4-22-1999

Can a Multidisciplinary Team Decrease Hospital Length of Stay for Elderly Trauma Patients?

Beth A. Ramsey
Grand Valley State University

CAN A MULTIDISCIPLINARY TEAM DECREASE HOSPITAL LENGTH OF STAY FOR ELDERLY TRAUMA PATIENTS?

By

Beth A. Ramsey

A THESIS

Submitted to
Grand Valley State University
in partial fulfillment of the requirements for
the degree of

MASTER OF SCIENCE IN NURSING

Kirkhof School of Nursing

1999

Thesis Committee Members:

Phyllis Gendler, Ph.D., R.N., C.S.

Kay Setter Kline, Ph.D., R.N.

Ulrike Berzau, M.M., M.H.S., P.T.

CAN A MULTIDISCIPLINARY TEAM DECREASE HOSPITAL LENGTH OF STAY FOR ELDERLY TRAUMA PATIENTS?

Beth A. Ramsey

4-22-99

ABSTRACT

CAN A MULTIDISCIPLINARY TEAM DECREASE HOSPITAL LENGTH OF STAY FOR ELDERLY TRAUMA PATIENTS?

Elderly trauma patients often experience prolonged hospital stays. This study was done to determine if a multidisciplinary team approach to patient care would decrease hospital length of stay (LOS) for elderly trauma patients in the intensive care unit (ICU). Using a descriptive, correlational design, a convenience sample of 74 elderly patients aged 65 to 99 years was obtained from a trauma registry. The hypothesis that hospital LOS decreases for elderly trauma patients in the ICU who have a team approach to care was not supported using the *t*-test for independent means ($t=1.6$, $df=72$, $p=.114$). A second hypothesis proposed that the earlier that initial team assessment occurs the shorter the hospital LOS for elderly trauma patients in the ICU. This hypothesis was supported in relation to the clinical nurse specialist (CNS)($r=.36$, $p=.014$) and the speech-language pathologist ($r=.47$, $p=.001$) using the Pearson's r correlation. This study supports early CNS interventions and nursing practice based on the Neuman Systems Model and affirms the role of the CNS in the multidisciplinary team management of the multiply injured patient.

DEDICATION

This is dedicated with love to my husband Steve, my son Jonathan, my daughter Katie, and my son-in-law Toby, for their strength and support throughout this project. I also want to thank my friend and colleague, Shelley Smith, for all her professional assistance.

Table of Contents

List of Tables

Figures

List of Appendices

CHAPTER ONE

INTRODUCTION

Trauma and the Elderly

In the next ten minutes, trauma will kill two persons in the United States. An additional 390 people will suffer disabling injuries (National Safety Council, 1997). Trauma is responsible for 42% of all emergency room visits (National Safety Council) and 10% to 15% of all hospital admissions (Wilson & Walt, 1996). Of special concern is the growing number of older adults (age 65 years and older) who are likely to become injured. According to Smith, Enderson, and Maull (1990), trauma in the elderly accounts for almost 30,000 deaths each year. The National Health Survey (1994) revealed that trauma to older adults during 1990 added up to 37 billion bed-days of disability, significantly impacting the American health care system. The "baby boomers" will hit age 65 in the year 2011. By 2040, the elderly population will reach a projected total of 68 million people and the "oldest" older adults, people over the age of 85 years, will number 14 million (U.S. Bureau of the Census, 1993). While a certain subset of the elderly population will remain frail, ill, or debilitated, there will be an increasing number of healthy, active, older

adults who will drive automobiles longer and participate in sports and exercise programs well into advanced years. As this healthy, active population increases and as advances in health continue to improve health and prolong active lifestyles, the number of traumatic injuries to older adults could potentially multiply, significantly impacting the utilization of health care resources and the cost of health care in this country.

Health Care Costs

Currently, Americans spend $900 billion per year on health care (Reiley & Howard, 1995) and older adults account for 33% of health care expenditures, exclusive of research costs (Jecker & Schneiderman, 1992). Unintentional trauma in the United States costs $444 billion or $4,500 per household per year (National Safety Council, 1997). The diagnosis related group (DRG) prospective payment system has been designed to reduce national health care costs by providing a payment incentive to decrease hospital length of stay (LOS) (Lutjens, 1993). However, the DRG system grossly underestimates costs in elderly trauma patients, especially if there is a severe head injury, one or more complications, or age more than 80 years (Schwab & Kauder, 1992). Under today's managed care systems, hospitals make a profit if the

amount of reimbursement is more than the cost of care delivery. This means that hospitals are under pressure to decrease the cost of care while maintaining high standards. With each additional day of hospitalization, health care costs rise.

Intensive Care Units (ICUs)

Hospitals first created intensive care units in the 1960s and now ICUs account for almost 7% of the total U.S. beds and 20% to 30% of hospital costs (Knaus, Wagner, Zimmerman, & Draper, 1993). It can be very expensive to stay in an ICU because of the high ratio of nurses to patients. For elderly patients who survive trauma, ICU length of stay can be affected by a variety of factors such as age (Covington, Maxwell, & Clancy, 1993), severity of injury (Smith, Enderson, & Maull, 1990), the presence of pre-existing conditions (Morris, MacKenzie, & Edelstein, 1990), and post-discharge placement related to social and family issues (Schwab & Kauder, 1992). Because the ICU LOS affects hospital LOS and hospital charges, the development of various strategies to reduce LOS in the ICU is a critical issue in geriatric trauma.

Multidisciplinary Team

One strategy that has been developed to improve care and to reduce LOS is the utilization of a multidisciplinary team approach to trauma care. While the ICU nurse is expected to be an expert in critical care nursing, patients need expertise from other disciplines as well. A team of knowledgeable health care providers who are committed to patient-centered care can contribute extensively to the management of the severely injured patient (Neff & Kidd, 1993). Because each team member brings a unique perspective to the group, a variety of patient needs can be identified and addressed.

At the trauma center in this study, members of the multidisciplinary team come from a variety of services, including nursing, medicine, social work, physical therapy, occupational therapy, speech therapy, respiratory therapy, pharmacy, and nutritional services (Spectrum Health-East Campus, 1993). Each person contributes uniquely in a coordinated manner within the team, ensuring a smooth transition for the patient through all phases of care.

Nursing and the Team

The trauma multidisciplinary team in the ICU is coordinated by the nursing director of the unit. This person

ensures that the meetings start and end on time, that the patients are presented in a timely manner, and that the patient's needs and goals are addressed by each member of the team. The ICU staff nurse presents patient information to the team and is responsible for appropriate follow-up of team recommendations. The clinical nurse specialist (CNS) with clinical expertise in a specialty field such as orthopaedics or neurology, helps the team with clinical decision-making and critical thinking. The CNS is an advocate for patient and family decision-making, providing education, support, and continuity throughout the patient's hospital stay (Hickey, Ouimette, & Venegoni, 1996).

Rehabilitation and the Team

Physical therapists evaluate and treat physical deficits resulting from injury as soon after admission as possible in order to prevent secondary complications of immobility (Welch & Anastasas, 1996). As stated in the document Spectrum Health-East Campus (1993), the role of the occupational therapist is to evaluate and treat physical and cognitive deficits resulting from traumatic injury and to provide recommendations for rehabilitation. The speech-language pathologist evaluates swallowing function, communication skills, and underlying cognitive processes,

then recommends appropriate treatment.

