78)

Variables	No %(n)	Yes %(n)
Primary Diagnosis		
Neoplasms	66.7 (4)	33.3 (2)
Circulatory	77.8 (14)	22.2 (4)
Respiratory	63.6 (7)	36.4 (4)
Digestive	66.7 (6)	33.3 (3)
Genitourinary	50.0 (7)	50.0 (7)
Other	88.2 (15)	11.8 (2)
ADLs at Admission		
Dependent in 0 - 5 ADLs	78.4 (40)	21.3 (11)
Totally Dependent in 6 ADLs	57.7 (15)	42.3 (11)
IADLs at Admission**		
Dependent in 0 - 5 IADLs	82.7 (43)	17.3 (9)
Totally Dependent in 6 IADLs	48.0 (12)	52.0 (13)
Level of Consciousness		
Alert	75.4 (49)	24.6 (16)
Conscious Impairment	50.0 (6)	50.0 (6)
Cognitive Status		
No Impairment	83.9 (26)	16.1 (5)
Cognitive Impairment	65.2 (15)	34.8 (8)
Sensory Deficits		
None	76.8 (43)	23.2 (13)
Visual and/or Hearing Deficits	75.0 (6)	25.0 (2)
Multiple Medical Problems		
No	62.1 (18)	37.9 (11)
Yes	77.1 (37)	22.9 (11)
Need for Discharge Planning*		
No	77.0 (47)	23.0 (14)
Yes	42.9 (6)	57.1 (8)

* $p \leq .05$; ** $p \leq .01$ by using Chi square tests

Table 36

Multivariate Logistic Regression Analysis for Postdischarge Resource Use[a] (N = 74) (I)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	1.51 (.72)	4.53 (1.11 - 18.52)	.036
Use of ER[c]	1.05 (.61)	2.86 (.82 - 9.95)	.098
ADLs at Admission[d]	.82 (.90)	2.28 (.69 - 7.49)	.175
LOS[e]	1.91 (.62)	6.78 (1.16 - 39.52)	.033
Hospitalization Costs Paid by the Patient[f]	.07 (.62)	1.07 (.31 - 3.63)	.912

[a] Postdischarge resource use has been dichotomized as 0 = no; 1 = used one of postdischarge resources

[b] Age has been dichotomized as 0 = 65 - 74 years; 1 = older than 75

[c] Use of ER in the past year has been dichotomized as 0 = no; 1 = yes

[d] ADLs at admission have been dichotomized as 0 = dependent in 0 - 5 ADLs; 1 = dependent in all six ADLs

[e] Length of stay has been dichotomized as 0 = less than 20 days; 1 = more than 21 days

[f] Hospitalization costs paid by the patient have been dichotomized as 0 = more than $455 US; 1 = less than $454 US

* Significant at $p \leq .05$

Table 37

Multivariate Logistic Regression Analysis for Postdischarge Resource Use[a] (N = 74) (II)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	1.88 (.80)	6.68 (1.37 - 31.62)	.019
Use of ER[c]	.88 (.69)	2.40 (.63 - 9.22)	.202
IADLs at Admission[d]	1.99 (.70)	7.34 (1.86 - 28.98)	.005
LOS[e]	1.60 (1.12)	4.93 (.55 - 44.29)	.154
Hospitalization Costs Paid by the Patient[f]	.00 (.00)	1.00 (1.00 - 1.00)	.644

[a] Postdischarge resource use has been dichotomized as 0 = no; 1 = used one of postdischarge resources

[b] Age has been dichotomized as 0 = 65 - 74 years; 1 = older than 75

[c] Use of ER in the past year has been dichotomized as 0 = no; 1 = yes

[d] IADLs at admission have been dichotomized as 0 = dependent in 0 - 5 IADLs; 1 = dependent in all six IADLs

[e] Length of stay has been dichotomized as 0 = less than 20 days; 1 = more than 21 days.

[f] Hospitalization costs paid by the patient have been dichotomized as 0 = more than $455 US; 1 = less than $454 US

* Significant at $p \leq .05$

Table 38

Multivariate Logistic Regression Analysis for Postdischarge Resource Use[a] (N = 74) (III)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	1.40 (.74)	4.06 (.95 - 17.41)	.060
Use of ER[c]	1.33 (.71)	3.79 (.95 - 15.17)	.060
Need for DP[d]	1.93 (.88)	6.90 (1.23 - 38.84)	.028
LOS[e]	1.99 (.99)	7.29 (1.05 - 50.53)	.044
Hospitalization Costs Paid by the Patient[f]	.55 (.73)	1.73 (.41 - 7.25)	.451

[a] Postdischarge resource use has been dichotomized as 0 = no; 1 = used one of postdischarge resources

[b] Age has been dichotomized as 0 = 65 - 74 years; 1 = older than 75

[c] Use of ER in the past year has been dichotomized as 0 = no; 1 = yes

[d] Need for discharge planning has been dichotomized as 0 = no; 1 = yes

[e] Length of stay has been dichotomized as 0 = less than 20 days; 1 = more than 21 days

[f] Hospitalization costs paid by the patient have been dichotomized as 0 = more than $455 US; 1 = less than $454 US

* Significant at $p \leq .05$

Relationships among Independent Variables and Postdischarge Patient Outcomes (Hypothesis H - K)

Postdischarge patient health outcomes were measured by improvement of ADLs and IADLs, unmet needs, and patient satisfaction with care at home which will be described as follows:

Bivariate Analysis - Predisposing Factors, Patient and Provider-Related Enabling Factors, and Need Characteristics with Improvement in ADLs (Hypothesis H)

As shown in Table 39, only one variable--employment status--was significantly related to improvement in ADLs. Participants who were retired or who were working were more likely to show improvement in ADLs two weeks after discharge. Hypothesis H1 (participants who were older will be more likely not to show improvement in ADLs) was rejected.

As shown in Table 40, none of the patient-related enabling factors was significantly related to improvement in ADLs. Hypothesis H2 (participants who had no family support will be more likely not to show improvement in ADLs) was not tested because of the lack of participants without family support (5.1%). Hypothesis H3 (participants who had prior hospitalization will be less likely to show improvement in ADLs) was rejected.

As shown in Table 41, one provider-related enabling factor--head nurse's duty schedule–was significantly related to improvement in ADLs ($p \leq .01$). In other words, participants who were admitted while the head nurse was off duty were more likely to show improvement in ADLs (68.6%).

Five need characteristics were significantly related to improvement in ADLs--IADLs

at admission, level of consciousness, cognitive status, sensory deficits, and need for DP (Table 42). In other words, participants who were dependent in 0 to 5 IADLs, alert, and interactive were more likely to show improvement in ADLs. Participants who did not have sensory deficits were more likely to show improvement in their ADLs two weeks after discharge. Participants who needed discharge planning services were more likely to show improvement in ADLs two weeks after discharge, even though no discharge planning services were provided. Although they did not receive discharge planning, their ADLs were improved two weeks after discharge. Hypothesis H4 (participants who had functional, cognitive, and level of consciousness impairment, and sensory deficits will be more likely not to show improvement in ADLs) was not fully supported. The relationships between four variables--IADLs at admission, the level of consciousness, cognitive status, and sensory deficits--and improvement in ADLs were supported.

In total, seven independent variables were significantly related to improvement in ADLs. These variables included type of admission, head nurse on duty schedule (two provider-related enabling factors), IADLs at admissions, the level of consciousness, cognitive status, sensory deficits, and need for DP (five need characteristics). Other independent variables did not show a significant relationship with improvement in ADLs.

Table 39

Relationships Between Predisposing Factors and Improvement in ADLs[a] (N = 64)

Variables	Not Improved %(n)	Improved %(n)
Age		
65 - 74 years	25.0 (7)	75.0 (21)
75 years	36.1 (13)	63.9 (23)
Gender		
Female	35.0 (14)	65.0 (26)
Male	25.0 (6)	75.0 (18)
Marital Status		
Married	32.1 (9)	67.9 (19)
Widowed & Single	30.6 (11)	69.4 (25)
Education		
0 - 6 Years	32.7 (18)	67.3 (37)
> 6 years	16.7 (1)	83.3 (5)
Living Arrangements		
With Elders or Alone	25.0 (3)	75.0 (9)
With Families	31.9 (15)	68.1 (32)
Employment Status*		
Never Had a Job	50.0 (12)	50.0 (12)
Retired or Working	20.0 (6)	80.0 (24)

* $p \leq .05$ by Chi square tests

Table 40

Relationships Between Patient-Related Enabling Factors and Improvement in ADLs[a]

(N = 64)

Variables	Not Improved %(n)	Improved %(n)
Individual Income		
< 9,999 NT	36.8 (14)	63.2 (24)
≥ 10,000 NT	24.0 (6)	76.0 (19)
Family Economic Status		
Low	33.3 (7)	66.7 (14)
Median & High	25.0 (5)	75.0 (15)
Use of ER in the Past Year		
No	25.9 (7)	74.1 (20)
Yes	35.1 (13)	64.9 (24)
Use of Hospitals in the Past Year		
No	33.3 (9)	66.7 (18)
Yes	29.7 (11)	70.3 (26)
Use of Home Health Care in the Past Year		
No	27.6 (16)	72.4 (42)
Yes	60.0 (3)	40.0 (2)
Use of Physician Services in the Past Year		
No	16.7 (1)	83.3 (5)
Yes	32.8 (19)	67.2 (39)

[a] No significant relationships between patient-related enabling factors and improvement in ADLs by using Chi square tests.

Table 41

Relationships Between Provider-Related Enabling Factors and Improvement in ADLs (N = 64)

Variables	Not Improved	Improved
Type of Admission		
ER	26.5 (13)	73.5 (36)
OPD	46.7 (7)	53.3 (8)
Admission Source		
Home	28.1 (16)	71.9 (41)
Other	57.1 (4)	42.9 (3)
Nursing Units		
Unit A	28.6 (2)	71.4 (5)
Unit B	22.2 (2)	77.8 (7)
Other	33.3 (16)	66.7 (32)
Medical Departments		
Metabolic Department	66.7 (4)	33.3 (2)
Neurologic Department	12.5 (1)	87.5 (7)
Respiratory Department	25.0 (3)	75.0 (9)
Other	31.6 (12)	68.4 (26)
Head Nurse Duty Schedule*		
No	17.2 (5)	82.8 (24)
Yes	45.2 (14)	54.8 (17)

* $p \leq .05$ by using Chi square tests

Table 42

Relationships Between Need Characteristics & Improvement in ADLs (N= 64)

Variables	Not Improved %(n)	Improved %(n)
Primary Diagnosis		
Neoplasms	33.1 (1)	66.7 (2)
Circulatory	18.8 (3)	81.3 (13)
Respiratory	40.0 (4)	60.0 (6)
Digestive	12.5 (1)	87.5 (7)
Genitourinary	38.5 (5)	61.5 (8)
Other	41.7 (5)	58.3 (7)
ADLs at Admission		
Dependent in 0 - 5 ADLs	24.3 (9)	75.7 (28)
Totally Dependent in 6 ADLs	40.7 (11)	59.3 (16)
IADLs at Admission***		
Dependent in 0 - 5 IADLs	15.4 (6)	84.6 (33)
Totally Dependent in 6 IADLs	56.0 (14)	44.0 (11)
Level of Consciousness**		
Alert	24.5 (13)	75.5 (40)
Conscious Impairment	63.6 (7)	36.4 (4)
Cognitive Status*		
No Impairment	15.8 (3)	84.2 (16)
Cognitive Impairment	43.5 (10)	56.5 (13)
Sensory Deficits**		
None	20.0 (9)	80.0 (36)
Visual and/or Hearing Deficits	66.7 (4)	33.3 (2)
Multiple Medical Problems		
No	37.5 (9)	62.5 (15)
Yes	27.5 (11)	72.5 (29)
Need for Discharge Planning***		
No	22.4 (11)	77.6 (38)
Yes	69.2 (9)	30.8 (4)

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$ by using Chi square tests

Bivariate Analysis - Predisposing Factors, Patient and Provider-Related Enabling Factors, and Need Characteristics with Improvement in IADLs (Hypothesis H)

As shown in Table 43, only one variable in predisposing factors--age--showed a significant relationship with improvement in IADLs ($p \leq .005$). Participants who were aged 65 to 74 years old were more likely to show improvement in IADLs (57.6%). The findings supported Hypothesis H1 (participants who were older will be more likely not to show improvement in IADLs).

One patient-related enabling factor--individual income-- was significantly related to improvement in IADLs (Table 44). In other words, participants who had a high individual income were more likely to be improved in IADLs. Hypothesis H2 was not tested because of the lack of participants without family support (5.1%). Hypothesis H3 (participants who had a prior hospitalization will be more likely not to show improvement in IADLs) was rejected.

As shown in Table 45, only one variable--medical departments--was significantly related to improvement in IADLs ($p \leq .05$). In other words, participants who were admitted to the hospital by neurologists were more likely to be improved in their IADLs two weeks after discharge.

As shown in Table 46, two need characteristics--cognitive status and need for discharge planning--were significantly related to improvement in IADLs. Participants who did not have cognitive impairment were more likely to be improved in their IADLs (61.5%; $p \leq .001$). Participants who needed discharge planning were more likely to be improved in

their IADLs two weeks after discharge (46.2%; $p \leq .01$).

In all, five independent variables were significantly related to improvement in IADLs. These variables included age (one predisposing factor), individual income (one provider-related enabling factor), medical departments (one provider-related enabling factor), cognitive status, and need for DP (two need characteristics). Other independent variables did not show relationships with improvement in IADLs.

Bivariate Analyses - Predisposing Factors, Patient and Provider-related Enabling Factors, and Need Characteristics with Unmet Needs (Hypothesis I)

As shown in Table 47 to Table 50, only two independent variables--nursing units and head nurse duty schedule--were significantly related to unmet needs. The nursing units were significantly related to unmet needs ($p \leq .001$). Participants who stayed in Unit A were more likely to have unmet needs (71.4%). Participants who stayed in Unit B were 100% free of any unmet needs after being discharged home. Participants who were admitted while the head nurse of the unit was on duty were also less likely to have unmet needs ($p \leq .05$). This finding supported Hypothesis I3 (participants who were admitted to the hospital when the head nurse of the units was off duty will be more likely to have unmet needs). However, other independent variables did not show significant relationships with unmet needs. Hypotheses I1, I2, and I4 were not supported by the findings.

Table 43

Relationships between Predisposing Factors and Improvement n IADLs (N = 67)

Variables	Not Improved %(n)	Improved %(n)
Age*		
65 - 74 years	42.4 (14)	57.6 (19)
75 years	76.5 (26)	23.5 (8)
Gender		
Female	63.4 (26)	36.6 (15)
Male	53.8 (14)	46.2 (12)
Marital Status		
Married	55.9 (19)	44.7 (15)
Widowed & Single	63.6 (21)	36.4 (12)
Education		
0 - 6 Years	61.7 (37)	38.3 (23)
> 6 years	25.0 (1)	75.0 (3)
Living Arrangements		
With Elders or Alone	60.0 (9)	40.0 (6)
With Families	60.4 (29)	39.6 (19)
Employment Status		
Never Had a Job	72.7 (16)	27.3 (6)
Retired or Working	53.1 (17)	46.9 (15)

* $p \leq .005$ by using Chi square tests

Table 44

Relationships Between Patient-Related Enabling Factors and Improvement in IADLs[a]

(N = 67)

Variables	Not Improved %(n)	Improved %(n)
Individual Income*		
< 9,999 NT	69.2 (27)	27.9 (12)
≥ 10,000 NT	44.4 (12)	53.6 (15)
Family Economic Status		
Low	65.0 (13)	35.0 (7)
Median & High	61.5 (16)	38.5 (10)
Use of ER in the Past Year		
No	55.2 (16)	44.8 (13)
Yes	64.9 (24)	35.1 (13)
Use of Hospitals in the Past Year		
No	51.6 (16)	48.4 (15)
Yes	66.7 (24)	33.3 (12)
Use of Home Health Care in the Past Year		
No	60.0 (36)	40.0 (24)
Yes	60.0 (3)	40.0 (2)
Use of Physician Services in the Past Year		
No	71.4 (5)	28.6 (2)
Yes	58.3 (35)	41.7 (25)

* $p \leq .05$ by using Chi square tests

Table 45

Relationships Between Provider-Related Enabling Factors and Improvement in IADLs

(N = 67)

Variables	Not Improved %(n)	Improved %(n)
Type of Admission		
ER	56.3 (27)	43.8 (21)
OPD	68.4 (13)	31.6 (6)
Admission Source		
Home	62.7 (37)	37.3 (22)
Other	37.5 (3)	62.5 (5)
Nursing Units		
Unit A	62.5 (5)	37.5 (3)
Unit B	70.0 (7)	30.0 (3)
Other	57.1 (28)	42.9 (21)
Medical Departments*		
Metabolic Department	87.5 (7)	12.5 (1)
Neurologic Department	22.2 (2)	77.8 (7)
Respiratory Department	66.7 (8)	33.3 (4)
Other	60.5 (23)	39.5 (15)
Head Nurse Duty Schedule		
No	54.8 (17)	45.2 (14)
Yes	68.8 (22)	31.3 (10)