Additional Team Members

The roles of other team members are based upon the type of service each member can provide. Social workers counsel trauma patients and their families and contribute information to the team about patient, family, and community resources, discharge placement opportunities, and available financial assistance (Haddock, 1994). According to the document Spectrum Health-East Campus (1993), respiratory therapists evaluate the respiratory conditions of injured patients and suggest treatments or equipment needed to maintain stable ventilation. The pharmacist is responsible for assuring safe, appropriate, and cost-effective medication therapy for injured patients. Registered dieticians assess the nutritional status of the patient, then recommend appropriate tube feedings, enteral or parenteral support, dietary plans, and nutritional education. The trauma surgeon is responsible for integrating the patient's complex medical care into the multidisciplinary process.

Team Process

A request for the multidisciplinary team is a part of the trauma surgeon's admission orders for early facilitation

of team assessment and discharge planning. The team meets twice a week to discuss patient assessments and needs, determine treatments and interventions, and set patient goals. Ongoing assessment and monitoring of patient progress is accomplished individually by each team member on a daily basis. Patient goals and progress toward the goals are documented by each team member in the patient's chart, which is an important part of the team process (Matteson, McConnell, & Linton, 1997). The purpose of the team is to promote the best possible outcome in an efficient and cost-effective manner by resolving problems effectively, decreasing fragmentation of care, and facilitating appropriate LOS (Spectrum Health-East Campus, 1993).

Purpose of the Study

A multidisciplinary team approach to trauma care provides early assessment, evaluation, and treatment of the severely injured elderly patient. But can the implementation of a multidisciplinary team in the ICU decrease hospital LOS for elderly trauma patients? Does the timeliness of each team member's initial assessment affect a patient's LOS?

The purpose of this study is to look at the relationship between hospital LOS and a multidisciplinary team approach to trauma care of the elderly in the ICU. This

study will also examine the impact of timing of initial team assessment on elderly patients' LOS in the hospital.

CHAPTER TWO

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The Neuman Model: Overview

The Betty Neuman Systems Model (Neuman, 1995) provides the conceptual framework for this study. It is an open systems model that focuses on wellness in relationship to environmental stressors and reaction to stress. It involves a holistic approach to nursing care in which each component of a person is understood in relationship to the whole being. Because of this approach, the Neuman model is an appropriate framework for a study involving a variety of health care providers who assess and treat various sub-systems of an individual, yet contribute to the optimal wellness of the whole person. Based on the four concepts of person, environment, health, and nursing, the Neuman Systems Model depicts how the body uses energy to resist stressors and to maintain a healthy equilibrium. If equilibrium cannot be maintained, illness will result due to weakened body defenses. If stressors penetrate the central core of the individual, death can occur.

The Neuman Model: Structure

The central core is the client system, either a person, family, group, or community that consists of unique

characteristics and basic survival factors. The client system is in constant interaction with an internal, external, and created (perceived) environment. The internal environment refers to intrapersonal forces within the client system such as physiological status or past experiences. The external environment involves all forces external to the client system. This includes interpersonal factors such as family relationships and extra personal factors such as financial status. Neuman's created environment includes both the internal and external environments and represents the subconscious mobilization of all system variables such as energy, integrity, values, and beliefs. Stressors are part of the environment. They can be either internal or external, but all stressors produce tension resulting in positive or negative outcomes (Neuman, 1995).

The central core and the concentric rings that surround and protect the core contain five interactive and dynamic attributes of a client system. They are the physiological, psychological, sociocultural, developmental, and spiritual variables that encompass a human being. These variables determine the client system's ability to resist an assault by stressors (Neuman, 1995).

The outer most ring is the flexible line of defense,

represented by a broken line because it is always changing (Neuman, 1995). As the flexible line of defense moves away from the normal line of defense, the wellness of the client escalates and the central core becomes increasingly protected against invasion by stressors. The flexible line of defense can expand or contract quickly to protect the client's normal state and is determined by personal health factors such as nutritional status, amount of exercise and sleep, number of cigarettes smoked, and alcohol consumption.

The next concentric ring is the normal line of defense, represented by a solid line that can expand or contract slowly (Neuman, 1995). If this line is impacted by stressors, illness or instability occurs. This ring portrays client characteristics such as level of health, coping mechanisms, education, and self-esteem.

The inner most rings, closest to the central core, are the lines of resistance, flexible broken lines that are activated automatically when the normal line of defense is initially invaded by a stressor (Neuman, 1995). When the lines of resistance remain intact, a state of health is maintained. But when these lines are invaded by stressors and the client cannot stabilize effectively, energy depletion and death can occur. Activation of the immune

system with mobilization of white blood cells to an injured body site is an example of how the lines of resistance can protect the central core.

The Neuman Model: Concepts

Health and wellness are used synonymously by Neuman and are defined as optimum client stability (Neuman, 1995). Illness is a negative variance headed toward the opposite end of a health-wellness continuum. Reconstitution occurs when the client system is stabilized and individual parts of the system are once again in harmony with the whole (Neuman, 1995).

Nursing's goals are to facilitate client system stability and achieve optimum client functioning. Nursing assessment involves three stages of prevention: primary, secondary, and tertiary (Neuman, 1995). Primary prevention is the identification of and the minimization of potential stressors before they invade the client system. This strengthens the flexible line of defense. Secondary prevention occurs after a stressor has broken through the flexible line of defense and symptoms have occurred. Providing appropriate treatment strengthens the lines of resistance and helps to attain client stability. Tertiary prevention maintains optimal wellness and the highest level

of health by supporting existing client strengths and conserving client energy. The goal of tertiary prevention is to prevent further interaction with stressors that could cause negative outcomes to occur. The Neuman Systems Model guides nursing toward the appropriate level of assessment for optimal client resistance to stressors and maximum client stability.

Integration of this study with Neuman's Model

Based on the Neuman model (Neuman, 1995), the client systems in this study are individuals aged 65 years or older who have suffered traumatic injury. The injury itself is the external stressor that initially invades the flexible line of defense, leaving the normal line of defense and the lines of resistance vulnerable to penetration by other internal and external stressors. If stressors attack the client's central core, survival of the whole client system becomes threatened.

Neuman (1995) theorizes that energy flows continuously between the client system and the environment. The ICU is an external environment in which extra personal stressors such as ventilation machines, halo traction devices, and intravenous fluid lines can impact the client's line of defense, even though these interventions are used to

strengthen the patient's condition. Patient interactions with nurses, physicians, and other health care providers are part of the interpersonal environment. Hospital visiting policies and expected LOS are interpersonal stressors. Intrapersonal stressors can include age, severity of injury, vital signs, and amount of sleep. Neuman's created environment encompasses the client's coping mechanisms and fight for survival as a response to being injured. Because of these injuries, the client system deviates from the previous level of wellness to a state of disequilibrium. Disability, disease, or death could occur if client system stability is not recovered. Figure 1 shows the integration of this study with Neuman's model.

According to Neuman (1995), the goal of nursing is to protect the client system and to achieve optimal functioning levels by decreasing reactions to stressors. As various stressors attempt to permeate all lines of defense, nurses and all team members can use Neuman's model for guidance toward the appropriate level of assessment. When applying assessment strategies, it is important for the nurse and other members of the team to maintain the patient's sense of self-control and self-esteem. This study focuses on the

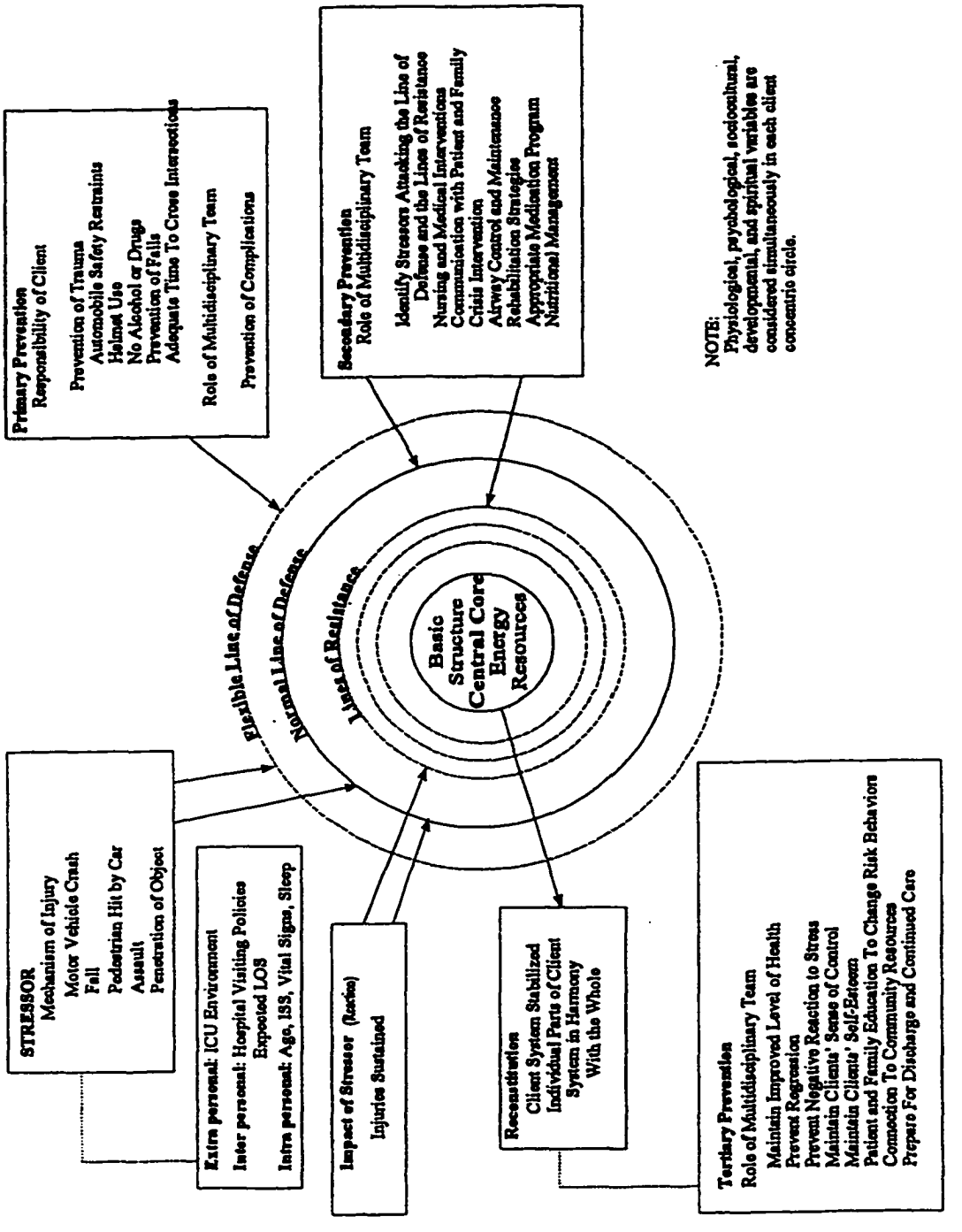

Figure 1. Trauma and multidisciplinary teams applied to the Neuman Systems Model. Adapted from "The Neuman Systems Model", 3rd edition (p.17) by Betty Neuman, 1995. Published by Appleton & Lange. Copied with permission (See Appendix A).

primary, secondary and tertiary levels of prevention to strengthen the normal line of defense and the lines of resistance to prevent destruction of the central core and to restore client system stability.

Integration of Primary, Secondary, and Tertiary Prevention

Primary prevention that focuses on the prevention of traumatic injuries is the responsibility of the client. This involves such activities as wearing seat belts and helmets when using motorized vehicles, removing scatter rugs and dangerous objects to prevent falls, and the avoidance of driving while under the influence of alcohol or drugs. Prevention of complications such as infections, pneumonias, and ulcers while in the ICU is part of the responsibility and goals of the multidisciplinary team.

This team of health care providers can assist the ICU staff nurse at the secondary level of prevention by helping to identify the stressors that are attacking the line of defense and the lines of resistance. After stressors are identified, each team member can recommend or provide appropriate treatment that will lead to client stability with a possible decrease in length of stay. The ICU staff nurse provides secondary care prevention by implementing the nursing process and by being the constant link in

communication between the injured patient, the family, and the team. The clinical nurse specialist provides expert guidance in decision-making for issues such as choice of treatment options or end-of-life concerns. Crisis management by the social worker, maintenance of airway stability by the respiratory therapist, and implementation of rehabilitation strategies by rehabilitation therapists are secondary preventions that can enhance wellness. To strengthen the line of defense and the lines of resistance, the pharmacist can evaluate and recommend appropriate medication for the elderly trauma patient in the ICU, while the registered dietician monitors the nutritional status of the patient and recommends changes in therapy.

Tertiary care prevention by the multidisciplinary team is aimed at maintaining the injured patient's improved level of health and preventing regression or negative responses to stressors. The staff nurse does this by continuing to coordinate patient care, by providing necessary medical treatments, and by supporting the patient and family throughout the ICU stay. At the tertiary level of prevention, the team must educate the patient and family about injury prevention and help them to change risk behaviors. They also need to connect the patient and

significant others to available community resources that deal with issues related to the patient's cause of injury, such as prevention programs that focus on drinking and driving, falls in the home, abuse of the elderly, or medication misuse. At the tertiary level, a multidisciplinary team can help the trauma patient and family to prepare for future discharge by addressing issues such as pain management, wound care, assistance in the home, and facility placement.

With a multidisciplinary team effort that addresses the comprehensive needs of the older trauma patient through primary, secondary and tertiary levels of prevention, length of hospital stay, hospital costs, and resource use could be decreased. Based on these factors, the Neuman Systems Model adequately provides the conceptual framework for this study.

Review of the Literature: Introduction

There were few studies in the health care literature relating hospital LOS to multidisciplinary teams that were involved specifically with severely injured geriatric patients. In comparison to other trauma research, studies focusing on elderly trauma were limited, and scientific studies that focused on a multidisciplinary team approach to injured patient care were scant. Hospital LOS was frequently

discussed in literature, but rarely was it related to multidisciplinary teams. Therefore, this literature review examined several publications related to some variables that were included in trauma research and in this study, including multidisciplinary teams, hospital LOS, severity of injury, age, mechanism of injury, and morbidity and mortality (outcomes).

The Multidisciplinary Team and LOS

A retrospective study of 140 elderly patients (mean age 80.5 years) by Hofmann et al. (1997) at a 400-bed university hospital, concluded that a multidisciplinary geriatric assessment team decreased hospital LOS. Using a two-group descriptive research design, seventy consecutive patients that had been seen by a geriatric assessment team and 70 consecutive patients who had not been involved with the team were analyzed through a review of their medical records. These were not trauma patients in an ICU but they were elderly patients who had been admitted to a general medical-surgical department from nursing homes or the outpatient practices of hospital geriatricians. The non-geriatric team patients spent almost twice as many days in the hospital (16.4 $\pm$ 9.8 days) as the patients who had been cared for by the team (8.6 $\pm$ 4.9 days, $p<.001$).