* $p \leq .05$ by using Chi square tests

Table 46

Relationships Between Need Characteristics & Improvement in IADLs (N= 67)

Variables	Not Improved %(n)	Improved %(n)
Primary Diagnosis		
Neoplasms	80.0 (4)	20.0 (1)
Circulatory	46.7 (7)	53.3 (8)
Respiratory	75.0 (6)	25.0 (2)
Digestive	75.0 (6)	25.0 (2)
Genitourinary	64.3 (9)	35.7 (5)
Other	46.7 (7)	53.3 (8)
ADLs at Admission		
Dependent in 0 - 5 ADLs	56.8 (25)	43.2 (19)
Totally Dependent in 6 ADLs	65.2 (15)	34.8 (8)
IADLs at Admission		
Dependent in 0 - 5 IADLs	53.5 (23)	46.5 (20)
Totally Dependent in 6 IADLs	70.8 (17)	29.2 (7)
Level of Consciousness		
Alert	56.1 (32)	43.9 (25)
Conscious Impairment	80.0 (8)	20.0 (2)
Cognitive Status**		
No Impairment	38.5 (10)	61.5 (16)
Cognitive Impairment	86.4 (19)	13.5 (3)
Sensory Deficits		
None	55.0 (27)	44.9 (22)
Visual and/or Hearing Deficits	57.1 (4)	42.9 (3)
Multiple Medical Problems		
No	67.9 (19)	32.1 (9)
Yes	53.8 (21)	46.2 (18)
Need for Discharge Planning*		
No	53.8 (28)	46.2 (24)
Yes	84.6 (11)	15.4 (2)

* $p \leq .01$; ** $p \leq .001$ by using Chi square tests

Table 47

Relationships Between Predisposing Factors and Unmet Needs[a] (N = 78)

Variables	No %(n)	Yes %(n)
Age		
65 - 74 years	85.3 (29)	14.7 (5)
75 years	83.3 (30)	16.7 (6)
Gender		
Female	83.7 (36)	16.3 (7)
Male	85.2 (23)	14.8 (4)
Marital Status		
Married	90.9 (30)	9.1 (3)
Widowed & Single	78.4 (29)	21.6 (8)
Education		
0 - 6 Years	83.6 (51)	16.4 (10)
> 6 years	100.0 (6)	0
Living Arrangements		
With Elders or Alone	86.7 (13)	13.3 (2)
With Families	82.0 (41)	18.0 (9)
Employment Status		
Never Had a Job	87.0 (20)	13.0 (3)
Retired or Working	85.3 (29)	14.7 (5)

[a] No significant relationships between predisposing factors and unmet needs by Chi square tests

Table 48

Relationships Between Patient-Related Enabling Factors and Unmet Needs[a] (N = 78)

Variables	No %(n)	Yes %(n)
Individual Income		
< 9,999 NT	82.2 (37)	17.8 (8)
≥ 10,000 NT	87.5 (21)	12.5 (3)
Family Economic Status		
Low	81.8 (18)	18.2 (4)
Median & High	85.7 (24)	14.3 (4)
Use of ER in the Past Year		
No	80.6 (25)	19.4 (6)
Yes	87.2 (34)	12.8 (5)
Use of Hospitals in the Past Year		
No	79.3 (23)	20.7 (6)
Yes	97.8 (36)	12.2 (5)
Use of Home Health Care in the Past Year		
No	84.4 (54)	15.6 (10)
Yes	80.0 (4)	20.0 (1)
Use of Physician Services in the Past Year		
No	100.0 (8)	0
Yes	82.3 (51)	17.7 (11)

[a] No significant relationships between patient-related enabling factors and unmet needs by Chi square tests

Table 49

Relationships Among Provider-Related Enabling Factors and Unmet Needs (N = 78)

Variables	No %(n)	Yes %(n)
Type of Admission		
ER	86.4 (44)	13.7 (7)
OPD	78.9 (15)	21.1 (4)
Admission Source		
Home	84.1 (53)	15.9 (10)
Other	85.7 (6)	14.3 (1)
Nursing Units**		
Unit A	28.6 (2)	71.4 (5)
Unit B	100.0 (9)	0
Other Unit	88.9 (48)	11.1 (6)
Medical Departments		
Metabolic Department	71.4 (5)	28.6 (2)
Neurologic Department	85.7 (6)	14.3 (1)
Respiratory Department	73.3 (11)	26.7 (4)
Other	90.2 (37)	9.8 (4)
Head Nurse Duty Schedule*		
No	75.8 (25)	24.2 (8)
Yes	97.0 (32)	3.0 (1)

* $p < .05$, ** $p \leq .001$ by using Chi square tests

Table 50

Relationships Among Need Characteristics and Unmet Needs[a] (N= 78)

Variables	No %(n)	Yes %(n)
Primary Diagnosis		
Neoplasms	75.0 (3)	25.0 (1)
Circulatory	93.3 (14)	6.7 (1)
Respiratory	81.8 (9)	18.2 (2)
Digestive	100.0 (8)	0
Genitourinary	85.7 (12)	14.3 (2)
Other	68.8 (11)	31.3 (5)
ADLs at Admission		
Dependent in 0 - 5 ADLs	84.1 (37)	15.9 (7)
Totally Dependent in 6 ADLs	84.6 (22)	15.4 (4)
IADLs at Admission		
Dependent in 0 - 5 IADLs	84.1 (37)	15.9 (7)
Totally Dependent in 6 IADLs	84.6 (22)	15.4 (4)
Level of Consciousness		
Alert	84.5 (49)	15.5 (9)
Conscious Impairment	83.3 (10)	16.7 (2)
Cognitive Status		
Interactive Functioning	88.5 (23)	11.5 (3)
Cognitive Impairment	78.3 (18)	21.7 (5)
Sensory Deficits		
None	83.7 (41)	16.7 (8)
Visual and/or Hearing Deficits	75.0 (6)	25.0 (2)
Multiple Medical Problems		
No	84.6 (22)	15.4 (4)
Yes	84.1 (37)	15.9 (7)
Need for Discharge Planning		
No	79.6 (43)	20.4 (11)
Yes	100.0 (14)	0

[a] No significant relationships between need characteristics and unmet needs by Chi square tests

Bivariate Analysis - Predisposing Factors, Patient and Provider-Related Enabling Factors, and Need Characteristics with Patient Satisfaction with Care at Home (Hypothesis J)

Patient satisfaction with care at home was measured by one question: Overall, were you satisfied with the care you receive at home at this time? This question did not specify what kind of care patients received. Examples of the type of care they might receive informal care, private assistant care, home health care, and others. In addition, only one question was included to measure this variable. Owing to these weaknesses of the measurement of patient satisfaction with care at home, this variable was not tested in the bivariate and multivariate analyses.

Multivariate Analysis - Independent Variables and Postdischarge Patient Outcomes (Hypothesis K)

The dependent variable--improvement in ADLs--was dichotomized as improved and not improved. To build logistic regression models of improvement in ADLs, each component was put in the regression model to determine whether a variable could predict improvement in ADLs within the component. The results showed that four variables--type of admission, admission source, medical departments, and head nurse on duty schedule--significantly predicted improvement in ADLs (Table 18). The seven variables were significantly related to improvement of ADLs in bivariate analyses, such as the employment status, head nurse on duty schedule, IADLs at admissions, level of consciousness, cognitive status, sensory deficits, and need for DP. These variables were included in building the logistic regression models of improvement in ADLs. The variables which were hypothesized for improvement of ADLs included age, the use of the hospital in the past year, ADLs and IADLs at

admission, primary diagnosis, the level of consciousness, sensory deficits, and multiple medical problems (Hypothesis K1). These variables were tested in the logistic regression model, but they were not all put in the model at the same time. Only five independent variables were put in each logistic regression model. Regarding multicollinearity, the variables which were not put in at the same time to build logistic regression models included ADLs and IADLs at admission and need for DP.

As shown in Table 51, the four variables--type of admission, admission source, head nurse on duty schedule, and the department of metabolic diseases--were the significant predictors of improvement in ADLs when ADLs at admissions were controlled. The other model shown in Table 52 demonstrated that although head nurse on duty schedule did not show a significant prediction with improvement in ADLs, IADLs at admission was a predictor of improvement in ADLs. Another model shown in Table 53 includes five variables--type of admission, admission source, head nurse on duty schedule, medical departments, and need for DP--were predictors of improvement in ADLs. In total, six variables were predictors of improvement in ADLs. These variables included four provider-related enabling factors and two need characteristics. Hypothesis K1 was not fully supported. Only one variable--IADLs at admission--was a significant predictor of improvement in ADLs.

The dependent variable, improvement in IADLs, has been dichotomized as improved or not improved. To build logistic regression models of improvement in IADLs, each component was put in the regression model to determine whether a variable can predict improvement in IADLs within the component. The results are shown in Table 18, three

variables--age, medical departments, and cognitive status--were significantly related to improvement in IADLs. The five variables were significantly related to improvement of ADLs in the bivariate analyses, which were age, individual income, medical departments, cognitive status, and need for DP. The variables which included age, the use of the hospital in the previous year, ADLs and IADLs at admission, primary diagnosis, the level of consciousness, sensory deficits, and multiple medical problems were hypothesized for the prediction of improvement in IADLs (Hypothesis K1). These variables were included in building the logistic regression models. The variables which may cause multicollinearity included ADLs and IADLs at admission and need for DP were not included in building logistic regression models at the same time.

As shown in Table 54, age was a predictor of improvement in IADLs. Individual income and the department of neurologic diseases showed a marginal significance. As shown in Table 55, age was a significant predictor when individual income, type of admission, medical departments, and IADLs were controlled. Yet individual income showed a marginal significance. As shown in Table 56, individual income and need for DP were the significant predictors when age, type of admission, and medical departments were controlled. Yet hospitalization in the department of neurologic diseases was a marginally significant predictor. Regarding these three models, the four variables--age, individual income, the department of neurologic diseases, and need for DP--were the predictors of improvement in IADLs. Hypothesis K1 was not fully supported. Only age was a predictor of improvement of IADLs.

The dependent variable--unmet needs--has been dichotomized as either yes or no. To

build logistic regression models of unmet needs, each component was put in a regression model to determine whether a variable could predict unmet needs within the component. The results were shown in Table 18, medical departments and nursing units showed significance in predicting unmet needs. Two variables--nursing units and head nurse duty schedule--showed a relationship with unmet needs in the bivariate analyses. The variables which were hypothesized for prediction of unmet needs included age, ADLs and IADLs at admission, and cognitive status. These variables were included in building logistic regression models. The variables which may cause multicollinearity were not included at the same time to build a regression model.

As shown in Tables 57, 58, and 59, the variable--nursing units--was the only significant predictor when age, the use of hospital, head nurse on duty schedule, ADLs and IADLs at admission, and need for DP were controlled. In other words, participants who stayed in Unit A were approximately 9 to 11 times more likely to have an unmet need than participants who stayed in the other units. The findings of these three models rejected Hypothesis K2. Hypothesis K3 was not tested because of the weakness of the measurement with the variable--patient satisfaction with care at home.

In summary, regarding the Andersen model, two predisposing factors, three patient-related enabling factors, all of the provider-related enabling factors, and four need characteristics were significant predictors of hospitalization outcomes, resource use, or patient health outcomes. Provider-related enabling factors were strong predictors of hospitalization outcomes and patient health outcomes, but not postdischarge resource use.

Table 51

Logistic Regression Analysis for Improvement in ADLs[a] (N = 64) (I)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Type of Admission[b]	1.96 (.85)	7.10 (1.34 - 37.64)	.021
Admission Source[c]	2.55 (1.12)	12.78 (1.42 - 114.80)	.023
Head Nurse Duty Schedule[d]	1.61 (.79)	5.02 (1.06 - 23.71)	.042
Medical Departments[e]			
Metabolic Department	-2.67 (1.23)	.07 (.01 - .77)	.030
Neurologic Department	1.19 (1.43)	3.29 (.20 - 55.05)	.407
Respiratory Department	.50 (.93)	1.65 (.27 - 10.15)	.590
ADLs at Admission[f]	1.09 (.76)	2.97 (.66 - 13.26)	.154

[a] Improvement of ADLs has been dichotomized as 0 = not improved; 1 = improved

[b] Type of admission has been dichotomized as 0 = OPD; 1 = ER

[c] Admission source has been dichotomized as 0 = other; 1 = home

[d] Head nurse on duty schedule has been dichotomized as 0 = on duty; 1 = off duty

[e] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other department served as a reference category.

[f] ADLs at admission have been dichotomized 0 = dependent in all six ADLs; 1 = dependent in 0 - 5 ADLs

* Significant at $p \leq .05$

Table 52

Logistic Regression Analysis for Improvement in ADLs[a] (N = 64) (II)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Type of Admission[b]	2.52 (1.05)	12.44 (1.59 - 97.37)	.016
Admission Source[c]	2.28 (1.22)	9.83 (.91 - 106.83)	.060
Head Nurse Duty Schedule[d]	.83 (.88)	2.29 (.41 - 12.96)	.348
Medical Departments[e]			
Metabolic Department	-3.65 (1.39)	.03 (.00 - .39)	.008
Neurologic Department	1.30 (1.64)	3.69 (.15 - 91.99)	.426
Respiratory Department	.47 (.97)	1.60 (.24 - 10.60)	.628
IADLs at Admission[f]	2.68 (1.01)	14.62 (2.03 - 105.20)	.007

[a] Improvement of ADLs has been dichotomized as 0 = not improved; 1 = improved

[b] Type of admission has been dichotomized as 0 = OPD; 1 = ER

[c] Admission source has been dichotomized as 0 = other; 1 = home

[d] Head nurse on duty schedule has been dichotomized as 0 = on duty; 1 = off duty

[e] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other department served as a reference category.

[f] IADLs at admission have been dichotomized 0 = dependent in all six IADLs; 1 = dependent in 0 - 5 IADLs

* Significant at $p \leq .05$

Table 53

Logistic Regression Analysis for Improvement in ADLs[a] (N = 64) (III)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Type of Admission[b]	1.04 (.87)	5.46 (.99 - 30.02)	.051
Admission Source[c]	2.33 (1.15)	10.29 (1.07 - 98.72)	.043
Head Nurse Duty Schedule[d]	1.72 (.81)	5.60 (1.14 - 27.32)	.034
Medical Departments[e]			
Metabolic Department	-2.89 (1.30)	.06 (.00 - .71)	.026
Neurologic Department	1.32 (1.60)	3.76 (.16 - 86.53)	.408
Respiratory Department	.18 (.93)	1.20 (.20 - 7.35)	.846
Need for DP[f]	2.05 (.88)	7.80 (1.39 - 43.78)	.020

[a] Improvement of ADLs has been dichotomized as 0 = not improved; 1 = improved

[b] Type of admission has been dichotomized as 0 = OPD; 1 = ER

[c] Admission source has been dichotomized as 0 = other; 1 = home

[d] Head nurse duty schedule has been dichotomized as 0 = on duty; 1 = off duty

[e] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other department served as a reference category.

[f] Need for discharge planning has been dichotomized as 0 = yes; 1 = no

* Significant at $p \leq .05$

Table 54

Logistic Regression Analysis for Improvement in IADLs[a] (N = 67) (I)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	1.23 (.60)	3.44 (1.07 - 11.10)	.039
Individual Income[c]	1.07 (.60)	2.92 (.91 - 9.40)	.072
Type of Admission[d]	.35 (.69)	1.42 (.37 - 5.54)	.609
Medical Departments[e]			
Metabolic Department	-1.24 (1.21)	.29 (.03 - 3.11)	.306
Neurologic Department	1.69 (.98)	5.40 (.79 - 36.86)	.085
Respiratory Department	.02 (.77)	1.02 (.23 - 4.65)	.978
ADLs at Admission[f]	.37 (.63)	1.16 (.34 - 5.00)	.561

[a] Improvement in IADLs has been dichotomized as 0 = not improved; 1 = improved

[b] Age has been dichotomized as 0 = more than 75 year; 1 = 64 to 75 year

[c] Individual income has been dichotomized as 0 = less than 9,999 NT; 1 = more than 10,000 NT

[d] Type of admission has been dichotomized as 0 = OPD; 1 = ER

[e] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other department served as a reference category.

[f] ADLs at admission have been dichotomized 0 = totally dependent in all six ADLs; 1 = dependent in 0 - 5 ADLs

* Significant at $p \leq .05$

Table 55

Logistic Regression Analysis for Improvement in IADLs[a] (N = 67) (II)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	1.29 (.61)	3.62 (1.10 - 11.93)	.035
Individual Income[c]	1.03 (.60)	2.81 (.88 - 9.08)	.085
Type of Admission[d]	.48 (.72)	1.62 (.40 - 6.60)	.502
Medical Departments[e]			
Metabolic Department	-1.41 (1.22)	.25 (.02 - 2.70)	.251
Neurologic Department	1.55 (1.00)	4.72 (.66 - 33.72)	.121
Respiratory Department	.25 (.81)	1.28 (.26 - 6.25)	.759
IADLs at Admission[f]	.88 (.65)	2.38 (.66 - 8.58)	.185

[a] Improvement in IADLs has been dichotomized as 0 = not improved; 1 = improved

[b] Age has been dichotomized as 0 = more than 75 year; 1 = 64 to 75 year

[c] Individual income has been dichotomized as 0 = less than 9,999 NT; 1 = more than 10,000 NT

[d] Type of admission has been dichotomized as 0 = OPD; 1 = ER

[e] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other department served as a reference category.

[f] IADLs at admission have been dichotomized 0 = dependent in all six IADLs; 1 = dependent in 0 - 5 IADLs.

* Significant at $p \leq .05$

Table 56

Logistic Regression Analysis for Improvement in IADLs[a] (N = 67) (III)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	.91 (.65)	2.49 (.70 - 8.81)	.158
Individual Income[c]	1.43 (.64)	4.17 (1.18 - 14.70)	.026
Type of Admission[d]	.20 (.73)	1.22 (.29 - 5.05)	.788
Medical Departments[e]			
Metabolic Department	-1.52 (1.23)	.22 (.02 - 2.44)	.218
Neurologic Department	1.89 (1.07)	6.64 (.81 - 54.57)	.078
Respiratory Department	-.09 (.81)	.82 (.19 - 4.50)	.916
Need for DP[f]	2.08 (.99)	7.97 (1.15 - 55.32)	.036

[a] Improvement in IADLs has been dichotomized as 0 = not improved; 1 = improved

[b] Age has been dichotomized as 0 = more than 75 year; 1 = 64 to 75 year

[c] Individual income has been dichotomized as 0 = less than 9,999 NT; 1 = more than 10,000 NT.

[d] Type of admission has been dichotomized as 0 = OPD; 1 = ER

[e] Medical departments have been categorized as four levels: 0 = other; 1 = metabolic department; 2 = neurologic department; and 3 = respiratory department. It has been recategorized as three dummy variables. Other department served as a reference category.

[f] Need for discharge planning has been dichotomized 0 = yes; 1 = no

* Significant at $p \leq .05$

Table 57

Logistic Regression Analysis for Unmet Needs[a] (N = 78) (I)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	1.12 (.97)	3.08 (.46 - 20.77)	.248
Use of Hospital[c]	.30 (.91)	1.34 (.23 - 7.98)	.746
Nursing Units[d]			
Unit B	-7.19 (32.96)	.00 (0- 8.61E+24)	.827
Unit A	2.44 (1.10)	11.51 (1.34 - 98.96)	.026
Head Nurse Duty Schedule[e]	2.10 (1.30)	8.18 (.64 - 103.86)	.105
ADLs at Admission[f]	.33 (1.09)	1.39 (.16 - 11.82)	.763

[a] Unmet needs have been dichotomized as 0 = no unmet need; 1 = having an unmet need

[b] Age has been dichotomized as 0 = 64 to 75 year; 1 = more than 75 year

[c] Use of the hospital in the past year has been dichotomized as 0 = yes; 1 = no

[d] Nursing units have been categorized as 3 levels: 0 = other; 1 = Unit B; and 2 = Unit A. It has been recategorized as two dummy variables. Other unit served as a reference category.

[e] Head nurse duty schedule has been dichotomized as 0 = on duty; 1 = off duty

[f] ADLs at admission have been dichotomized 0 = dependent in 0 - 5 ADLs; 1 = totally dependent in all six ADLs

* Significant at $p \leq .05$

Table 58

Logistic Regression Analysis for Unmet Needs[a] (N = 78) (II)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	1.44 (1.07)	4.22 (.51 - 34.88)	.181
Use of Hospital[c]	.29 (.90)	1.34 (.23 - 7.84)	.749
Nursing Units[d]			
Unit B	-7.00 (32.93)	.00 (0- 9.82E+24)	.831
Unit A	2.30 (1.11)	9.96 (1.13 - 87.65)	.038
Head Nurse Duty Schedule[e]	2.80 (1.55)	16.37 (.79 - 340.03)	.070
IADLs at Admission[f]	1.21 (1.24)	3.36 (.30 - 38.17)	.328

[a] Unmet needs have been dichotomized as 0 = no unmet need; 1 = having an unmet need

[b] Age has been dichotomized as 0 = 64 to 75 year; 1 = more than 75 year

[c] Use of the hospital in the past year has been dichotomized as 0 = yes; 1 = no

[d] Nursing units have been categorized as 3 levels: 0 = other; 1 = Unit B; and 2 = Unit A. It has been recategorized as two dummy variables. Other unit served as a reference category.

[e] Head nurse on duty schedule has been dichotomized as 0 = on duty; 1 = off duty

[f] IADLs at admission have been dichotomized 0 = depended on 0 - 5 IADLs; 1 = totally dependent in all six IADLs

* Significant at $p \leq .05$

Table 59

Logistic Regression Analysis for Unmet Needs[a] (N = 78) (III)

Independent Variables	B (SE)	Odds Ratio (CI)	*p*
Age[b]	.97 (1.07)	2.63 (.32 - 21.35)	.248
Use of Hospital[c]	1.00 (1.03)	2.71 (.36 - 20.21)	.746
Nursing Units[d]			
Unit B	-9.38 (86.43)	.00 (0- 3.14E+69)	.827
Unit A	10.68 (56.07)	43669.48 (0 - 2.32E+52)	.026
Head Nurse Duty Schedule[e]	1.88 (1.24)	6.58 (.58 - 74.40)	.105
Need for DP[f]	18.32 (81.81)	90589448 (0- 3.95E+77)	.763

[a] Unmet needs have been dichotomized as 0 = no unmet need; 1 = having an unmet need

[b] Age has been dichotomized as 0 = 64 to 75 year; 1 = more than 75 year

[c] Use of the hospital in the past year has been dichotomized as 0 = yes; 1 = no

[d] Nursing units have been categorized as 3 levels: 0 = other; 1 = Unit B; and 2 = Unit A. It has been recategorized as two dummy variables. Other unit served as a reference category.

[e] Head nurse duty schedule has been dichotomized as 0 = on duty; 1 = off duty

[f] Need for discharge planning has been dichotomized 0 = yes; 1 = no

* Significant at $p \leq .05$

CHAPTER 5

DISCUSSION, RECOMMENDATIONS, AND CONCLUSIONS

The size of the older adult population with multiple medical problems has increased rapidly in the country of Taiwan. The medical costs associated with service use can quickly become a financial burden for both the government and the family of older adults. Understanding how services are used and the effect of these services on the health status of the older adult can contribute to better quality care for these consumers and reduce medical costs for both Taiwanese older patients and the government.

This study looked at the use of hospital services and postdischarge resource use to address this issue. A model commonly used to evaluate a population's resource use and their health status is the Andersen model. This model evaluates a person's health status and resource use based on characteristics of the individual and/or a facility. Results can help health care professionals to understand the use of health care services and the effects on the patient's health status after using the services. Health care professionals can also examine the effects of characteristics of a Taiwanese older adult and/or a facility on post-hospital resource use and the change of health status. These will help health care professionals provide better quality care for Taiwanese older adults.

Variables selected to represent characteristics of Taiwanese older adults and hypotheses identified in Chapter Three were formulated in terms of the Andersen model and a literature review. The results of testing the hypotheses have been listed in Table 60. Although the results showed that the variables selected for this study did not fully describe the Andersen model, some results supported the Andersen model. Fourteen out of 25

characteristics of patients or of the facility could predict patient health outcomes and/or postdischarge resource use. Age was a predictor of length of stay (LOS), postdischarge resource use, and improvement in IADLs. Gender was a predictor of patient satisfaction with hospital care. Individual income was a predictor of improvement in IADLs. A prior ER admission was a predictor of postdischarge resource use. A prior hospitalization was a predictor of LOS. Type of admission, admission source, and head nurse on duty schedule were predictors of improvement in ADLs. Nursing units were a predictor of patient satisfaction with hospital care and unmet needs. Medical departments were a predictor of LOS, hospitalization costs paid by the government, patient satisfaction with hospital care, and improvement in ADLs and IADLs. ADLs at admission were a predictor of LOS. IADLs at admission were a predictor of postdischarge resource use and improvement in ADLs. Multiple medical problems were a predictor of the average daily hospitalization cost paid by the government. Need for discharge planning was a predictor of LOS, postdischarge resource use, and improvement in ADLs and IADLs.

Eleven variables did not predict outcomes for any dependent variables. Some components could not predict dependent variables at all. For example, predisposing factors, patient-related enabling factors, and need characteristics were not predictors of unmet needs. Another important finding was that provider-related enabling factors were significant predictors of hospitalization outcomes and patient outcomes. Discussion, recommendations, and conclusions are described in terms of the results of multivariate analyses (Table 61).

Table 60

Summary of Results of the Hypotheses

Hypotheses	Accepted/ Rejected	Results
Bivariate Analyses for LOS and average hospitalization costs paid by the government A1. Predisposing Factors: Age, gender, marital status, and living arrangements were hypothesized as related to LOS and average daily hospitalization costs paid by the government.	Rejected	None of the hypothesized predisposing factors had a significant relationship with LOS and hospitalization costs paid by the government in the expected direction. The age factor was significantly related to LOS, but it was in the opposite direction. Gender was significantly related to hospitalization costs paid by the government, but it was also in the opposite direction.
A2. Patient-related enabling factors: Four variables which included social support, individual income, and previous utilization of hospital and physician services in the past year were hypothesized to have positive relationships with LOS and the average daily hospitalization costs paid by the government.	Rejected	Previous use of the hospital and physician services in the past year were significantly related to LOS, but they were in the opposite direction. None of the patient-related enabling factors was significantly related to the average daily hospitalization costs paid by the government.
A3. Provider-related enabling factors The variable type of admission was hypothesized to have a positive relationship with LOS and the average daily hospitalization costs paid by the government. The variable head nurse on duty schedule was hypothesized to have a negative relationship with LOS and the average daily hospitalization costs paid by the government.	Supported Rejected	Participants who were admitted to the hospital via the emergency room had a longer LOS than participants who were admitted from the out-patient department. The head nurse duty schedule was not significantly related to LOS or average daily hospitalization costs paid by the government. The admission source and the medical department were significantly related to the average daily hospitalization costs paid by the government.

A4. Need characteristics: Six variables which included functional status, level of consciousness, cognitive status, multiple medical problems, and hospital criteria for discharge planning service were hypothesized to have relationships with LOS and the average daily hospitalization costs paid by the government.	LOS: 4 variables were supported Costs: rejected	Participants who needed help in all six ADLs or IADLs, had consciousness impairment and who met hospital criteria for discharge planning were more likely to have a longer LOS. Two variables, ADLs and IADLs, were significantly related to the costs, but they were in the opposite direction.
Multivariate hypotheses for LOS B1. The functional status, consciousness level, cognitive status, multiple medical problems were hypothesized as predictors of LOS when other predisposing, and enabling factors, plus need characteristics were controlled.	One variable was supported	ADLs was a positively significant predictor of LOS. Other variables which were not hypothesized, such as age, a prior hospitalization, and the neurological department were the significant predictors of LOS when medical departments were controlled.
Multivariate hypotheses for the average daily hospitalization costs paid by the government B2. The functional status, consciousness level, cognitive status, multiple medical problems were hypothesized as predictors of the average daily hospitalization costs when other predisposing and enabling factors, and need characteristics were controlled.	One variable was supported	Participants who had more than one medical problem had higher average hospitalization cost paid by the government. The medical departments were not hypothesized, but it was a significant predictor. Participants who were admitted via metabolic department, respiratory department, and neurological department were significantly predicted to have a lower average daily hospitalization costs paid by the government when gender, sensory deficits, and ADLs at admission were controlled.
Bivariate hypotheses for patient satisfaction with hospital care C1. Predisposing factors: Age, gender, education, and marital status were hypothesized as related to patient satisfaction with hospital care.	Rejected	Only gender was significantly related to patient satisfaction, but it was in the opposite direction. The findings showed that female participants were more likely to be dissatisfied with hospital care than male participants.
C2. Patient related enabling factors: Social support and individual income were hypothesized as related to patient satisfaction with hospital care.	Rejected	None of the patient-enabling factors were show to be significantly related to patient satisfaction. Social support was not tested.

C3. <u>Provider related enabling factors:</u> The nursing unit was hypothesized as related to patient satisfaction with hospital care.	Rejected	The nursing unit was not related to patient satisfaction with hospital care. However, the medical department was significantly related to patient satisfaction with hospital care. Participants were more likely to be satisfied who were admitted via the metabolic department than participants who were admitted by non-metabolic departments.
C4. <u>Need characteristics:</u> Functional status, multiple medical problems, and hospital criteria for discharge planning were hypothesized a negative relationship with patient satisfaction with hospital care.	Rejected	None of the need characteristics had a relationship with patient satisfaction with hospital care.
Multivariate hypotheses for satisfaction with hospital care D1. Age, income, social support, head nurse on duty schedule, functional status, multiple medical problems, and high daily hospital charge were hypothesized as predictors of satisfaction with hospital care when other predisposing and enabling factors, need characteristics, and hospitalization outcomes were controlled.	Rejected	None of the hypothesized variables showed a significant prediction with patient satisfaction with hospital care. Social support was not tested. Gender and nursing units were two predictors of patient satisfaction with hospital care. Participants who were male and admitted to Unit 10B were more likely to be satisfied with hospital care.
Bivariate hypotheses for postdischarge resource use E1. <u>Predisposing factors:</u> Three variables which included age, living arrangements, and marital status were hypothesized as a positive relationship with postdischarge resource use.	One variable was supported	Only age had a significant positive relationship with postdischarge resource use. Participants who were older than 75 years were more likely to use postdischarge resources than younger participants.
E2. <u>Patient-related enabling factor:</u> Three variables which included low-income, lack of social support, and prior hospitalization were hypothesized as a positive relationship with use of postdischarge resources.	Rejected	The variable social support was not tested. None of the hypothesized patient-related enabling factors had a significant relationship with postdischarge resource use.

E3. <u>Provider-related enabling factors:</u> Participants who were admitted from other institutions via the ER at the time the head nurse was off duty were more likely to use postdischarge resources.	Rejected	None of these three provider-related enabling factors had a significant relationship with postdischarge resource use.
E4. <u>Need characteristics</u> Participants who had a heart and/or neurological illness, who were functional, conscious, and cognitive impairment, sensory deficits, or had multiple medical problems were more likely to use postdischarge resources.	One variable was supported	IADLs had a significant positive relationship with postdischarge resource use. Participants who depended on all six ADLs were more likely to use postdischarge resources.
Bivariate Hypotheses for postdischarge resource use F1. LOS and the average daily hospitalization costs were hypothesized positively related to postdischarge resource use.	One variable was supported	Participants who had a longer LOS were more likely to use postdischarge resources.
Multivariate hypotheses for postdischarge resource use G1. Age, prior hospitalization, multiple medical problems, LOS, and functional, cognitive, and conscious impairment were hypothesized as predictors of postdischarge resource use when other variables, such as predisposing, enabling, and need factors plus daily hospital charge were controlled.	Two variables were supported	Age and LOS were the significant predictors of postdischarge resource use.
Bivariate Analyses for functional status H1. <u>Predisposing factors</u> Age was hypothesized as negatively related to improvement in ADLs and IADLs.	One variable was supported	Age was only one predisposing factor which had a relationship with improvement in IADLs. Participants who were 65 to 74 years of age were more likely to be improved in IADLs. Age was not significantly related to improvement in ADLs.
H2. <u>Patient-related enabling factors</u> Social support was hypothesized as related to improvement in ADLs and IADLs. H3. Prior hospitalization was hypothesized as a negative relationship with improvement in ADLs and IADLs.	Not tested Rejected	Social support was not tested. None of the patient-related enabling factors had a relationship with improvement in ADLs. None of the hypothesized variables showed a significant relationship with IADLs.