The implementation of a 25-member multidisciplinary team approach to orthopaedic care by Brita-Rossi et al. (1996) at Beth Israel Hospital in Boston showed a decreased LOS in five targeted DRG groups, along with decreased costs. The cost savings for joint implants amounted to $1,000 per case, and the average LOS for total hip replacement patients decreased from 8.5 days to 4 days. In addition to cost savings and decreased LOS, patient satisfaction remained high due to an excellence in patient-centered care.

Using historical and concurrent control subjects, Webb, Fayad, Wilbur, Thomas, and Brass (1995) studied 2009 stroke patients over a six-year period at the Yale-New Haven Hospital in New Haven, Connecticut. The intervention in the study was consultation by a specialized multidisciplinary stroke team during the last two years of the review period. With the team approach, workups were completed faster, discharge planning began earlier, and complications were detected sooner and managed better. They found that a coordinated, multidisciplinary team approach to stroke care shortened the median hospital LOS from 10 to 8 days ($p<.0001$). The rate of complications decreased with urinary tract infections ($p=.056$) and the patients who did develop infections had a shorter LOS ($p=.0007$). However, there were

no changes in mortality or in LOS for patients with aspiration pneumonia.

Timing of Initial Intervention

Length of stay has been the primary determinant of the use of hospital resources, and in an attempt to decrease LOS, hospitals have often focused on discharge planning (Lutjens, 1993). Three studies looked at the timing of the initial assessment for discharge planning and its effect on LOS.

An experimental study by Farren (1991) looked at 432 medical patients aged 15 to 97 in a southwestern medical center. Length of stay for patients receiving early discharge planning were compared to similar patients with no specific discharge planning protocols. The experiemntal group of 174 patients received discharge planning within 24 hours of admission while 258 patients in the control group received discharge planning only when their physician ordered it. Patients with less than a two day stay were eliminated from both groups. The control group had a median LOS of six days and the experimental group had a median LOS of four days, a difference of two days. These results showed that early discharge planning that occurred within 24 hours of hospital admission significantly reduced LOS ($p<.05$).

Evans, Hendricks, Lawrence-Umlauf, and Bishop (1989) studied 243 patients at the Veterans Affairs Medical Center in Seattle who were receiving social work intervention because of discharge planning. Twenty-one of the subjects were women and 222 were men. Ages ranged from 24 to 92 years. A chart review was used to obtain LOS and Medicare DRG information. A control group was created by inventing patients whose medical diagnoses matched those of the study group. The control group's predicted LOS was determined by computing geometric means of the LOS allowed by each patient's DRG. Timing of intervention was measured using the percentage of hospital stay that had occurred before consultation. The researchers found that the earlier the social work assessment the shorter the LOS. Timing of assessment accounted for 13% of the variance in LOS ($p<.05$).

McGinley, et al. (1996) developed a multidisciplinary discharge planning process at the Frankford Health Care System in Pennsylvania that decreased LOS from 6.7 to 5.4 days for all inpatients. The system that was implemented also improved the timeliness of intervention and patient care delivery. The team members involved nursing, social service, home care, food and nutritional services, physical therapy, and utilization review. An assessment tool and

guidelines for discharge planning were developed for use during the admission process and for reassessment, which improved the timeliness of the intervention.

Age and Trauma

The elderly are predisposed to injury due to the inevitable consequences of aging, such as the accumulation of disease processes and the deterioration of the senses (Santora, Schinco, & Trooskin, 1994). Although older people experience the same type of injuries as younger ones, there are differences in injury patterns that occur with advancing age (Schwab & Kauder, 1992). Once the injuries have occurred, concern arises that complications will develop that could increase LOS and worsen outcomes.

At St. Joseph's Hospital and Medical Center in Phoenix, Schiller, Knox, and Chleborad (1995) studied 3,064 injured patients from their trauma registry over a five year period. Of their total trauma population, 243 (8%) were elderly (age 60 and above). The results showed not only that there was a relationship between age and mortality but that the mean number of hospital days for the elderly group was higher (20 days compared to 13 days) than for younger patients ($p<.025$). Morbidity was also increased for the geriatric group, with cardiac dysrhythmia occurring five times more

often in the elderly than in younger patients. Chest complications, infections, and thrombophlebitis almost doubled, which was statistically significant ($p<.001$) and accounted for much of the increased LOS, cost, and overall mortality. An analysis of causes of blunt trauma demonstrated that automotive injury was predominant for the elderly group.

DeKeyser, Carolan, and Trask (1995) did a comparative study of geriatric and younger trauma patients (n=766) at a suburban trauma center. They grouped trauma patients into three age categories (age 35-54, n=223; age 55-64, n=135; age 65 and older, n=408) and found significant differences between age groups on LOS ($p<.01$). Their conclusion was that the elderly demonstrated longer hospital stays than younger patients.

Phillips, Rond, Kelly, and Swartz (1996) studied 16,432 trauma cases from a nine-county area in Florida, in which 24.2% (n=3980) of the cases were geriatric (age 55 years or older). Nearly 32% of all deaths involved the very old (age 85 years or older) who made up 23.1% of the geriatric population.

Carrillo, Richardson, Malias, Cryer, and Miller (1993) looked at 94 elderly patients with blunt trauma injuries to

determine what impact advanced age had on outcome. Although one-third of the patients developed complications, they found a high survival rate (87%) and a high rate of independent living at home after hospital discharge (87%). Their study also suggested that a prolonged stay in the ICU was not associated with an unfavorable long-term outlook.

A retrospective study in Tennessee by Covington, Maxwell, and Clancy (1993) found that injured elderly adults (age 65 years and older) had longer mean hospital and ICU lengths of stay than younger adults or children. From a registry of 21,214 patients, cause of injury in the geriatric population (n=2808) was examined and it was found that falls caused 68% of the injuries. This was followed by transportation-related injuries (22%), which generated the highest mean hospital charges and the longest mean lengths of stay.

Elderly Survival and Injury Severity Scores (ISS)

Many injury rating scores have evolved over the years, either to triage patients to trauma centers or to predict outcomes. However, most scoring systems do not include age as a variable. Therefore, researchers who have used trauma scoring systems for elderly trauma patients have had differing results (Rauen, 1992). Some studies have been done

that have found the Injury Severity Score to be a poor predictor of survival or mortality, possibly because ISS is an anatomical measure of injury, not a physiological measure. The means that the ISS rates injuries with a score according to the amount and location of bodily tissue and organ damage, but does not measure physiological parameters such as blood pressure and pulse (Feliciano, Moore, & Mattox, 1996). However, other studies have found that ISS can accurately predict survival in geriatric trauma patients.

Using a computer data bank, Kilaru et al. (1996) did a retrospective analysis of 40 elderly trauma patients (age 65 or older) with closed head injury and an admission Glasgow Coma Scale (GCS) score of 8 or less to examine functional status outcome. To obtain current long-term outcome data, telephone interviews were conducted with the patient, the patient's family, or the physician. The study period had a 38 $\pm$ month follow-up in which 27% of the original 40 patients were still alive. The mean age of all 40 patients was 74 years. The results of this study showed that age by itself was not a predictor of functional outcome ($p<0.07$). For elderly patients with severe head injury, 85% did not show significant neurological improvement, even with long-

term survival. ISS scores did not reflect eventual functional outcome ($p=0.24$), but the GCS and heart rate were predictive of long-term functional outcome and mortality. The most common mechanism of injury was fall (51%), followed by motor vehicle collisions (30%), and pedestrian collision (19%).