H4. <u>Need characteristics</u> Functional status, cognitive status, conscious status, and sensory deficits were hypothesized as negatively related to improvement in ADLs and IADLs.	Five variables were supported	Participants who depended in 0 - 5 IADLs, were consciously alert, interactively functioning, and did not have sensory deficits were more likely to be improved in ADLs. Cognitive status was significantly negatively related to improvement in IADLs. Participants who were interactively functioning were more likely to have improved IADLs two weeks after discharge.
Bivariate hypotheses for unmet needs I1. <u>Predisposing factors</u> Age was hypothesized as positively related to unmet needs.	Rejected	None of the predisposing factors was significantly related to unmet needs.
I2. <u>Patient-related enabling factors</u> Individual income, social support, and prior hospitalization were hypothesized as negatively related to unmet needs.	Not tested/ Rejected	Social support was not tested. None of the patient-related enabling factors was significantly related to unmet needs.
I3. <u>Provider-related enabling factors</u> The head nurse on duty schedule was hypothesized as negatively related to unmet needs.	Supported	Participants who were admitted while the head nurse of the unit was on duty and stayed in unit 3B were less likely to have unmet needs.
I4. <u>Need characteristics</u> Functional status and sensory deficits were hypothesized as negatively related to unmet needs.	Rejected	None of the need characteristics was significantly related to unmet needs.
Bivariate hypotheses for patient satisfaction with home care J1. <u>Predisposing factors</u> Age was hypothesized as positively related to patient satisfaction with care at home.	Not tested	
J2. <u>Patient-related enabling factors</u> Individual income and social support were hypothesized as positively related to patient satisfaction with care at home.	Not tested	

J4. <u>Provider-related enabling factors</u> Nursing unit was hypothesized as related to patient satisfaction with care at home.	Not tested	
J5. <u>Need characteristics</u> Functional status and multiple medical problems were hypothesized as negatively related to patient satisfaction with care at home. J3. Hospital criteria for discharge planning were hypothesized negatively related to patient satisfaction with care at home.	Not tested	
Multivariate hypotheses for improvement in ADLs K1. Age, social support, the previous utilization of hospitals, functional status, consciousness level, sensory deficits, primary diagnosis, and multiple medical problems at admission were hypothesized as predictors of improvement of ADLs when other predisposing, enabling, and need factors, plus hospitalization outcomes were controlled.	One variable was supported.	Only one variable, IADLs at admissions, was a negative predictor of improvement in ADLs when type of admission, admission source, the head nurse on duty schedule, and the medical department were controlled for.
Multivariate hypotheses for improvement in IADLs K1. Age, social support, the previous utilization of hospitals, functional status, consciousness level, sensory deficits, primary diagnosis, and multiple medical problems at admission were hypothesized as predictors of improvement of IADLs when other predisposing, enabling, and need factors, and hospitalization outcomes are controlled.	One variable was supported.	Age was a negative predictor of improvement in IADLs when individual income, type of admission, medical department, and ADLs & IADLs at admissions were controlled.
Multivariate hypotheses for unmet needs K2. Age, social support, functional status, and cognitive status were hypothesized as predictors of unmet needs when other predisposing, patient and provider related enabling factors, need characteristics, and hospitalization outcomes are controlled.	Rejected	None of these variables predicted unmet needs. Only one variable, the nursing unit, was a predictor of unmet needs when age, use of hospital, head nurse on duty schedule, and ADLs were controlled. Participants who stayed in unit 3B were more likely to have unmet needs two weeks after discharge.

Multivariate hypotheses for patient satisfaction with care at home K3. Age, social support, income, functional status, and multiple medical problems were hypothesized as predictors of patient satisfaction with care at home when other predisposing, enabling, and need factors, and hospitalization outcomes are controlled.	Not tested	

Table 61 Summary of Relationships among Independent Variables and Dependent Variables In Terms of Multivariate Analyses

Variables		LOS	Costs by Gov	Satis w/ hosp care	Rsource use	Improve ADLs	Improve IADLs	Unmet needs
Predisposing Factors	age	* (-)			* (+)		*(-)	
	gender			* (-)				
	marry							
	education							
	living							
	employment							
Patient Related Enabling Factors	indi income						* (+)	
	family econ							
	ERused				* (+) @			
	hosp used	* (-)						
	HHC used							
	Dr. visited							
Provider Related Enabling Factors	type adm					*(-)		
	adm source					* (-)		
	units			* (+) B				* (-)A
	medical departments	* (-) neur	* (-) resp, meta,neur			* (-) meta	* (+) neur @	
	HN duty					* (-)		
Need Characteristics	Dx							
	ADLs	* (+)						
	IADLs				* (+)	*(-)		
	consciousne							
	cognitive							
	sensory							
	mul med pro		* (+)					
	need for DP	* (+)			* (+)	*(-)	* (-)	
	LOS				* (+)			

* (+) a positive predictor at p ≤ .05; * (-) a negative predictor at p ≤ .05; @ significant at p = .05 - .10

Effects of the Andersen Model in Hospitalization Outcomes, Resource Use and Patient Health Outcomes

Predisposing factors

Only two predisposing factors, age and gender, significantly predicted length of stay (LOS), patient satisfaction with hospital care, resource use, or improvement in instrumental activities of daily living (IADLs). Marital status, education level, and living arrangements were not predictors of patient outcomes and postdischarge resource use.

Age. Related literature has shown that age was a positive predictor of LOS (Incalzi et al., 1992; Narain et al., 1988; Wolinsky et al., 1994). In this study, age was a negative predictor of LOS. The reason for this might be that there were only four adults in this group (5.1%) that were over the age of 84. The average age in this study was younger than other study populations sampled previously. This study does not represent the older elderly, those patients aged 85 or older. In past literature concerning LOS, most studies were done on patients receiving care in the US. This study population was drawn from an oriental society, and there may be differences in the medical system and health behaviors. Since the National Health Insurance System was implemented in Taiwan, patients have better access to hospital care with a reasonable copayment. Nevertheless, some of the patients used acute beds instead of nursing home beds, and remained in the hospital longer. For example, in this study, one patient had a 79-day hospital stay. Although the medical system in Taiwan was not evaluated in the current study, the system might indirectly encourage patients to use hospital care rather than seeking a lower level of care.

Age could predict postdischarge resource use. In past literature, age was the greatest

risk factor for residing in a nursing home (Rudberg et al., 1996; Wolinsky and Johnson, 1991). The results from these studies indicated that "being old" was more likely the reason for being admitted to a nursing home. The results of this study also showed that the participants aged 75 or older were more likely to use postdischarge resources. The results of this study related to age and postdischarge resource use were supported by the past literature.

Age was not only a predictor of LOS and postdischarge resource use, age also was a predictor of improvement of IADLs. In the literature age was a strong factor in improvement of functional status (Sager et al., 1996; Wu et al., 1995). In other words, younger participants had greater improvement in their IADLs two weeks after discharge than participants who were older than 75 years. The results of this study related to age and improvement in IADLs were supported by the past literature.

Gender. Gender was a predictor of patient satisfaction with hospital care. However, the direction of the relationship between gender and patient satisfaction was different from previous studies (Lee & Kasper, 1998; Messner & Lewis, 1996). Cultural characteristics might be a reason. In the Taiwanese society, especially among the elderly, the male is the dominant member of society. Male patients may be more likely to express their needs for care. The nurses may be more likely to respond to their requests. On the other hand, female patients may be less likely to express their need for care. If female patients did not receive the care they needed, they may be less satisfied. While they may accept this type of care during their hospitalization, they were not satisfied. The level of dissatisfaction noted by the females was still present in their minds and when investigators interviewed them, they indicated their dissatisfaction in their response score.

Marital status and living arrangements. These two variables were not predictors of any dependent variables. Reasons why they were not predictors might include the fact that the marital status of most participants was either married or widowed; only one participant was single (1.3%). Most of the participants lived with their spouses or families; very few lived alone or at other places (10.4%). Previous studies may have included more diverse living arrangements.

In all, two predisposing factors--age and gender--predicted LOS, patient satisfaction with hospital care, postdischarge resource use, and improvement in IADLs.

Patient-Related Enabling Factors

Three patient-related enabling variables--individual income, ER visits, and a prior hospitalization in the past year--significantly predicted LOS, improvement in IADLs, or postdischarge resource use. Family economic status, use of home health care, and use of physician services in the past year were not significant predictors of resource use or patient health outcomes.

Individual income. Although previous literature did not look at improvement of functional status in relation to individual income in their studies, the individual income of participants can help the participants to have greater access to health care services and help them to improve their functional status. Therefore, individual income has been looked at for its effect on the improvement in functional status in this study. The results showed that improvement in IADLs was predicted by individual income. This finding suggests that participants who had a higher individual income might be able to get more help to improve their IADLs.

Use of the ER in the past year. Postdischarge resource use was predicted by use of the ER in the past year. Literature showed that any previous use of health care services was also a factor in being admitted to the hospital (Boult et al., 1993; Eve, 1998; Fethke et al., 1986). The results of this study showed that the participants who had visited an ER in the past year were more likely to use postdischarge resources. This finding suggests that participants who had been admitted to the hospital in the past year might have a lower health status so that they had a higher degree of need for postdischarge resources.

Prior hospitalizations in the past year. In the U.S. studies, a prior hospitalization was positively related to LOS in past literature (Wolinsky et al., 1994). In the current study, participants who were not admitted to a hospital in the past year had a longer LOS. This finding was in the opposite direction of the findings of the previous literature. A reason for this may be health behaviors rooted in cultural beliefs. Most Taiwanese older adults do not have routine, annual physical examinations. Most of them do not like to visit a doctor. Therefore, when they need to go to a hospital, they are very sick. Participants who had a prior hospitalization in the past year were more likely to have some kind of pre-existing disease so that their medical situation was well understood and they did not require extensive testing. Physicians order many examinations for patients who were not recently admitted to the hospital from which they can make the best diagnosis. Therefore, the hospital stay is longer for most Taiwanese older adults.

Family economic status. It was hypothesized that family economic status would influence postdischarge resource use and patient health outcomes based on Taiwanese culture. Traditionally, older children have to take care of their parents even for daily

expenses if their parents need help. However, the results of this study suggested that this cultural tradition might be changing. On the other hand, family economic status was measured based on the household income and the number of people in the household (p. 92). The family economic status might not indicate how much financial support the participants can obtain from their family.

Use of home health care and physician visits in the past year. Although the variable physician visits in the past year was hypothesized to have a relationship with LOS and the average daily hospitalization cost paid by the government, the results did not support these hypotheses. The reasons for this might be because most participants had visited a physician in the past year, only a few participants (11.5%) had not visited a physician. Only 6.6% of the participants had been visited by a home care nurse.

Provider-Related Enabling Factors

Of the four components described by Andersen, the provider-related enabling factors most frequently demonstrated significance in terms of hospitalization outcomes and patient outcomes. All of the five provider-related enabling factors were significantly related to the dependent variables. In all, nursing units and medical departments were frequently significant predictors. Since each nursing unit had its own primary nurses and each medical department had its own physicians, health care professionals practice patterns made a difference in predicting patient health outcomes. Few previous studies applied provider-related enabling factors to examine resource use and patient outcomes. This is an important finding. It also supports the importance of examining provider-related enabling factors in the Andersen model.

Provider-related enabling factors predicted hospitalization outcomes and patient health outcomes; however, they did not predict postdischarge resource use. This result might suggest that no matter what services participants received from health care providers, that these services did not influence the need for postdischarge resources or the use of postdischarge resources. All of them did not refer or did refer patients to appropriate health care services. In other words, patients in this hospital had a similar chance of being referred to health care resources. On the other hand, all the health care professionals might not be concerned about patient's post-hospital care. Health care professionals might feel that to refer a patient to post-hospital care services was not a responsibility of their job. Another reason for these results might be because of the lack of postdischarge resources; hospital based health care professionals may believe do not have a role to play in this issue.

Nursing units. Participants evaluated hospital care based on the care they received in specific nursing units. Nursing units significantly predicted patient satisfaction with hospital care. The difference in the nursing units was nursing personnel. As shown in Appendix L, Unit B had 0% nurse turnover rate and a 100% discharge planning training rate. Stable and trained nursing personnel may be an important factor in improving patient satisfaction. The results matched hospital data regarding patient satisfaction. Data collected by a hospital satisfaction survey showed that Unit B always had the best patient satisfaction score among the six units.

Another finding showed that nursing units were a predictor of unmet needs. Although none of the previous literature examined nursing units in their studies, the nursing units were included in this study to understand the role of primary nurses in meeting patient

needs in post-hospital care. It is not possible to study individual nurses in the current study therefore nursing units were measured. The major difference among the nursing units was nursing personnel. Unit A showed a real difference when the characteristics of the nursing units were reviewed (Appendix L). This unit had a high nurse turnover rate (16.6%) and a low discharge planning training rate (58.3%). It seems that the length of employment for nursing personnel was short; half of the primary nurses were untrained in the discharge planning program at that time.

When the variable unmet needs was reviewed closely, the findings showed that most participants needed help in ADLs and IADLs, but only 2.4% of the participants indicated an unmet need in ADLs and none of them had an unmet need in IADLs. The percent of unmet needs in this study was lower than in previous studies. For example, de Veer and de Bakker's study (1994) showed that 96% of the respondents had an unmet need with ADLs. Dansky et al. study (1996) showed that 39.2% of respondents had unmet needs. Chen and Wilkins's study (1998) showed that 30% of the respondents had needs for health-related personal assistance. The result of this study showed that unmet needs among this population were lower than the samples selected in the previous studies. The care received by participants at home must have been good because of the low unmet needs score shown by this particular group. Since 94.9 % of the participants had support from their family, and 89.6% of the participants lived with spouses or families, these factors might be the reason for the low level of unmet needs in ADLs and IADLs.

In fact, only 15.7% of the participants had an unmet need of skilled nursing care or information regarding self-care. Of this 15.7%, 81.8% had an unmet need related to skilled

nursing care and information regarding self-care. Both of these were related to nursing care. Therefore, if primary nurses did not tell patients about skilled nursing care or give them vital information about taking care of themselves at home, the patients would still have these kinds of needs two weeks after discharge. The number of patients with these kinds of needs could be reduced if adequate information was provided prior to discharge. It is difficult to provide bedside teaching for after care if the nursing personnel is new or untrained. On the other hand, home health care could have also provided these services if patients had been referred to them. However, only one participant (1.3%) received formal home health care.

Medical departments. Medical departments were a predictor of LOS. Evens and Hendricks (1993) included the use of hospital services (included medical, surgical, and neurological department) in predicting LOS. The results showed that patients who were admitted via the medical department were more likely to stay in the hospital longer, and patients who were admitted via the department of neurological diseases had a shorter LOS. In the current study, participants who were admitted via the department of neurological diseases also had a shorter LOS. This result might suggest that physicians in the department of neurological diseases might be considering the patient's length of stay. On the other hand, the physicians might like to discharge patients if they are medically stable. For example, patients who are admitted to the hospital for a stroke may only stay in the hospital for a couple of days to examine their problems and receive medical care. The neurological physicians may not allow these patients to stay in the hospital longer for skilled nursing care or social problems. The results might also suggest that physicians in different departments might have different pressure to keep beds full for receiving higher reimbursement.

Medical departments were also a predictor of the average daily hospitalization cost paid by the government. In other words, participants who were admitted through physicians who worked in the departments of respiratory diseases, departments of metabolic diseases, and neurological diseases had a lower average daily hospitalization cost paid by the government. The results might suggest that the other departments might have more expensive procedures than these three departments or less selective use of lab tests in these three departments.

In medical departments, participants who were admitted through the department of neurological diseases were more likely to have a shorter LOS, lower daily hospitalization cost paid by the government, and faster improvement in IADLs. Since the director of the department of neurological diseases was a developer of the discharge planning service in the university teaching hospital physicians in this department were required to consider patients' post-hospital care. In addition, this department has hired a senior nurse who serves as a case manager. Her responsibility includes bedside teaching to patients who are admitted via this department. These activities might be reasons for the success of the department of neurological diseases. However, the department of neurological diseases was not a significant predictor of postdischarge resource use. Participants who were admitted through the department of neurological diseases did not make use of postdischarge resource any more than participants admitted through other departments.

Type of admission, admission source, and head nurse on duty schedule. These three variables were predictors of improvement in IADLs. Participants who were admitted from their home and through the emergency room were more likely to show improvement in their

IADLs. This finding suggests that participants who were admitted to the hospital because of an urgent symptom at home were more likely to show improvement in IADLs two weeks after discharge. An acute disease with urgent symptoms may indicate a problem that might resolve faster than a chronic disease.

Head nurse on duty schedule was also a negative predictor of improvement in IADLs. It is difficult to suggest why this variable demonstrated significance, it may be that services provided by the nurse's aides or nurses make up for the absence of the head nurse.

Needs Characteristics

Of the eight need characteristics, four need characteristics--ADLs and IADLs at admission, multiple medical problems, and need for discharge planning--predicted one of the dependent variables. Other need characteristics, such as primary diagnosis, level of consciousness, cognitive status, and sensory deficits were not predictors of any of the dependent variables.

ADLs and IADLs at admission. In past literature concerning LOS, ADLs commonly predict LOS (Incalzi et al., 1992; Narain et al., 1988; Pompei et al., 1991; Reiley & Howard, 1995). This study also showed that ADLs at admission were a predictor of LOS. The score of IADLs at admission was a predictor of postdischarge resource use and improvement in ADLs. In the previous literature, IADLs were a predictor for the use of home health care (Wolinsky & Johnson, 1991; McCallun et al., 1996). ADLs frequently showed a significant relationship with the use of hospitals, NH, and HHC (Cafferata, 1987; Eve, 1988; Fethke et al., 1986; Kempen & Suurmeijer, 1991; Wolinsky & Coe, 1984; Wolinsky & Johnson, 1991). In this study, ADLs were not a predictor of postdischarge resource use, but IADLs

were a predictor.

These findings might suggest that participants who had limitations in IADLs at their admission showed slow recovery in ADLs. Since most patients have limitations in IADLs before limitations in ADLs, the patients who had limitations in ADLs might have had more serious limitations in physical functional status than patients who only had limitations in IADLs. Therefore, limitations in IADLs might only indicate patients had a mild functional limitation that resulted in a different recovery rate in ADLs two weeks after discharge.

Another finding showed that ADLs at admission could predict LOS, and IADLs at admission could predict postdischarge resource use. In other words, patients with limitations in ADLs at admission were the ones whose LOS was affected. Conversely, patients with limitations in IADLs at admission were the ones whose LOS were not affected; however, their postdischarge resource use was affected. These findings might suggest that participants who had a low functional status had a longer LOS. Participants with a mild functional disability had a greater need for postdischarge resources (i.e., physical therapy) to help them recover their IADLs faster.