In contrast, Smith, Enderson, and Maull (1990) completed a retrospective study utilizing the trauma registry at the University of Tennessee Medical Center. They compared 456 elderly (older than age 65) patients to 985 younger patients with traumatic injury by dividing each group into thirds according to ISS. They found that LOS was longer for the geriatric group than for the younger group in those patients with ISS scores of 25 or less. The elderly patients who had ISS scores higher than 25 generally died, and therefore had a shorter hospital LOS. The researchers also concluded that for all ages, both ISS and age were positively associated with mortality ($p<.001$). Overall mortality was 6.0% for patients under age 65 and 8.6% for those 65 years and older. The rate of complications (26%) was also related to mortality ($p<.01$). These included infections (14.5%), pulmonary disease (10.7%), cardiac disease(5.5%), and renal disease(3.7%). Cause of injury

involved 282 falls (61.8%), 116 motor vehicle crashes, including pedestrians (25.4%), 18 cases of assault (3.9%), 10 thermal injuries (2.2%), and 30 other injuries (6.6%). Mechanism of injury was shown to be a factor related to mortality ($p<.001$).

VanAalst, Morris, Yates, Miller, and Bass (1991) at VanderBilt University studied 98 geriatric patients with severe blunt injury who had an ISS $\geq$ 16. They found that ISS was a good predictor of mortality in their patient population. They also looked at geriatric patients in relation to function and independence. During hospitalization, 44.9% died. The survivors were interviewed one year after discharge (88.9% were still alive at the time of the interviews). They found that age $\geq$ 75 years was associated with poor long-term outcomes (p.=004), but they also found that two-thirds of the survivors had regained some level of independence.

In a study by Perdue, Watts, Kaufman, and Trask (1998), the differences in occurrence of mortality in elderly and younger trauma patient were examined. Records from 5,139 patients over the age of 15 years were reviewed retrospectively. There were 346 deaths with an overall mortality rate of 6.7%. The mortality rate for non-geriatric

patients was 6.0% (283 of 4,691) and for the geriatric patients (63 of 448) the rate was 14.0% ($p<0.001$). Mortality was stratified into early (within the first 24 hours after injury) and delayed (more than 24 hours after injury). Most of the mortality in the elderly trauma patients was delayed (37 of 63) in contrast to the younger patients whose mortality occurred early after injury (175 of 283) ($p<0.005$). The mean ISS of survivors was 8.7 and the mean ISS of non-survivors was 39.3 ($p<0.001$). The authors also examined pre-existing diseases and complications, concluding that elderly trauma patients suffer late mortality more than younger patients due to increased preexisting disease, more complications, and age itself.

Aggressive Care for the Elderly Trauma Patient

In a study of 126 multiply-injured patients age 65 years and older who had been admitted to the Department of Traumatology and Emergency Surgery at the University Hospitals of Leuven, Belgium, Broos, D'Hoore, Vanderschot, Rommen, and Stappaerts (1993) looked at the importance of aggressive care in elderly patients with multiple trauma. Of the survivors still living at home before injury,78% were able to go back to their normal surroundings. They felt that aggressive trauma care for the elderly was justified.

Zeitlow, Capizzi, Bannon, and Farnell (1994) obtained data on injured patients aged 65 years or older (n=601) from the Saint Marys Hospital-Mayo Clinic Trauma Registry who had sustained multi-system trauma and had an ISS score $\geq$10 (n=94). Analysis showed that blunt mechanisms of injury were most frequent, with falls (n=55) and motor vehicle crashes (n=34) being most prominent. In their study, 37% of the 94 patients required an ICU admission, in-house mortality was 23% (mostly due to head injury), and there were 55 complications. At discharge, 53% of the patients went home and 36% went to nursing homes. When follow-up of the patients occurred one year later, the researchers found that although seven patients had died, 75% were at home and were independent. They concluded that in spite of significant morbidity and mortality, the high level of independence achieved by the survivors justified aggressive care for elderly trauma victims.

Summary and Implications for Study

The reviewed studies indicated that as age increases in the elderly, long-term outcomes are generally poorer with increased complications that generate adverse outcomes. The studies also showed that elderly trauma patients stay in the hospital longer than younger patients, but that a

multidisciplinary team approach to patient care may decrease hospital LOS. Three of the studies showed a decreased LOS when the initial team assessment occurred soon after hospital admission.

From the literature review it was shown that some researchers looked at long-term outcomes and levels of independence. Two of the studies found that the majority of elderly trauma patients survived and lived independent lives after hospital discharge, justifying aggressive, resuscitative care.

The literature review implied that with an expedient multidisciplinary approach to trauma care in the ICU, most elderly patients suffering severe injuries could experience a reduced hospital LOS and a return to independent living. Therefore, the focus of this study was to look at multidisciplinary team effect and timing of initial team assessment on hospital LOS for elderly trauma patients.

Hypotheses/Research Questions

This study addressed the following questions:

1. Is there a difference in hospital LOS between elderly trauma patients who are assessed by the individual members of the multidisciplinary team and those who are not assessed by the team?

2. What is the relationship between hospital LOS and timeliness of initial multidisciplinary team assessment by each individual team member for geriatric trauma patients?

3. Is there a relationship between hospital LOS and age, gender, severity of injury (ISS), number of complications, mechanism of injury, and discharge disposition?

This study proposed the following hypotheses:

1. Hospital LOS for elderly trauma patients in the ICU will decrease with a multidisciplinary team approach to patient care.

2. The earlier that initial multidisciplinary assessment occurs by individual team members, the shorter the hospital LOS for elderly trauma patients in the ICU.

Definition of Terms

In this research, the following terms are defined as:

1. Trauma: A physical injury to the body caused by an external force.

2. Elderly: Age 65 years or older.

3. Multidisciplinary Team: A specialized group of health care providers who individually assess and treat patients in the ICU, then meet weekly as a team to discuss the patients. For this study, the team included the clinical

nurse specialist, social worker, physical therapist, occupational therapist, speech therapist, and dietician who collaborated to provide optimal care for elderly trauma patients. Although there were additional disciplines actually involved in the multidisciplinary team at the hospital, for this study only the team members who needed a physician order to assess the patient were included. For example, because the staff nurse was automatically involved with every trauma patient and did not need a physician order to do a patient assessment, that nurse was not included.

4. Hospital LOS: Length of time from day of hospital admission to day of discharge, not including the actual day of discharge; measured in number of days.

5. Timeliness: Length of time from team order to initial, individual team assessment, beginning when the ICU secretary noted the physician order for the team and ending with initial documentation by each team member. These parameters were chosen because they were the most consistently documented times on the ICU patient charts. They were measured in hours and days.

6. ICU: A hospital unit where trauma patients are monitored continuously by specialized staff.

CHAPTER 3

METHODS

Research Design

For this study, a descriptive correlational design was used to examine the relationship between hospital LOS and assessment by individual members of a multidisciplinary team in geriatric trauma. The relationship between timing of initial assessment and LOS was also explored. Because the purpose of a descriptive-correlational study is to describe the relationships among variables (Polit & Hunger, 1995), this study also included other variables that could have been relevant to LOS. A retrospective study was necessary because some of the required data on each trauma patient could not be entered into the computerized trauma registry until after hospital discharge.