Multiple medical problems. The average daily hospitalization cost paid by the government was predicted by the presence of multiple medical problems. This was the only need characteristic which significantly predicted hospitalization costs paid by the government. Although multiple medical problems were not measured in the previous studies for their relationship to costs (Pompei et al., 1991; Wolinsky et al., 1994), multiple medical problems were measured in this study because they represented one measure of severity of illness. The more diseases the patients have, the more treatment they might need.

Additionally, the more medical problems patients have, the more treatments or examinations the physicians are allowed to order for the patients. Therefore, according to the results, if patients had one disease the government paid lower hospitalization costs, if the patients had more than one medical problem the government paid higher hospitalization costs for them.

The *total* hospitalization cost paid by the Taiwanese government for all patients who were admitted to the university teaching hospital in August 1998 was U.S. $1,420.24. For the older adults who participated in this study, the average total hospitalization cost paid by the Taiwanese government was U.S. $2,045.39. Since most Taiwanese older patients had multiple chronic diseases and functional disabilities, they needed more hospital care. On the other hand, the result might suggest that the Taiwanese government paid more medical costs for older adults than younger patients. Compared to a study which was done on American low-income adult patients, although the average hospitalization cost paid by the government for the elderly patients was not available in this study, the average total hospitalization cost paid by the American government for all patients was U.S. $2,414 (Salit, Kuhn, Hartz, Vu, & Mosso, 1998). U.S. Bureau of the Census (1996b) reported that the average cost per stay for community hospitals for all types of patients in the USA was $6,230. Although the average daily hospitalization cost paid by the government for elderly patients was not available in these two reports, the statistics available were only the hospitalization cost paid by the government for all types of patients. These two statistics provided an idea that hospital costs for the American government might be higher in the U.S. than Taiwan. In fact, the medical costs for the Taiwanese government are lower. That may be because the relative cost of living index is lower in Taiwan than in the US.

The average *daily* hospitalization cost paid by the government for all patients was U.S. $173.97 in the university teaching hospital in August 1998, and the average daily cost paid by the government for older adults who participate in this study was U.S. $145.2. These results might suggest that the hospital received lower reimbursement for beds occupied by elderly patients than beds occupied by younger patients.

The length of stay (LOS) in this study population was 13.8 days which is longer than any of the other patients admitted to the UTH during August 1998. The mean LOS for all ages in the general medical department of the UTH in 1998 was 11.2 days. The mean LOS for all departments for all ages in August 1998 was 7.28 days. LOS for people aged 65 and older was 8.1 days in 1993 in the USA (U.S. Bureau of the Census, 1996b). Since the Taiwanese culture does not accept having older people in a nursing home, Taiwanese older adults might stay in the hospital longer for skilled nursing care or because of social problems instead of being transferred to a nursing home.

In all, the Taiwanese government paid for these patients' hospitalizations more than for any other. Additionally, the patients in this study had a longer LOS. In other words, the Taiwanese government paid more for the hospital stay of older adults, and they stayed in the hospital longer. However, UTH received a lower reimbursement rate from the government for a bed occupied by an older adult compared to a bed occupied by a younger patient.

The findings showed that 17.6% of total hospitalization costs were paid by the elderly patient; the government paid 82.4% of total hospitalization costs. Compared to older Americans aged 65 and older, 92.1% of hospital costs were paid by the government, 4.8% were paid by private insurance, and 0.5% were paid by the patient (U.S. Bureau of the

Census, 1996b). Taiwanese older adults had higher medical care costs in their later life than American older adults. In other words, the results of this study might suggest that the Taiwanese government might need to have policies to encourage people to save money for medical costs that they might have in their later life.

Need for discharge planning. This variable did predict LOS, improvement in ADLs and IADLs, and postdischarge resource use. The need for discharge planning was measured by whether or not the participants qualified for discharge planning services based on the discharge planning screening instrument used in UTH (Appendix C). This instrument seemed to be an index of health status. The instrument included three items related to ADLs (i.e., daily activities, eating, and incontinence) and six other items related to physical impairment. If these items were looked at in terms of the Andersen model, they would fall under the category of need characteristics. Need characteristics appear so frequently that it is overly weighted in this instrument which might be a reason why this instrument was a predictor of LOS, improvement of functional status, and postdischarge resource use. Therefore, the items in the instrument should be analyzed to determine what items really predict resource use and patient health outcomes.

Primary diagnosis. The literature showed that diagnoses were not a predictor of LOS in Narain et al. (1988) and Incalzi et al. (1992); but diagnoses were significantly related to LOS in Wolinsky et al. (1994) and McClaran et al. (1996). In the current study, primary diagnosis was not a predictor of LOS. In fact, primary diagnosis was not a predictor of any dependent variable. The results might suggest a sampling issue. The participants in this study were drawn from all general medical departments so that participants in this study included

a wide range of diagnoses. The classification of a diagnosis adopted from the ICD-9 code book (Appendix M) might not represent the severity of illness for a particular diagnosis. A larger sample size and stratified sampling based on diagnosis might produce significant relationships between diagnosis and patient health outcomes and resource use.

Level of consciousness, cognitive status, and sensory deficits. These three need characteristics were not predictors of any dependent variables. These three variables might be able to predict one of the dependent variables, but they were excluded from multivariate analyses because of the small sample size.

Theoretical Framework and Findings

The use of the Andersen model to evaluate postdischarge resource use and patient outcomes and the connection of these results to a discharge planning screening instrument has been done for the first time in this study. According to the Andersen health behavioral model, four components can predict the utilization of health care services and outcomes. These four components are predisposing factors, patient-related enabling factors, provider-related enabling factors, and need characteristics. Twenty five variables related to the four components of the Andersen model were developed and tested. Based on the hypotheses generated for this study, the results showed that only 14 of the variables were predictors of hospitalization outcomes, patient outcomes, or resource use. These variables represented two predisposing factors, three patient-related enabling factors, five provider-related enabling factors, and four need characteristics. Some of the findings resulted in the rejection of hypotheses generated from the model.

The findings of this study supported hypotheses that some constructs can predict

patient outcomes and health behavior. Age was a predictor of LOS, postdischarge resource use, and improvement in IADLs. Especially, provider-related enabling factors were important constructs in predicting outcomes. Nursing units and medical departments made a difference in patient outcomes and hospitalization outcomes based on the Andersen model. In other words, health care professionals really play a role in patient and hospitalization outcomes. ADLs and IADLs at admission were important measures which help describe the patient's level of function, identify patients at risk for longer LOS, and those who will need postdischarge resources. The discharge planning screening instrument used in the UTH was a predictor of LOS, postdischarge resource use, and improvement in functional status. These findings partially supported the Andersen model as a useful tool for evaluation of health behavior and patient outcomes among this group.

However, 11 variables did not predict hospitalization outcomes, postdischarge resource use, or patient outcomes. Although four population characteristics affected some constructs, they did not predict all of the outcomes and health behavior measured in this study. Four predisposing factors, three patient-related enabling factors, and four need characteristics were not predictors of hospitalization outcomes, postdischarge resource use, or patient outcomes. The average daily hospitalization cost paid by the government was predicted by only one of the provider-related enabling factors--medical departments, and one of the need characteristics--number of medical problems. The result indicated that none of the predisposing factors and the patient-related enabling factors affected hospitalization costs paid by the government. In other words, the reimbursement by the government was not affected by patient characteristics, individual income, family economic status, and use of

health care services in the past year. Additionally, functional status and primary diagnosis did not predict hospitalization costs paid by the government. In other words, whether or not a patient had a functional disability made no difference in reimbursement from the government. Since medical departments were a predictor, the results might suggest that being hospitalized in a specific medical department affects the reimbursement rate in a fee-for-services system more than functional status or primary diagnosis.

Another finding showed that unmet needs were predicted by a single provider-related enabling factor--nursing units. In other words, none of the predisposing factors, patient-related enabling factors, or need characteristics could predict unmet needs. However, previous literature showed that predisposing factors and patient-related enabling factors were major factors in predicting unmet needs. According to these findings, the four components which represented population characteristics in the Andersen model could not fully predict utilization of health care services and the change of health status measured in this study. Although the findings of this study partially support the Andersen model, they do not appear to fully predict postdischarge resource use and patient health outcomes among Taiwanese older adults.

Several constructs found in the Andersen model were not tested in this study. These constructs include: environmental factors, the health care delivery system, belief, culture, and community-level enabling factors. It is not possible or practical to include all the components mentioned in the Andersen model in a single study of this size so some components of the model were specifically selected over others. An emphasis was placed on determining the effects of population characteristics on health behaviors and patient outcomes. These are

factors described by Andersen as directly affecting patient health behavior and patient outcomes as compared to others such as environmental factors which are described as having an indirect effect.

The Andersen model has been used extensively in the evaluation of health behaviors in western culture under the western health care system. The participants in this study represent a different culture with a different set of cultural values and beliefs. By not including culture, values, or beliefs in this study it is possible to identify specific patient characteristics which directly influence or predict health behaviors and outcomes. One of the reasons for not including culture and beliefs in this study was that all of the participants are Taiwanese older adults, and the culture would be homogenous and not heterogeneous as in American society. They might be homogeneous in values and beliefs in health and health care services. The questionnaire used in this study was lengthy if the questionnaire included cultural characteristics participants would be too tired during the interviews. In addition, while cultural beliefs may help to explain some of the results, not including them at this time highlights essential patient variables which have the strongest influence and the most direct effect. The impact of culture should be included in follow up studies as this factor has been receiving increasing interest in health care research. Culture, value, and beliefs are seen as having an impact on health seeking behaviors and may influence the selection of postdischarge resource use.

The hypotheses of the Anderson model as tested in this study were not fully supported by the findings. The findings might suggest that the variables identified in this study did not fully describe the constructs, but it should be noted that the constructs of the

model are very broad and difficult to refine. Andersen himself mentioned that some of the constructs are very difficult to measure. On the other hand, the Andersen model was developed and tested in Western countries, the model may not include factors which affect Taiwanese older adults' health behaviors and outcomes.

According to the findings of this study, factors which significantly relate to postdischarge resource use and patient outcomes should be included in a further study. Provider-related enabling factors also need to be measured using more variables to identify the great importance of this component. In addition, cultural characteristics should be included.

Recommendations for Practice

Discharge Planning Screening Instrument

According to the results of multivariate analyses, the variables which should be included in a discharge planning instrument were age, gender, individual income, use of the hospital and the ER in the past year, ADLs and IADLs at admission, and multiple medical problems (Table 62). All of this information would not be difficult to obtain so that primary nurses could determine patients' discharge planning needs in a very short time at admission. Provider-related enabling factors were not recommended for inclusion in the instrument because every patient in the UTH should have equal access to discharge planning services. Additionally, the items in the discharge planning screening instrument used in the UTH should be reviewed to determine what items are appropriate to include in the screening instrument. Four items in the instrument were tested in the current study and might not need to be reviewed again; they are level of consciousness, incontinence, eating, and daily

activities. According to the results, level of consciousness might not need to be included in the screening instrument, the other three might be better to include in the screening instrument. The other five items might have to be studied to determine whether or not they should be part of the discharge planning screening instrument for this particular group. These include nutritional status, respiratory function, need for oxygen, risk for pressure sore, and pain level (Table 63).

The discharge planning screening instrument used in the UTH emphasized patients' physical status, it is like an index of severity of illness. However, it might be overly weighted towards the importance of physical status, and ignored the importance of patient characteristics. This screening instrument will need to be tested in order to determine if it is a better predictor than the one currently used.

Table 62

Factors Suggested for a Discharge Planning Screening Instrument

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1. Age (1) less than 64 (2) 65 - 74 years (3) 75 - 84 years (4) more than 85 years

2. Gender (1) Female (2) Male

3. How much income of your own do you receive a month (e.g., pension, interests, rental)?
(0) None (1) less than - 9,999 NT
(2) more than 10,000 NT (3) Unknown

4. How many active medical problems do you have? (Examples include eye disorders, cardiovascular disease, cancer, confusion or dementia, hearing disorders, gastrointestinal disorders, infectious disease, pulmonary disease, and cerebrovascular disease; genitourinary disorders, arthritis, alcoholism, diabetes, fractures, hypertension, psychiatric disorders, renal disease, and skin disease.)
Number: _____

5. Have you been admitted to an emergency room for physical health problems in the past year before admission? (0) No (1) Yes

6. Have you been admitted in a hospital for physical health problems in the past year before admission?
(0) No (1) Yes

7. Functional Status

activities	Independent	Independent with assistance	Dependent
(a) Eating/feeding	0	1	2
(b) Bathing/grooming	0	1	2
(c) Toileting	0	1	2
(d) Transferring	0	1	2
(e) Incontinent of bowel/bladder function	0	1	2
(f) Dressing	0	1	2
(g) Meal preparation	0	1	2
(h) Responsible for own medication administration	0	1	2
(i) Handling own finances	0	1	2
(j) Grocery shopping	0	1	2
(k) Walking	0	1	2
(l) Bus ride	0	1	2

Table 63

The Discharge Planning Screening Instrument Used in the UTH

ITEMS	0	1	2	score
1. Consciousness	Clear	Confused	@Coma	
2. Activities	Independent	Needs Help	@Dependent	
3. Eating	Independent	Needs Help	@NG, TPN	
4. Incontinent	Independent	Needs Help	@Catheter tube	
5. Resp. Style	Independent	@Trachea Tube	@Ventilator	
6. Need for Oxygen	No	Needed for Activities	@Needed for anytime	
7. Risk for Pressure Sore	No	1, 2 degree	@ >3 degree	
8. Nutrition	Normal (Albumin>3.0)	Albumin 2.5-3.0	@Bed (Albumin <2.5)	
9. Pain Levels	No	Medium (3-7)	@Severe (8-10)	
@ Need for discharge planning, consult the discharge planner.				

Health Care Professionals

The results of this study can help health care professionals recognize the importance of their role in improving patients' health status and receiving appropriate post-hospital care. Since provider-related enabling factors were major predictors of patient health outcomes, health care professionals should continue to provide quality care to improve patients' health status. Health care providers should receive continuing education programs to help them recognize the importance of their role in post-hospital care.

The organization's continuing education program should have a complete monitoring system to evaluate primary nurses to ensure that all nurses have been trained for discharge planning nursing skills. The nursing department of UTH did have a policy that new primary nurses attend continuing education programs, as shown in Appendix L. However, approximately half of the nurses in Unit A had not received discharge planning courses. Therefore, an evaluation policy should be developed to make sure the primary nurses have received the necessary training to update their knowledge and skills.

The referral system by which patients are referred to the discharge planning department should be monitored to ensure that all patients are assessed for discharge planning needs. According to the results, 18.4% of the participants who met the hospital criteria for discharge planning did not receive discharge planning. Patients were assessed as needing discharge planning, but they did not receive the service. Two possible reasons for this may be the fact that the discharge planning nurse did not receive a referral request from the primary nurse, or she might have received the referral request but decided that the patient did not need discharge planning. Since the process was not monitored, it is difficult to know

what the exact problems are.

Stable and trained nursing personnel is important in improving patients' health care status and postdischarge resource use. Since the presence of stable and trained nursing personnel was an important factor in predicting postdischarge resource use and patient outcomes, nursing administrators should be concerned about their nurses. Nursing administrators should have projects for studying factors which will positively affect the trained nursing personnel so they will be able to help patients in the transition from hospital to home and help patients in staying at home after discharge.

The degree of patient satisfaction among females should be of concern to administrators, since Taiwanese female older patients showed their dissatisfaction in this study. Patient satisfaction is a standard of quality care. Health Care Financing Administration (HCFA) treats patient satisfaction as a criterion of outcome evaluation. Hospital administrators should explore why female patients are dissatisfied and find ways to increase female satisfaction. Maybe the health care professionals can educate older female patients in their right to ask for the care they need and encourage them to say what they need.

Taiwanese Government

The Taiwanese government should have a complete health care network to care for the elderly, since older adults have a longer LOS and higher hospitalization costs.

Since the participants had a longer LOS and the government had to pay higher hospitalization costs for them, a complete health care network is needed, which includes care from home to the hospital and from the hospital back home. Such services are likely to reduce LOS and hospitalization costs for this group. A case management system for severely

disabled older patients might also save money paid by the government for this particular group. In addition, these patients can get appropriate care in the least restrictive setting.

Since most participants did not have any unmet needs in ADLs and IADLs, informal care played a big role in elderly care. Therefore, informal care and family/friend support system should be encouraged by NHI policies. According to the results, most of the participants (75%) were satisfied with the care they received at home and they had few unmet needs in ADLs and IADLs. Informal care is really important to support the disabled elderly who want to stay at home. Staying at home suits the goals of both patients and the government. In addition, it is acceptable in Taiwanese culture. Therefore, the government should develop policies to support the disabled elderly staying at home.

The government should also develop policies to encourage the disabled elderly and their families to use home health care. Health care providers should be encouraged to provide home health care for patients who need it. A low use of home health care among this group was indicated by this study. Although most participants did not have unmet needs in daily activities, some participants still had some kind of unmet needs after being home from the hospital. Most of their needs were related to professional home health care, such as skilled nursing care and information about taking care of themselves. In fact, in reviewing the resources used by participants at home, only one participant had been visited by home health care nurses during the two weeks following discharge. In addition, 16.9% of the participants hired a private assistant to help them in daily activities. Home health care has not been used very well in the Taiwanese health care system. Reasons for this might include that the referral system was not used, and/or that patients and families did not know home health care

services were available to them. Understanding why patients and families tended to hire an assistant and what problems they have might inform the government and health services providing regarding needs that some poor families have that they cannot afford to these services. Health care policies might negatively and indirectly encourage patients, families, and health care providers to use hospital care. If the Taiwanese government wishes to save hospital costs, it has to develop policies that can encourage health care providers, patients, and families to use home health care.

Recommendations for Future Research

Study Population.

A stratified sampling, a larger sample size, and a longer period of data collection are suggested for further studies to help increase the likelihood of finding significant results. In this study postdischarge interviews were implemented two weeks after discharge. However, postdischarge interviews could be postponed from two weeks to two months or six months to observe for changes in functional status. Therefore, a longer data collection period would better evaluate the changes in functional status. Since provider-related enabling factors were significant predictors of patient outcomes, a multiple-hospital sample will help to recognize the importance of provider-related enabling factors.

Patient-Related Enabling Factors

Two variables--social support and family economic status--in patient-related enabling factors should be tested in different ways for future studies. The variable social support could not be properly studied because only 5.1% had no family support. Since social support showed a significant relationship with resource use in past literature, important information

will be gained if social support is used in the analysis. The variable family economic status was expected to demonstrate a relationship with postdischarge resource use and patient outcomes but it was not significant in the multivariate analyses. Since family support is important in the oriental society, it is necessary to have further studies to understand the effects of family support in elderly care. Therefore, a way to measure family support and family economic status might need to be considered. For example, Will you get enough care from your family when you need it? How much financial support can your family offer you for your living costs when you are sick? Can you get enough financial support from your family when you are sick? Research into the 5.1% who have no family support to determine their needs could also be helpful.

Provider-Related Enabling Factors

Provider-related enabling factors should be emphasized, since all five variables under the provider-related enabling factors predicted hospitalization outcomes or patient health outcomes. However, one variable--the head nurse off duty--was a significant predictor of improvement in ADLs. The importance of this finding may lack practical application as it is difficult to understand why this happened. Since this variable was measured for understanding the role of the head nurse in improving patient health behaviors and patient health outcomes, further studies will be needed to understand the role of the head nurse on patient outcomes and health behavior. Future research should focus on provider-related enabling factors which may help identify problems of hospitalization costs, LOS, and patient outcomes.

Since provider-related enabling factors could not predict resource use, variables

which can be a provider-related enabling factor and may affect patients' postdischarge resource use should be studied, such as a physician referral request for home health care, knowledge of post-hospital care, and attitude of hospital professionals toward the roles of post-hospital care. These are variables which may help to identify the importance of provider-related enabling factors in patient health outcomes and hospitalization outcomes.

Length of Stay and Hospitalization Costs

According to the low adjusted R^2 in LOS and the average daily hospitalization costs paid by the government, some variables might be significant in LOS and hospitalization costs, but they were not included in this study (e.g., physician characteristics). Only physicians can decide when the patient is going to be discharged. Physicians are the only ones who can order treatments, medications, and examinations for their patients. Therefore, physician characteristics might be the crucial factor in predicting LOS and hospitalization costs. These characteristics might include specialities, a concern for patient's after care, and training in continuing care. On the other hand, self-reported health status, the number of major informal caregivers, the number of chronic diseases, and the severity of the illness may also be factors that could be included in future studies to investigate factors affecting LOS.

Cultural Characteristics

Cultural characteristics are included as predisposing factors in the Andersen model, but they were not measured in the current study. This study population was drawn from a group of older, hospitalized Taiwanese adults. Therefore, results were different from the previous studies. Cultural characteristics should be considered as one of the reasons for the difference in findings, so that further studies would include them. Including cultural

characteristics would then help health care professionals understand the health behaviors and patient outcomes in this group. Examples of these characteristics include the attitude toward an annual health examination and the attitude toward preventive medicine for future studies.

Conclusions

The purpose of this study was to examine resource use and patient health outcomes in terms of the Andersen model. According to the results of the descriptive analyses, participants had a longer LOS and higher hospitalization cost paid by the government, lower satisfaction with patient teaching in after care, and few unmet needs. To examine the relationships between resource use and patient outcomes and Andersen's four components, the results showed that 14 variables predicted hospitalization outcomes, resource use, or patient outcomes. Of these variables nine are recommended to be included in a discharge planning screening instrument. The other five variables related to provider-related enabling factors were not included in the instrument, but provide information about the importance of providers to the patient's well-being. Additionally, recommendations for practice and future studies were provided. Since the number of older adults with multiple chronic medical problems is estimated to be increasing, elderly care will be a challenge for families, health care professionals, and the government. A complete and culturally acceptable health care network will be needed to address this challenge.

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Appendix A

Resources Available in the local city, Taiwan

Items	Taiwan Province[c]	Local City
Number of hospitals	620	40
Hospitals[a]	0.36	0.46
Number of clinics	11,911	295
Clinics[a]	6.83	8.53
Number of people per clinic	1,464	1,173
Medical care personnel[a]	48.13	101.38
People served per medical care personnel	208	99
Number of beds[a]	48.77	68.50
People per beds	205	146
Average length of stay	8.98	8.59
Occupancy rate	64.88	70.78
Number of nursing home facilities[b]	82	4
Number of home health care agencies[b]	97	10

Sources: Ministry of the Interior, R.O.C. 1998

[a] The number of health care services per 10,000 people

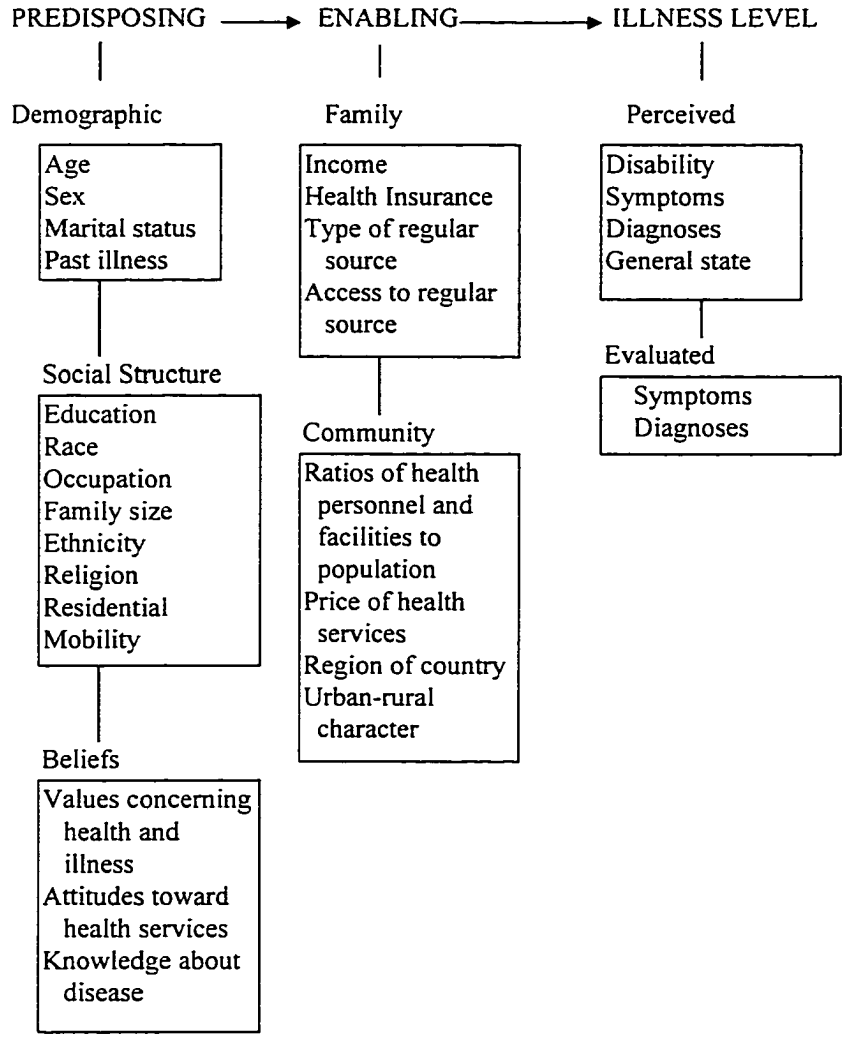
[b] Sources from The Association of Long-Term Care

[c] Taiwan Province has 21 cities, which includes the local City

Appendix B

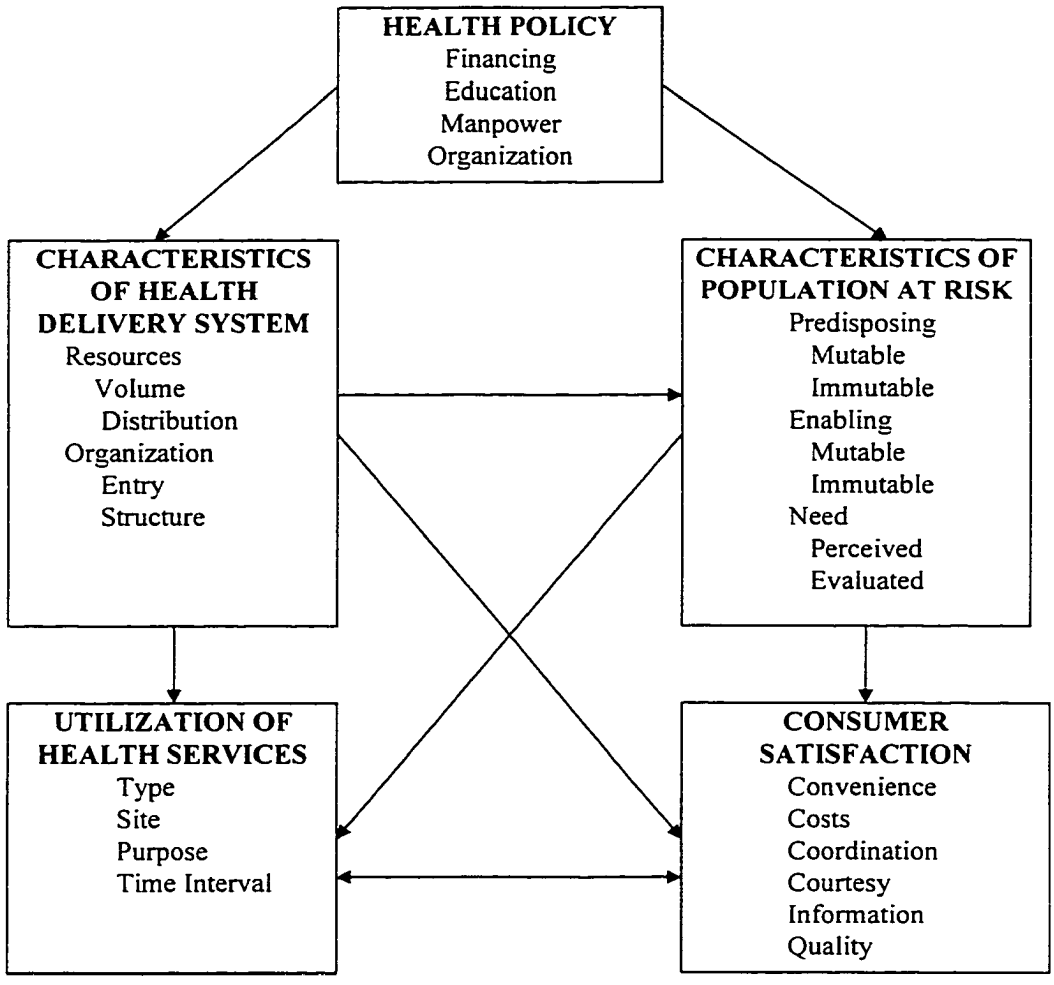
Development of the Andersen Model

Figure B1. Individual determinants of health service utilization.



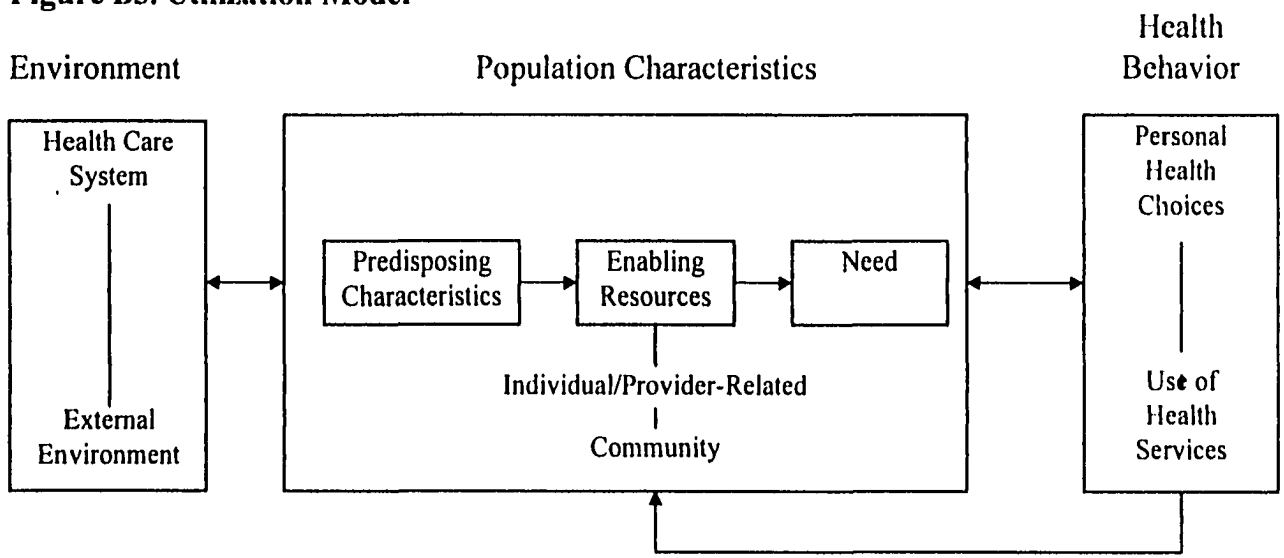
Sources: Andersen, R. M., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. Milbank Memorial Fund Quarterly, 51, 95-124.

Figure B2. Framework for the study of access



Sources: Aday, L. A. & Andersen , R. M. (1974). A framework for the study of access to medical care. Health Services Research, 208-220.

Figure B3. Utilization Model



Source: Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? Journal of Health and Social Behavior, 36(1), 1-10.

Appendix C

Table C1. The Discharge Planning Screening Instrument Used in the UTH

ITEMS	0	1	2	score
1. Consciousness	Clear	Confused	@Coma	
2. Activities	Independent	Needs Help	@Dependent	
3. Eating	Independent	Needs Help	@NG, TPN	
4. Incontinent	Independent	Needs Help	@Catheter tube	
5. Resp. Style	Independent	@Trachea Tube	@Ventilator	
6. Need for Oxygen	No	Needed for Activities	@Needed for anytime	
7. Risk for Pressure Sore	No	1, 2 degree	@ >3 degree	
8. Nutrition	Normal (Albumin>3.0)	Albumin 2.5-3.0	@Bed (Albumin <2.5)	
9. Pain Levels	No	Medium (3-7)	@Severe (8-10)	
@ Need for discharge planning, consult the discharge planner.				

Table C2. The Discharge Planning Screening Instrument Used in this Study

ITEMS	0	1	2	score
1. Conscious	Clear	Confused	Coma	
2. Activities	Independent	Needs Help	Dependent	
3. Eating	Independent	Needs Help	NG, TPN	
4. Incontinent	Independent	Needs Help	Catheter tube	
5. Resp. Style	Independent	Trachea Tube	Ventilator	
6. Need for Oxygen	No	Needed for Activities	Needed for anytime	
7. Pressure Sore	No	1, 2 degree	>3 degree	
8. Pain Levels	No	Medium (3-7)	Severe (8-10)	
Patients who received a score greater than 1 will be recruited for the study.				

Appendix D

Old Dominion University
Tel.: (757) 451-4849
Fax: (757) 683-5674
E-mail: LILYCJLIN@AOL.COM
Address: 1134 Bolling Ave., #212B
Norfolk, VA 23508

April 25, 1998

Dear Ms. Lin

We have reviewed your study proposal--Discharge planning utilization & its effect on the health of older adults in Taiwan. It is a very good study for this hospital and our patients. We will give you full support for your data collection. You will have access to the patients at admission, access to the patient records through notification of the medical record department that you will have permission to examine the specified charts after patients have been discharged from the hospital, and you will be permitted to gather information about ward documents (i.e., nursing hours, schedules of head nurses, cost of participants' hospitalization).

We would like to receive a copy of the results of the study which may assist the hospital in developing our discharge planning program. Any information obtained in connection with the study should remain anonymous. Any information that could identify the hospital should remain confidential. Additionally, we have a suggestion that an oral agreement from patients and families for interviews should be refined for the research. A written consent form is not appropriate for Taiwanese. Additionally, we suggest the use of verbal agreement to indicate willingness to participate in the study. If you or any members of your committee have any questions or concerns, they should feel free to contact me.