Advantages to the descriptive-correlational design were that (1) the design was straight forward, (2) it could be completed quickly and economically, and (3) it was an efficient and effective way of collecting large amounts of data (Polit & Hunger, 1995). The limitation of this design was that it could not determine cause and effect between the involvement of the multidisciplinary team and hospital LOS.

Sample and Setting

The setting for this study was an American College of Surgeon's verified Level II trauma center in a metropolitan midwestern city. The center admits approximately 30 elderly trauma patients to the ICU each year. A convenience sample of 74 elderly trauma patients, who met specific inclusion criteria, was obtained from the computerized trauma registry. The subjects were admitted to the trauma center's ICU between January 1, 1995 and April 30, 1998. The inclusion criteria included age 65 years or older, blunt or penetrating trauma, and admission to the ICU for at least 24 hours to ensure time for the multidisciplinary team to receive a physician's order and to respond. To validate a trauma diagnosis, there must have been an ICD-9-CM discharge diagnosis between 800.0 and 959.9, which are standardized trauma codes (Practice Management Information Corporation [PMIC], 1997).

Instruments

The trauma registry houses computerized data records of all trauma patients who are either admitted to the hospital or who die in the emergency department. A nationally certified data registrar with an associate's degree in health information management and a bachelor's degree in

communications retrospectively abstracts data from each patient chart and enters the information into the registry. The registry software, "Trauma!" (Cales, 1997), is used by various trauma centers throughout the United States. To ensure interrater reliability and validity of data, a standardized data code book and a trauma registry user's manual are utilized for data abstraction and entry. In addition, a second certified data registrar routinely validates accuracy and completeness of information through monthly, random registry reviews. The trauma registry contains over 200 user-defined fields for the collection of patient information, including demographic statistics, ICD-9-CM External Causes of Injury Codes (E-codes 810.0 to 968.9), and ICD-9-CM Diagnosis Codes (800.0 to 959.9). The following variables for this study were extracted from the trauma registry: (1) actual age in years, (2) gender, (3) Injury Severity Score (ISS) (scores range from 1 to 75), (4) number of complications, (5) mechanism of injury (motor vehicle crash, fall, pedestrian hit by a car, assault, penetrating injury, or other), (6) LOS in the hospital (days), and (7) discharge disposition (home, left against medical advice, sub-acute care facility, inpatient rehabilitation, skilled nursing facility, residential

facility, or morgue).

In addition to information from the trauma registry, timing of initial team assessment in regards to specific team member involvement was collected through a retrospective chart review. Timing of initial team assessment by each individual team member was measured in hours and days beginning with the notation of the multidisciplinary team order in the ICU and ending with the first documented entry of each discipline on the patient's chart. Timing of initial team assessment did not automatically begin at the time of admission because the order for the multidisciplinary team was sometimes written hours or days after admission, and this would have skewed the true response times of the team members. After the actual hours were calculated, they were collapsed into 24 hour time intervals (days). Response times less than 24 hours were calculated as one day, while times between 24 and 47 hours were calculated as two days, and so forth.

Only six of twelve possible team members were included in this study: the clinical nurse specialist, physical therapist, occupational therapist, speech-language pathologist, social worker, and registered dietician. Because the trauma surgeon, staff nurse, nursing director of

the ICU, pharmacist, respiratory therapist, and trauma coordinator can assess the patient without waiting for a multidisciplinary team order from the physician, they were not included in the study.

Verification for this method of data collection was obtained through random chart reviews by the certified data registrars who were able to validate abstractor accuracy. A data collection form (See Appendix B) for recording all data from both the trauma registry and the patients' charts was developed by this researcher. To protect the privacy of individuals, confidentiality was assured by eliminating patient identifiers from the collection form, including patient names and hospital record numbers.

Procedure

Before initiating this study, approval was obtained from the participating trauma center, as well as from Grand Valley State University (See Appendix C and D). To begin data collection, a list of all trauma patients meeting inclusion criteria from January 1, 1995 through April 30, 1998 was obtained from the trauma registry. These dates were chosen because the registry software dated back to January, 1995. Using that list, computerized reports were then produced that contained data relevant to

the variables included in this study. During this time, multidisciplinary team information concerning the timing of physician order notation and initial team member assessment was also abstracted manually from the patients' charts in the medical record's department. All data obtained from the trauma registry and the patients' charts were then transcribed onto the data collection form in preparation for statistical analysis. Upon completion of the study, all data collection forms were destroyed to protect individual patient privacy.

CHAPTER 4

RESULTS/DATA ANALYSIS

The purpose of this research was to see if a multidisciplinary team approach to trauma care in the ICU and timing of initial team assessment would affect hospital length of stay in elderly trauma patients. The following two hypotheses were proposed: (1) Hospital LOS for elderly trauma patients in the ICU would decrease with a multidisciplinary team approach to patient care, and (2) the earlier that initial multidisciplinary assessment occurs by each team member, the shorter the hospital LOS for elderly trauma patients.

To analyze the data collected in this study, the Statistical Package for the Social Studies (SPSS) was used. The dependent variable being studied was hospital LOS, measured on an interval scale. The independent variables included (1) involvement/no involvement of the multidisciplinary assessment team (measured on a nominal scale), (2) timeliness of initial team assessment (measured on an interval scale), and (3) various demographic variables, measured on either a nominal scale (gender, mechanism of injury, and discharge destination) or an interval scale (Injury Severity Score and number of

complications). Each variable was examined in relationship to team and non-team involvement. The *t*-test for independent means was used to analyze the differences between the team and non-team groups and hospital LOS. The Pearson's r correlation coefficient was used to evaluate the relationship between hospital LOS and the independent variables. An analysis of variance with post hoc Scheffe procedure was used to determine if there were differences between hospital LOS and the discharge destinations (home, sub-acute/skilled/long-term care, rehabilitation or morgue). The level of significance for supporting a hypothesis was set at $p=<.05$ for all statistical tests.

Subjects

To be included in this study, trauma patients must have been in the ICU for at least 24 hours and must have been age 65 years or older. Consequently, the study sample consisted of 74 elderly ICU trauma patients whose mean age was 77.26 years (SD 7.26). Ages ranged from 65 to 99 years. Gender happened to be split evenly, but there were almost twice as many trauma patients involved with the multidisciplinary team than were not involved. Motor vehicle crashes caused the most injuries to patients seen by the team (25), while falls were the primary cause of injury for patients not seen

by the team (16). Fifty-nine percent of the patients were admitted on the evening shift when the multidisciplinary team was not available. (See Table 1).

Table 1

Elderly Trauma Patients Admitted to the ICU (n=74)

	Team Involvement			
	Team		No Team	
	n=48	64.9%	n=26	35.1%
Gender				
Male	28	58.3%	9	34.6%
Female	20	41.7%	17	65.4%
Age Groups				
65 - 69	9	18.8%	3	11.5%
70 - 79	23	47.9%	12	46.2%
80 - 89	15	31.3%	9	34.6%
90 - 99	1	2.0%	2	7.7%
Shift Admitted				
Day	6	12.5%	18	69.2%
Evening	36	75.0%	8	30.8%
Night	6	12.5%	--	--

Data Analysis and Hypotheses

Even though all of the elderly trauma patients in this study were admitted to the ICU, some were involved with the multidisciplinary team and some were not, depending upon the decision of the trauma surgeon. Members of the team were from a variety of disciplines and met weekly to facilitate optimal patient care and appropriate LOS. Consequently, this study examined two research hypotheses involving the effects of the multidisciplinary team on hospital LOS.

First Hypothesis: Team Approach Decreases Hospital LOS

The first hypothesis proposed that hospital LOS for elderly trauma patients in the ICU would decrease with a multidisciplinary team approach to patient care. Hospital LOS for all trauma patients involved with the team ranged from 2 to 74 days with a mean of 13.4 days (SD 12.73) and without the team the LOS ranged from 2 to 36 days with a mean of 8.8 days (SD 9.77). Although the only 74 day stay in the team group was an outlier, the *t*-test for independent means showed that this outlier made no significant difference between the team and non-team's mean hospital LOS ($t=1.60$, $df=72$, $p=.114$ with the outlier) and ($t=1.44$, $df=71$, $p=.155$ without the outlier). Therefore, the outlier was included in all statistical analyses. (See Table 2).

Table 2

Outlier and Hospital Length of Stay

Hospital LOS In Days	Range	Mean	SD
Outlier Excluded			
All Patients	2 - 42	10.93	9.45
Team	2 - 42	12.11	9.16
Non-Team	2 - 36	8.81	9.77
Outlier Included			
All Patients	2 - 74	11.78	11.91
Team	2 - 74	13.40	12.73
Non-Team	2 - 36	8.80	9.77

Note. The outlier was a hospital length of stay of 74 days.

The data in this study did not support the first hypothesis. However, because the team patients had higher ISS scores and therefore were sicker with longer hospital LOSs, in actuality the team probably did decrease hospital LOSs for the more severely injured patients. It must also be noted that the team/non-team groups differed with respect to variables that could have affected hospital LOS. These extraneous variables were examined for possible

relationships to LOS and included age, gender, severity of injury (ISS), number of complications, mechanism of injury, and discharge disposition.

The extraneous variables that were shown not to have any significant relationship to hospital LOS when examined using the *t*-test for independent means included mechanism of injury, gender, and age. When a *t*-test was done on the total patient sample to determine if there were differences between the mean hospital LOSs for falls and motor vehicle crashes (mechanism of injury), no significant differences were found ($t=-.48$, $df=69$, $p=.64$). Another *t*-test conducted on team patients also showed that there were no significant differences between the mean hospital LOSs in relationship to gender (male and female) ($t=-.41$, $df=46$, $p=.68$). An additional *t*-test was done on the total patient sample which demonstrated that there were no significant differences between the mean ages of the patients in relationship to team and non-team groups ($t=-1.19$, $df=72$, $p=.24$). A Pearson's r analysis showed no significant relationship between age and hospital LOS ($r=-.21$, $p=.070$).

However, a Pearson's r analysis on the entire sample did show a positive correlation between ISS scores and hospital LOS ($r=.36$, $p=.001$). There were also significant

differences between the mean hospital LOS in relationship to the ISS for patients seen by the team and those not seen by the team. Elderly trauma patients seen by the team had ISS scores ranging from 1 (minor injury) to 38 (major injury) with a mean of 15.31 (SD 8.41). The non-team patients had scores ranging from 1 to 21 with a mean of 9.81 (SD 5.38). The higher ISS scores for the patients seen by the team indicated that the team patients were more severely injured than the non-team patients ($t=3.42$, $df=69.88$, $p=.001$).

Using Pearson's *r* analysis, a moderately strong, positive relationship was demonstrated between the number of complications and the hospital LOS for all the trauma patients ($r=.65$, $p=.000$). The elderly trauma patients involved with the team had developed a total of 13 complications (mean=.40, SD=.74) in contrast to those patients not involved with the team who had developed six complications (mean=.38, SD= .80).

In this study, elderly trauma patients were discharged to one of the following six destinations: rehabilitation center, home, skilled nursing center, long-term care, sub-acute care facility, or morgue. However, in preparation for an analysis of variance (ANOVA), the six discharge destinations were re-categorized into four groups: (1) home

(2) sub-acute/skilled/long-term care (3) rehabilitation, and (4) morgue. The ANOVA showed significant differences between the mean hospital LOSs of the discharge destination groups ($F=4.04$, $p=.01$). In order to find where these differences existed, a post hoc Scheffe test was completed that demonstrated a significant difference between the mean hospital LOSs of the destination groups "home" and "sub-acute/skilled/long-term care". This suggested that the elderly trauma patients who had been discharged to sub-acute/skilled/long-tem care facilities had substantially longer hospital stays than the patients who went home. Data also showed that a large number of team patients (17) were discharged to a rehabilitation center while many of the non-team patients were discharged home (8). (See Table 3).

Eleven of the trauma patients died during their hospitalizations, which affected the hospital LOS. Only two of the patients who died had an ISS over 25, and both of them were involved with the team. A *t*-test analysis revealed that for the patients who had died there was no significant difference between the mean hospital LOS of those on the team or those not on the team ($t=-.05$, $df=9$, $p=.96$). Table 4 shows the distribution of deaths between the team and non-team patients with their hospital LOSs.

Table 3

Discharge Destinations and Hospital Length of Stay

Destination	Total Sample		Team	No Team
	Mean LOS	SD	Frequency	
Home	5.53	4.07	11	8
Acute/Skilled/Long-Term	17.00	16.46	14	7
Rehabilitation	13.78	10.33	17	6
Morgue	8.45	8.73	6	5

Table 4

Team and Non-Team Deaths and Hospital Length of Stay

Group	Deaths (Frequency)	Mean Hospital LOS (Days)	SD
Team	6	8.33	6.05
Non-Team	5	8.60	12.03

Summary of Results for the First Hypothesis

Data analysis did not show a significant relationship between hospital LOS and team or non-team groups (t=1.6, df=72, p=11). Therefore, the hypothesis that hospital LOS for geriatric trauma patients decreases with a multidisciplinary team approach to trauma care was not supported. Also, when looking at hospital LOS in relationship to other extraneous variables, the study results indicated that gender, age, mechanism of injury, and death were not significantly related to LOS. The results did demonstrate a positive correlation between hospital LOS and ISS, number of complications, and discharge destinations.

Second Hypothesis: Early, Individual Team Assessment Decreases Hospital LOS

The second hypothesis proposed that the earlier the initial multidisciplinary assessment occurs by each team member, the shorter the hospital LOS for elderly trauma patients admitted to the ICU. Pearson's r showed a significant, but weak, positive relationship between timing of initial assessment by the clinical nurse specialist and the hospital LOS (r=.36, p=.014). The relationship between timing of initial assessment by the speech-language pathologist and hospital LOS was also positive and slightly

stronger (r=.47, p=.001). There were no significant relationships between the timing of initial assessment by other team members and hospital LOS (See Table 5). Therefore, the data analysis supported the hypothesis that the earlier the initial multidisciplinary team assessment by each team member, the shorter the hospital LOS for elderly trauma patients in the ICU. However, this only related to the CNS and the speech-language pathologist.

Although 48 patients in this study were assessed by the team, 30 of them (62.5%) had physician orders for the team initiated during evening and night hours when the team was not available to respond in a timely manner.