Sincerely

Fun-Jen Tsai

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Appendix E

The Modified Andersen Model and Measured Variables in the Current Study

The Modified Andersen Model	Measured Variables
Predisposing Factors	Age, gender, marital status, education, living arrangements, and employment status.
Patient-Related Enabling Factors	Social support, individual income, family economic status, and previous use of health care services.
Provider-Related Enabling Factors	Type of admission, admission source, nursing units, medical departments, and head nurse duty schedule.
Need Characteristics	Primary diagnosis, ADLs and IADLs at admission, level of consciousness, cognitive status, sensory deficits, multiple medical problems, and hospital criteria for discharge planning
Hospitalization Outcomes	Length of stay, hospitalization costs, patient satisfaction with hospital care
Health Behavior	Post-hospital resource use
Patient Health Outcomes	Improvement in ADLs and IADLs, unmet needs, and patient satisfaction with care at home

Appendix F
Summary of Independent Variables and Dependent Variables in Previous Studies

Table F1
Summary of Independent Variables and Dependent Variables in Previous Studies which adopted the Andersen model

Study	Predisposing factors	Enabling factors	Need characteristics	Dependent variables
Bazargan, Bazargan, & Baker (1998)*	age gender, education, & living arrangements	perceived social support, accessibility of medical physicians, private insurance, Medicare, Medicaid, and residential stability	perceived health status, diagnosis, and limitation of daily activities	the number of emergency room utilizations, hospital admissions, and physician visits
Branch, Jette, Evashwick, Polansky, Rowe, and Diehr (1981)*	age, gender, race, education, household composition, and marital status	income, occupation, Medicaid, VA insurance, Medicare, private insurance, regular physician relationship, and transportation problems	perceived health status, dependence in activities, physical activities performance, ability to climb stairs, ability to walk a half mile, and lack of current health problems	hospitalization days, physician contacts, and home care during the previous 12-month period

Boult, Dowd, McCaffery, Boult, Hernandez, Krulewitch (1993)*	age, gender, race, education, living arrangements, and control of health	annual income	self-reported health status, more than 14 bed days in the past year, less activity in the past year, worse health in the past year, coronary artery disease, cerebrovascular disease, diabetes, hypertension, cancer, arthritis, hospital admission in the past year, more than 6 physician visits, use of visiting nurses in the past year, no informal caregiver available, functional limitation, more than one fall in the past year, visual impairment, incontinence, cognitive impairment, and hearing impairment	repeated hospital admission
Cafferata (1987)*	age, gender, race, education, job, marital status, living arrangements, and chronic diseases	number of physician personnel per 1,000 population, family income, and insurance status	perceived health status, concern about health status, a particular physician as usual source of care, bed disability days, physician visits in the past year, and ever hospitalized in the past year	hospital admissions and physician visits
Chappell & Blandford (1987)*	gender, age, marital status, living arrangements, education, country of birth, ethnicity, religion, and major occupation	total income and social support	perceived health, number of sick days in the past year, number of hospitalized days in the past year, number of chronic conditions, and functional disability	utilization of home health care services, physician, and hospital services

Chiang (1989)*	age, gender, marital status, education, living arrangements, perceived distance barrier, and perceived cost barrier	employment status, insurance coverage, regular medical care system, a regular source of care, and residence	self-perceived health status, number of chronic diseases, ADLs, and bed disability days	use of hospital services
Evashwick, Rowe, Diehr, & Branch (1984)*	age, gender, race, education, household composition, and marital status	income, occupation, health insurance, transportation, and having regular physician	ADLs, physical conditions, and perceived health status	use of hospitals, physician services, and home care
Eve (1988)*	age, marital status, education, race, head of household, living children, retirement, previous health status, and disabled in a previous year	annual family income, satisfied with life, able to get along on income, private health insurance, Medicare coverage, and previous use of health services	disabled and self-reported health status	the number of hospitalizations in the past year, the number of physician visits in the past year, and number of nights in the hospital in the past year

Ginsberg, Israeli, Cohen, and Stessman (1996)*	background of military service, World War II experience, family status, migration, living conditions, religious practices, education, and employment status	health care access and satisfaction, self-reported health status, health care utilization, support networks, and physical aids	use of medicines and ADLs	ER visits in the past year
Kempen & Suurmeijer (1991)*	age, gender, living arrangement, education, and social network	income, amount of informal care, amount of social/emotional support received	ADLs and IADLs, depression, feeling of loneliness, and satisfaction with health	use of professional home health care
McCallum, Simons, J Simons, Wilson, Sadler, & Owen (1996)	gender, age, and marital status, and living alone	income, private health insurance, education, owning a private house, having a friend, and having a pet	functional status, self-reported health, health problems prior to the onset of illness, and doctor visits in the three months before interview, hospitalization in the six months before interview, depression, diabetes, and previous coronary artery diseases	use of home care

Mutran & Ferraro (1988)*	gender, race, education, and age	income, urban residence, marital status, and Medicaid enrollment	chronic illness, serious illness, disability, and self-assessed health	Hospital and physician services
Wolinsky & Coe (1984)*	gender, age, marital status, living arrangements, race, education, retirement status, and labor force participation	a regular source of care, a telephone in the home, income level, private health insurance, Medicaid coverage, Medicare coverage, and community resource's dimension	perceived limited activity, overall health status, and body mass ratio	use of hospital and physician services in the past year

Wolinsky, Culler, Callahan, and Johnson (1994)*	age, race, education, a set of two dummy variables reflecting living arrangements, kin support, and non-kin support	having private insurance coverage in both physician visits and hospital, population density, financial dependence on Social Security, and a set of three dummy variables reflecting geographic regions	perceived health status, diagnoses, had a disease, functional status, lower body limitations, and upper body limitations. Functional status was subdivided to three parts: five basic ADLs, three household ADLs, and three Advanced ADLs.	length of stay and total patient costs
Wolinsky & Johnson (1991)*	age, gender, race, living arrangements, marriage, multigenerational family, telephone, education, kin support, nonkin support, health worries, and health control	health insurance, Medicaid, residential stability, population density, and social security dependence	perceived health, basic ADLs, household ADLs, lower body limitations, and upper body limitation	home health services, number of physician visits, number of hospital nights, and nursing home contacts

Wu, Liang, Chang, Lin, and Maloy (1994)*	age, gender, education, economic status, and social support		chronic conditions, functional status, self-rated health, and mental health status	the utilization of hospital days, western medicine physician visits, Chinese medicine physician visits, western pharmacy visits, and Chinese drug store visits in the past month

* Study population was a group of community-dwelling elderly

Table F2

Summary of Independent Variables and Dependent Variables in Non-Andersen Studies

Authors	Independent Variables	Dependent Variables
Evans, Hendricks, Lawrence, and Bishop (1988)	age 75 or over, emergency admission, unmarried, less than subsistence level income, a prior hospital admission within the past 2 months, living arrangements (living alone or admitted from a skilled nursing care facility), incontinence, poor mental status, dependent self care (need for human assistance to dress, groom, or eat), terminal illness, psychiatric comorbidity, unemployed, two or more chronic medical problems, poor social support, and alcoholism	LOS, readmission, NH admissions
Fethke, Smith, & Johnson (1986)	age, education, gender, marital status, being widowed, self-reports of health and physical function, a prior to hospitalization, major life events, information on availability of family and social support systems, measures of the patient's emotional resources, medical history, primary and secondary diagnoses, and postdischarge orders	readmission
Hall, Deldstein, Fretwell, Rowe, and Epstein (1990)	gender, education, occupation, income sufficiency (in a three-point scale), living arrangements (living alone or not), married status, social contacts, emotional status, functional status (i.e., body care and movement, mobility, ambulation, and home management), and cognitive function (mini-mental test)	patient satisfaction
Incalzi, Gemma, Capparella, Terranova, Porcedda, Tresalti, & Carbonin (1992)	gender, age, living location, living arrangements prior to admission, the primary diagnosis, the number of additional diagnosis, and amount of prescribed medications	LOS

Lee and Kasper (1998)	age, race, marital status, income, education, and supplemental insurance, number of limitations in ADLs and IADLs.	patient satisfaction
McClaran, Berglas, and Franco (1996)	age, marital status, number of living children, children living in the Montreal area, the service of admission, diagnosis, date of admission, and date of discharge	LOS
Narain, Rubenstein, Wieland, Rosbrook, Strome, Pietruszka, and Morley (1988)	age, ethnicity, marital status, living location, and active medical problems, diagnoses, prescription medications, ADLs (a 7-point scale including the six Lawton ADL items and plus transferring), and mental status	LOS
Reiley & Howard (1995)	age, gender, race, type of insurance, whether the patient lives with next of kin, patient sensory/perceptual impairment, prior hospitalizations (within 6 months), functional status, and severity of illness	LOS
Rudberg, Sager, and Zhang (1996)	age, gender, race, living arrangements, hospital site, primary diagnosis, secondary diagnosis, ADLs, IADLs, Mini-mental State Examination, and length of stay	NH admissions
Sager, Franke, Inouye, Landefeld, Morgan, Rudberg, Siebens, and Winograd (1996)	age, gender, race, marital status, and living arrangements	functional status
Winograd, Lindenberger, Chavez, Mauricio, Shi, and Bloch (1997)	age, marital status, living arrangements, caregiver status, residence at admission, number of geriatric conditions, number of geriatric diseases, principal diagnosis, number of medical diagnoses, ADLs, IADLs, Mini-mental State Examination, geriatric depression scale, self-reported physical functioning scale, and physical performance and mobility examination.	improvement of functional status

Wu, Damiano, Lynn, Alzola, Teno, Landefeld, Desbiens, Tsevat, Mayor-Oakes, Harrell Jr. & Knaus (1995)	age, gender, race, diagnosis, Glasgow coma score, quality of life, Duke activity status index two weeks before admission, and limitation in ADLs two weeks before admission	patient function two months after admission

Appendix G

Measures of Functional Status in Previous Literature

Authors	Functional status
Chappell & Blandford (1987)	The functional status was measured by using the telephone, bathing, cutting toenails, taking medications, needing skilled nursing care, watching TV, feeding, dressing, and moving around without help.
De Veer and De Bakker (1994)	Eleven items were used for measuring ADLs such as dressing, washing themselves, and taking care of feet/nails. Seven items were used for measuring IADLs such as preparing dinner, easy house cleaning activities, and bed making.
Incalzi, Gemma, Capparella, Terranova, Porcedda, Tresalti, & Carbonin (1992)	Activities of daily living, score of mini-mental state examination, and the geriatric depression Scale
Inouye, Wagner, Acampora, Horwitz, Cooney, Hurst, & Tinetti (1993)	ADLs were measured by five items: feeding, bathing, grooming, dressing, and toileting. Transferring and walking were included in mobility ADLs.
Kempen & Suurmeijer (1991)	The ADL tasks were dressing, getting in/out of bed, arising from a chair, washing face/hands, eating/drinking, washing self completely, using the toilet, moving around inside the house, going up/down stairs, moving around outdoors on flat ground, taking care of feet/nails. The IADL tasks were preparing dinner, preparing breakfast/lunch, 'light' house cleaning activities, 'heavy' house cleaning activities, washing/ironing clothes, bed making and shopping.

Sager, Franke, Inouye, Landefeld, Morgan, Rudberg, Siebens, and Winograd (1996)	ADLs were measured by bathing, eating, toileting, dressing, transferring, walking. IADLs were measured by telephoning, shopping, using transportation, preparing meals, doing housework, taking medications, and managing finances,
Tennstedt, McKinlay, and Kasten (1994)	Personal ADLs were bathing, eating, toileting, dressing, transfer, and taking medication. IADLs were light and heavy housecleaning, meal preparation, laundry, shopping, transportation, managing finances, and arranging for health or social services.
Winograd, Lindenberger, Chavez, Mauricio, Shi, and Bloch (1997)	The Physical Performance and Mobility Examination assesses a patient's ability to perform 6 physical tasks: (1) bed mobility, (2) transfer skills, (3) multiple stands from a chair, (4) standing balance, (5) step-up, and (6) ambulation.
Wolinsky, Culler, Callahan, and Johnson (1994)	Basic ADLs were measured by bathing, dressing, getting out of bed, toileting, and getting outside. Household ADLs included meal preparation, shopping, and light and heavy housework. Advanced ADLs involved the difficulties with managing money, using the telephone, and eating.
Wu, Damiano, Lynn, Alzola, Teno, Landefeld, Desbiens, Tsevat, Mayor-Oakes, Harrell Jr. & Knaus (1995)	ADLs included eating, continence, toileting, transferring, bathing, dressing, and walking
Wu, Liang, Chang, Lin, and Maloy (1994)	ADL was measured by one item, "difficulty in bathing." IADLs were a composite of five items: shopping, managing money, using the telephone, doing heavy work in or around the house, and taking a bus or train.

Appendix H
RESPONSE BIAS ANALYSIS

Table H1

Comparison of Participation and Non-participation on Patient Predisposing Factors[a]

Variables	Study Participants (N = 78) %(n)	Non-Participants (N = 29) %(n)
Age		
65 - 74 Years	48.7 (38)	48.3 (14)
≥ 75 Years	51.3 (40)	51.7 (15)
Gender		
Female	61.5 (48)	65.5 (19)
Male	38.5 (30)	34.5 (10)
Marital Status		
Married	48.7 (38)	35.7 (10)
Widowed & Single	51.3 (40)	64.3 (18)
Education		
None	41.3 (31)	60.7 (17)
1-6 Years	49.3 (37)	32.1 (9)
> 6 Years	9.3 (7)	7.1 (2)
Living Arrangements		
Alone	5.2 (4)	3.7 (1)
Spouse Only	16.9 (13)	3.7 (1)
Spouse and Children	14.3 (11)	25.9 (7)
Spouse, Children & Grandchildren	58.4 (45)	59.3 (16)
Other	5.2 (4)	7.4 (2)
Job Status		
Never Had a Job	41.3 (26)	40.0 (6)
Retired	52.4 (33)	60.0 (9)
Working	6.3 (4)	0

Notes:
Age: M=76(SD=6) and range= 66-8 for study participants and M=76(SD=5) and range=67-85 for non-participants
Year of education: M=4.4 (SD=4.5) and range=0-16 for study participants and M=2.8 (SD=4.2) and Range=0-13 for non-participants
[a] There were no significant differences between participants and non-participants on the predisposing factors

Table H2

Comparison of Participation and Non-participation on Patient-Related Enabling Factors (N = 107)

Variables	Study Participants (N = 78) % (n)	Non-Participants (N = 29) % (n)
Social Support		
Family	94.9 (74)	96.4 (27)
Other	5.1 (4)	3.6 (1)
Individual Income Status		
None	9.1 (7)	14.3 (1)
< 9,999 NT	53.2 (41)	46.4 (13)
More than 10,000 NT	37.7 (29)	39.3 (11)
Family Economic Status (n = 56)		
Low-income	46.2 (24)	75.0 (3)
Mild	11.5 (6)	0
Better	42.3 (22)	25.0 (1)
The Previous Use of Health Care Services		
ER Visits	53.2 (41)	48.1 (13)
Hospital	55.1 (43)	70.4 (19)
Nursing Home Admission*	2.6 (2)	18.5 (5)
Home Health Care	6.6 (5)	12.0 (3)
Physician Visits	88.5 (69)	88.5 (23)

* $p < .005$

Table H3 Comparison of Participation and Non-participation on Need Characteristics (N = 107)

Variables	Study Participants (N = 78) %(N)	Non-Participants (N = 29) %(N)
Primary Diagnosis		
Neoplasms	7.9(6)	4.5(1)
Circulatory	25.0(19)	9.1(2)
Respiratory	14.5(11)	27.3(6)
Digestive	11.8(9)	22.7(5)
Genitourinary	18.4(14)	9.1(2)
Other	22.4(17)	27.3(6)
Mean of ADLs* (SD)	3.78(2.31)	5.11(1.53)
Mean of IADLs* (SD)	4.37(1.80)	5.46(.81)
Level of Consciousness*		
Alert	84.6(66)	53.6(15)
Lethargic	6.4(5)	21.4(6)
Obtunded	7.7(6)	7.1(2)
Stupor/comatose	1.3(1)	17.9(5)
Cognitive Status		
No Impairment	56.4(31)	53.3(8)
Mild Impairment	25.5(14)	13.3(2)
Moderate Impairment	14.5(8)	33.3(5)
Severe Impairment	3.6(2)	0
Sensory Deficits		
None	78.9(56)	66.7(14)
Hearing	5.6(4)	9.5(2)
Visual	7.0(5)	4.8(1)
Both	8.5(6)	19.0(4)
Multiple Medical Problems		
No	37.2(29)	29.6(8)
Yes	62.8(49)	70.3(19)
Need for Discharge Planning		
No	81.6(62)	63.6(14)
Yes	18.4(14)	36.4(8)

* $p < .05$

Appendix I
Preliminary Assessment

I am looking for .....? Study Number: _____

What is your first name? Answer is (0) incorrectly (1) correctly

[the interviewer should check-on patient]

A. Preliminary Assessment

1. Date of Birth: _____

2. The Discharge Planning Screening

ITEMS	0	1	2	score
1. Conscious	Clear	Confused	Coma	
2. Activities	Independent	Needs Help	Dependent	
3. Eating	Independent	Needs Help	NG, TPN	
4. Incontinent	Independent	Needs Help	Catheter tube	
5. Resp. Style	Independent	Trachea Tube	Ventilator	
6. Need for Oxygen	No	Needed for Activities	Needed for any time	
7. Pressure Sore	No	1, 2 degree	>3 degree	
8. Pain Levels	No	Medium (3-7)	Severe (8-10)	
@patients who received a score greater than 1 will be included in this study.				

3. The patient agrees to participate in this study:

We invite you to participate in a research project to determine the effects of discharge planning on patient outcomes and costs for hospitalized patients. You are being asked to participate twice, once while you are in the hospital and a second time fourteen days after discharge from the hospital. In the admission interview, you will be asked about your health, your previous use of health care services, and the types of medication you were taking before admission. In the postdischarge interview, you will be asked about your health status, if you are being readmitted to the hospital, any services needed for helping you in your daily living activities, and your satisfaction with your hospital care. The investigator will collect additional information about you from your medical chart, such as charges for hospitalization, treatment, and length of stay.

Although there may be no direct benefit to you from this study, your participation will help identify which components of the discharge planning process are the best ones to be used for the elderly by those at the university teaching hospital.

Participation in this study entails no risk or discomfort to you. All information obtained during this study will be kept strictly confidential. Your name, address, and telephone number are only used to keep contact with you; they will not be made available to the public. Participation will be anonymous. If the results of this study are published, your name or identifying information will not be used.

Do you agree to participate in this study?

(0) No (1) Yes

Admission Assessment

Study Number: _____ Date: _____ Interviewee: (1) Patient (2) Caregiver

B. Patient Characteristics

Now, I'd like to ask some questions about yourself.

I. Demographics:

1. Are you single, married, widowed, or other?
   (1) single (2) married (3) widowed (4) other _____

2. How many years of education have you received? _____ years

3. Do you have a job?
   (0) No, go to 3a (1) Yes, go to 4
   3a. Are you retired?
   (0) No (1) Yes, go to 4

4. How much income of your own do you receive a month (e.g., pension, interests, rental)[show income ladder to subjects and circle the letter which identifies patient income category]?
   (0) None (1) less than - 9,999 NT
   (2) 10,000 - 19,999 NT (3) 20,000 - 29,999 NT
   (4) 30,000 - 39,999 NT (5) 40,000 - 49,999 NT
   (6) 50,000 - 59,999 NT (7) more than 60,000 NT
   (8) Unknown

5. How much income do you have a month in your household (include you, your spouse, or anyone who can provide money to household living cost. The items include salary, interests, and rental)?
   (1) less than 9,999 NT (2) 10,000-19,999 NT
   (3) 20,000-29,999 NT (4) 30,000-39,999 NT
   (5) 40,000-49,999 NT (6) 50,000-59,999 NT
   (7) 60,000-69,999 NT (8) 70,000-79,999 NT
   (9) more than 80,000 NT

6. Can you get any help at home when you are sick?
   (0) No
   (1) Yes; family support
   (2) Yes; friends' support
   (3) Other: _____

7. Do you have National Health Insurance?
   (0) No (1) Yes

8. How were you admitted to the university teaching hospital?
   (1) Emergency room

(2) Outpatient department
(3) Other: _____

9. Where were you admitted from?
(0) home (1) other hospitals (2) Nursing homes (3) Others: _____

10. How many active medical conditions do you have? (examples include eye disorders, cardiovascular disease, cancer, confusion or dementia, hearing disorders, gastrointestinal disorders, infectious disease, pulmonary disease, and cerebrovascular disease; genitourinary disorders, arthritis, alcoholism, diabetes, fractures, hypertension, psychiatric disorders, renal disease, and skin disease.)
Number: _____

II. Previous Utilization of Health Care Services
Let's talk about your previous uses of health care services.

1. Have you been admitted to an emergency room for physical health problems in the past year before admission?
(0) No (1) Yes, go to 1a
1a. Are the reasons the same for this admission?
(0) No (1) Yes

2. Have you been admitted in a western medicine hospital for physical health problems in the past year before admission?
(0) No (1) Yes, go to 2a
2a. Are the reasons the same for this admission?
(0) No (1) Yes

3. Have you been admitted in a nursing home for physical health problems in the past year before admission?
(0) No (1) Yes

4. Have you visited a Chinese Medicine doctor for physical health problems in the past year before admission?
(0) No (1) Yes, go to 4a
4a. Are the reasons the same for this admission?
(0) No (1) Yes

5. Have you visited a western medicine doctor for physical health problems in the past year before admission?
(0) No (1) Yes, go to 5a
5a. Are the reasons the same for this admission?
(0) No (1) Yes

6. Have you been visited by home health nurses in the past year before admission?
(0) No (1) Yes, go to 6a
6a. Are the reasons the same for this admission?
(0) No (1) Yes

III. Health status

1. Functional Status

Variables	Independent	Independent with assistance	Dependent
(a) Eating/feeding	0	1	2
(b) Bathing/grooming	0	1	2
(c) Toileting	0	1	2
(d) Transferring	0	1	2
(e) Incontinent of bowel/bladder function	0	1	2
(f) Dressing	0	1	2
(g) Meal preparation	0	1	2
(h) Responsible for own medication administration	0	1	2
(i) Handling own finances	0	1	2
(j) Grocery shopping	0	1	2
(k) Walking	0	1	2
(l) Bus ride	0	1	2

2. Level of consciousness
   (1) Alert
   (2) Lethargic (or somnolent)
   (3) Obtunded
   (4) Stupor or semi-coma
   (5) Coma

3. Sensory Deficits
   (0) None
   (1) Visual deficits
   (2) Hearing deficits
   (3) Visual and Hearing deficits

4. Cognitive Status: Short Portable Mental Status Questionnaire (SPMSQ) (Pfeiffer, 1975)
[Ask questions 1-10 and record all answers. Check correct (+) or incorrect (-) for each, and record total number of errors based on ten questions.]
I would like to ask you questions about time, place and yourself that can help people measure their health status.

(+)	(-)		
____	____	1.	What is the date today? _____(month/day/year)
____	____	2.	What day of the week is it? _____
____	____	3.	What is the name of this place? _____
____	____	4.	How old are you?
____	____	5.	What is your telephone number? (ask question 5a only if subject has no telephone)
			5a. [Ask only if subject does not have a phone.] What is you street address? _____.
____	____	6.	When were you born? _____(month/day/year)
____	____	7.	Who is the president of the Taiwan now? _____
____	____	8.	Who was the president just before him? _____
____	____	9.	What is your mother's maiden name?
____	____	10.	Subtract 3 from 20 and then subtract 3 from each answer, all the way down. _____ [correct answer is: 17, 14,11, 8, 5, 2]
_____			Total number of errors

Admission Inpatient Chart Review

Study Number: _____

C. Data collected within 48 hours at admission

1. Date of admission: _____ (month/day).

2. Gender: (1) Male (2) Female

3. Wards: (1) 3B (2) 6B (3) 7B
(4) 8B (5) 9B (6) 10B

4. Contact person: _____; Phone: _____

Address : _____

Discharge Inpatient Chart Review

Study number: _____

D. The Duty Schedule of the Head Nurse

1. Is the head nurse on duty or not when the patient was admitted?
(0) No (1) Yes

2. Nursing hours/per month when the patient was in the hospital. _____hours.

E. Cost of the hospitalization

1. Paid by the National Health Insurance _____ NT.
2. Paid by the patient _____NT.
3. Paid by other _____NT.

F. Data collected after discharge

1. Did the patient qualify for discharge planning by a primary nurse?
(0) No, (1) yes,

2. Date of discharge: _____ (Month/day/year).

3. Length of Hospital Stay: _____ Days

4. Primary discharge diagnosis: _____

5. Secondary discharge diagnosis: _____.

Post-Discharge Interview

Study number: _____ Date: _____ Interviewee: (1) Patient (2) Caregiver

G. Functional Status

Variables	Independent	Independent with assistance	Dependent
(a) Eating/feeding	0	1	2
(b) Bathing/grooming	0	1	2
(c) Toileting	0	1	2
(d) Transferring	0	1	2
(e) Incontinent	0	1	2
(f) Dressing	0	1	2
(g) Meal preparation	0	1	2
(h) Responsible for own medication administration	0	1	2
(i) Handling own finances	0	1	2
(j) Grocery shopping	0	1	2
(k) Walking	0	1	2
(l) Bus ride	0	1	2

H. Unmet Needs

Now, I'd like to ask you whether you need help with the following items.

1. Do you need any help with the following?

Items	No	Yes
(m) Climbing stairs	0	1
(n) Do you need skilled nursing care with the use of an IV, catheterization, or with your bed sores, and any wounds, etc?	0	1
(o) Do you need information about diseases, medicine, diet, rules of life, etc?	0	1

2. Do you have someone to help you with the list above?
[only ask questions about items where patients indicate needing help]

Items	without help at most time	without help at sometime	with some help	always enough help
(a) Eating/feeding	1	2	3	4
(b) Bathing/grooming	1	2	3	4
(c) Toileting	1	2	3	4
(d) Transferring	1	2	3	4
(e) Incontinent	1	2	3	4
(f) Dressing	1	2	3	4
(g) Meal preparation	1	2	3	4
(h) Responsible for own medication administration	1	2	3	4
(i) Handling own finances	1	2	3	4
(j) Grocery shopping	1	2	3	4
(k) Walking	1	2	3	4
(l) Bus ride	1	2	3	4
(m) Climbing stairs	1	2	3	4
(n) Skilled nursing care (e.g., IV, catheterization, care of pressure sores and wounds)	1	2	3	4
(o) Information (e.g., diseases, medicine, diet, rules of life)	1	2	3	4

I. Patient satisfaction

I would like to ask you for your opinion regarding the services you received in the UTH. How satisfied were you with the following items? [Show the ladder of satisfaction to the patients]. Very Satisfied: VS; Somewhat Satisfied: SS; No Opinion: NO; Somewhat Dissatisfied: SDS; Very Dissatisfied: VDS.

Variables	VDS	SDS	NO	SS	VS
Preparation of Discharge					
1. The way the nurses showed you how to manage your medications when you were ready to go home.	1	2	3	4	5
2. The nurses showed you how to take care of yourself at home (e.g., diet, follow-up care).	1	2	3	4	5
3. The nurses cared about your questions during the hospitalization regarding your concerns about staying at home after discharge.	1	2	3	4	5
4. You feel you were pushed by the hospital staff to be discharged from the hospital.	1	2	3	4	5
5. Are you satisfied with your care at home at this time?	1	2	3	4	5
Total hospital care					
6. The nurses understood when you shared your problems.	1	2	3	4	5
7. Overall, your pain and other symptoms were reduced during hospitalization.	1	2	3	4	5
8. Overall, you got care that you needed during the hospitalization.	1	2	3	4	5
9. Overall, were you satisfied with hospital care?	1	2	3	4	5

10. Will you suggest to your friends who have the same diseases as you to be tereated at the UTH?

(0) No (1) Yes

11. Other concerns: _____

_____

J. Postdischarge Resource Use

1. Have you been admitted to an emergency room since discharge?
   (0) No (1) Yes

2. Have you been admitted to a hospital since discharge?
   (0) No (1) Yes

3. Have you been admitted to a nursing home since discharge?
   (0) No (1) Yes

4. Have you been visited by a home health care nurse since discharge?
   (0) No (1) Yes

5. Have you hired an assistant to help you in daily activities?
   (0) No (1) Yes

Appendix J
The Investigator Training Program

Purpose:

Investigators will have the knowledge and skill to interview participants.

Two-day Training: Two Six-Hour Sessions

The first day

1. Introduction to the background of the study problem, the purpose of the study, and survey methods
2. Introduction and discussion of the interview schedule
3. Introduction of techniques of interviews
4. The interviewer's responsibilities
5. Interview demonstration
6. Practice interviewing: Role play to be an interviewer and an interviewee repeated trails with principal interviewer or without the principal interviewer

The second day

1. The interviewer's responsibilities
2. Interview demonstration
3. Practice interviewing: Role play to be an interviewer and an interviewee repeated trails with principal interviewer or without the principal interviewer
4. Questions and answers

The interview (General):

1. Interviewers must present a neat appearance and be as much like respondents in demographic characteristics as possible.
2. Interviewers must be friendly, encouraging, punctual, courteous, and accept all responses without disapproval, approval, or surprise.
3. Using a conversational tone rather than just reading questions is appropriate, and questions should follow the wording of the interview schedule.
4. If the participant does not understand a question, it should be repeated as originally worded rather than making extensive departures from the schedule.
5. Interviewers should fully understand the interview schedule during training sessions in which interviewers role play interviewing and being interviewed in order to gain greater familiarity with the schedule and how the participants might feel.
6. The interviewer generally pauses to indicate more is needed and if nothing is forthcoming, repeats the question. If the same response is received, the interviewer must gently probe with nondirective or neutral comments like "Could you explain that some more?" or "anything else?" Probing must in no way hint at the nature of a response desired or otherwise influence it. If still the same, go to the next question, then come back to the question later.
7. Interviewers will interview the participant within 48 hours of admission and two weeks after discharge.

8. Be patient when participants want to talk about something else, then wait for a better chance to come back to the topic.
9. There are ways to help the participant recall the answers. The participant may have recall problems such as times of physician visits, hospital admission, nursing home admission and home health nurse visits (Anchor to holiday to assist participant's recall).

Steps of the interview:

a. Introduce ourselves.
b. Explain the purpose of the study, get verbal agreement.
c. Create friendly atmosphere.
d. Observe nonverbal responses from participants.
e. Go through all questions one by one at first interview.
f. Create a good relationship and make appointment for second interview. Give a business card that the participant and his or her primary informal caregiver can contact us if needed.
g. Call the participant three days before visiting them at home to make sure the participants and primary informal caregivers are ready to be interviewed.
h. Visit participants at home, express concern regarding the patient's health to make sure that the participant's recovery is progressing smoothly.
i. Go through the interview schedule one by one with the participant. If the participants are not able to answer the questions because of physical problems, then primary informal caregivers can answer the questions for the participants.
j. Express appreciation to them.
k. Finish the interview.

Document review:

In the beginning, the principal interviewer should show how to find the data in a medical record or an inpatient chart. The principal interviewer collects three inpatient records and asks investigators to review the same files once again. The difference should be minimized as much as possible, so we can to assure the inter-rater reliability.

Follow-up

Randomly select approximately 10% of the completed interviews submitted and telephone participants to ask whether the interview occurred.

References

Frey, J. H., & Oishi, S. M. (1995). How to conduct interviews by telephone and in person. CA: Sage Publications.
Shelley, S. I. (1984). Research methods in nursing and health. Boston: Little, Brown and Company.

Appendix K

Description of Nursing Units in the University Teaching Hospital

Data	Unit A[a]	Unit B	Unit C	Unit D	Unit E	Unit F
Number of beds	24	28	57	50	58	50
Occupied rate (beds) (%)	99.2	98.2	99.6	97.0	96.4	99.7
Patient turnover rate (%)	19.1	24.4	21.7	24.5	28.1	23
Nursing hours	2.34	2.22	1.88	1.89	1.90	1.90
Number of nurses	12	12	21	18	22	19
Mean working years of primary nurses	2.0	1.50	2.6	2.94	2.33	1.76
Nurse turnover rate (%)	16.6	0	0	5.5	0	5
Discharge planning training rate (%)	58.3	100.0	100.0	100.0	100.0	42.0

[a] Unit A was the newest unit compared to other units. It was established in 1997; other units were established 7 years ago

Appendix L

The Classification of Diagnoses Based on the ICD-9

Name	ICD-9 A-code
Infection & parasitic diseases	001-139
Neoplasms	140-239
Endocrine, nutritional, & metabolic diseases & immunity disorders	240-279
Diseases of the blood & blood-forming organs	280-289
Mental diseases	290-319
Diseases of the nervous system & sense organs	320-389
Diseases of the circulatory system	390-459
Diseases of the respiratory system	460-519
Diseases of the digestive system	520-579
Diseases of the genitourinary system	580-629
Complication of pregnancy, childbirth, & the puerperium	630-677
Diseases of the skin & subcutaneous tissue	680-709
Diseases of musculoskeletal system & connective tissue	710-739
Congenital anomalies	740-759
Symptoms, signs, & ill-defined conditions	780-799
Injury & poisoning	800-999

Autobiographical Statement

Chouh-Jiaun Lin was born in Keelung, Taiwan, and attended the public schools there. She graduated from Keelung Ladies High School in 1975. Four years later she received her Bachelor of Science in Nursing from the China Medical College. She received her Master's degree in Science of Nursing in 1988 from the University of Dubuque.

Chouh-Jiaun Lin worked for two years as a clinic primary nurse in the Tri-Service General Hospital. She was also a head nurse at the Nursing Department in the China Medical College Pei-Kung Hospital for three years and a supervisor for one year. She has served as an instructor for the China Medical College since 1984.

Chouh-Jiaun is a member of The Nurses' Association of ROC, The Chinese Medicine Association of ROC, and The Long-Term Care Professionals Association of ROC. She also is a member of Sigma Theta Tau International National Honor Society of Nursing, Gerontology Society of America, and Association for Gerontology in Higher Education in the U.S. She has published several papers in professional journals either Chinese or English. She also presented a paper at the Annual Scientific Meeting of Gerontology Society of American in November 1998. She has been married for three years to Chu-Yen Hsu and they have one son--Matthew.