Table 5

Timing of Initial Team Assessment

Team Member	r Value	p Value
Clinical Nurse Specialist	.36	.014
Physical Therapist	.04	.764
Occupational Therapist	.05	.737
Speech-Language Pathologist	.47	.001
Social Worker	.24	.103
Registered Dietician	.13	.369

CHAPTER FIVE

DISCUSSION AND IMPLICATIONS

Purpose and Support of Hypotheses

The purpose of this study was to see if a multidisciplinary team approach to trauma care in the ICU and timing of initial team assessment would affect hospital length of stay in elderly trauma patients. The first hypothesis, that hospital LOS for elderly trauma patients in the ICU would decrease with a multidisciplinary approach to patient care, was not supported by the findings. However, the second hypothesis was supported, but only in relationship to the clinical nurse specialist and the speech-language pathologist: The earlier that initial multidisciplinary team assessment occurs by each individual team member, the shorter the hospital LOS for elderly trauma patients.

Discussion of the First Hypothesis

The outcomes of this study showed that three variables in the study were related to hospital LOS: (1) number of complications, (2) severity of injury, and (3) timing of initial assessments by the clinical nurse specialist and the speech-language pathologist. There were differences in hospital LOS between sub-acute/skilled/long-term care and

home. The variables team/non-team, age, gender, mechanism of injury, and death did not have a significant relationship to hospital LOS. Therefore, because team involvement was not related to hospital LOS as proposed, the first hypothesis was not supported. Yet the patients seen by the team were sicker, as demonstrated by ISS scores, and ISS had a positive correlation with hospital LOS. Therefore, the sicker patients were more likely to stay in the hospital longer. The data analysis also showed that the number of complications in relationship to hospital LOS was statistically significant, and that the team patients appeared to have more complications than the non-team patients. Realistically, the team may have actually decreased hospital LOS by discharging or transferring patients from the hospital faster than they would have been otherwise.

There have been some studies published that have described positive effects of multidisciplinary teams on hospital LOS, but only a few of the studies have involved elderly trauma patients. Hofmann et al. (1997) studied 140 elderly patients who had been admitted to a medical-surgical unit, and they found that a multidisciplinary geriatric assessment team decreased hospital LOS. But these patients

were primarily nursing home patients and outpatients who had diagnoses such as dementia, cerebrovascular accident, incontinence, hip fracture, change in mental status, and functional decline. These were not acutely ill trauma patients in an ICU as in the current study.

Brita-Rossi et al. (1996) showed a decrease in hospital LOS with the implementation of a 25-member multidisciplinary team approach to orthopedic care. But this study focused on patients receiving major hip, knee, back, and neck surgery who were on a medical unit. These were not all elderly patients and none were trauma patients in the ICU.

By using a specialized multidisciplinary team for stroke care, Webb, Fayad, Wilbur, Thomas, and Brass (1995) shortened the median hospital LOS for their patients who had been diagnosed with acute stroke. These were not trauma patients but were medical patients involved with university and private practice neurology services.

Previous research studies have shown that age can impact hospital LOS, if comparisons are made between old and young patients. Schiller, Knox, and Chleborad (1995), DeKeyser, Carolan, and Trask (1995), and Covington, Maxwell, and Clancy (1993) compared elderly trauma patients to younger ones and found that the mean hospital LOS was higher

for the elderly than for the young. In the current study, only patients aged 65 years or older were used, and age was not statistically significant for hospital LOS.

This study supports the findings of previous research by Kilaru et al. (1996), Smith, Enderson, and Maull (1990), and Zeitlow, Capizzi, Bannon, and Darnell (1994) which showed that falls are the number one cause of injury in the elderly, and that motor vehicle crashes are second. They correlated mechanism of injury to mortality, but not to hospital LOS. Covington, Maxwell, and Clancy (1993) found that transportation-related injuries as a group generated the longest mean hospital LOSs, but this study did not support that relationship. The current study also did not support a correlation between mechanism of injury and LOS.

However, a positive correlation between ISS and hospital LOS was found which showed that elderly trauma patients with the severest injuries stayed longest in the hospital. These results were in contrast to a previous study by Smith, Enderson, and Maull (1990) which indicated that LOS was longer for elderly patients whose ISS scores were 25 or less. However, the patients in their study with ISS scores over 25 generally died and had shorter length of stays. In this study, only two of the eleven patients who

died had ISS scores over 25, which may account for the differences.

In a study by Carrillo, Richardson, Malias, Cryer, and Miller (1993), one-third of their elderly patients developed complications following blunt trauma. They did not correlate these findings to hospital LOS. In contrast, one-fourth of the elderly trauma patients in this study developed complications, and the results showed a positive correlation between number of complications and hospital LOS and team/no team.

The relationship between hospital LOS and two other variables in this study, gender and discharge destination, cannot be compared to previous research, because no other research has been identified. But in this study, patients discharged to sub-acute/skilled/long-term care facilities had increased hospital LOSs compared to discharges to the home. This can be explained in part because of the time it takes for families to make destination decisions and for the health care staff to locate available beds in these type of facilities.

Discussion of the Second Hypothesis

The results of this study supported the hypothesis that the earlier the initial multidisciplinary team assessment by

individual team members occurs, the shorter the length of stay for elderly trauma patients. This support was only in relation to the clinical nurse specialist and the speech-language pathologist. This agrees in part with the findings by Farren (1991) and McGinley, et al. (1996) who showed that early multidisciplinary intervention reduced hospital LOS. However, these studies involved the initial utilization of newly created discharge protocols and assessment tools for medical patients, which this study did not use.

Evans, Hendricks, Lawrence-Umlauf, and Bishop (1989) showed that the earlier the assessment by a social worker, the shorter the hospital LOS. In contrast, the outcomes of this study did not support early social worker intervention to decrease hospital LOS. This may have been influenced by the inconsistent, frequently delayed response times of the social workers at this trauma center during the three year period of this study. While the rest of the team members usually responded in a timely manner, the social workers frequently had very delayed response times for unknown reasons.

Both Hypotheses and the Neuman Systems Model

The Neuman Systems Model (Neuman, 1995) supports the use of the multidisciplinary assessment team for elderly

trauma patients in the ICU. Neuman's secondary level of prevention provides an opportunity for the team to contribute to optimal patient care and possibly decrease hospital LOS by assessing and recommending appropriate treatments that will lead to client stability. The Neuman Systems Model also supports the findings that the earlier the initial team assessment occurs (with the clinical nurse specialist and the speech-language pathologist), the shorter the hospital LOS for the elderly trauma patient. Early assessment can strengthen the line of defense and the lines of resistance through identification of attacking stressors and appropriate therapies, which are two roles of members of the multidisciplinary team. Complications may be prevented by the team on the secondary prevention level of the model through early detection and treatment.

Limitations

The limitations to this study included the use of a retrospective design, a selection of patients from only one site, and the non-random assignment of patients to the team. These limiting factors will prevent the generalization of the study to other patient populations or settings and can also threaten the external validity of the study. The patients in actual practice who had minor injuries often

received a team assessment while some of the patients with more severe injuries did not have team assessment. Also, no two trauma patients had the exact same injuries, so the two groups in this study could not be similar in respect to type of injuries. The use of a descriptive-correlational design limited the researcher's ability to determine cause and effect between hospital LOS and involvement of the multidisciplinary team. Threats to internal validity included differences between team and non-team groups with respect to age, gender, severity of injury, number of complications, timing of initial team assessment, and discharge destination.

The study outcomes may have been affected by the inclusion of patients who had died, which may have affected hospital LOS. Some research studies do not include deaths when examining LOS. Also, the trend was to order the team for the sickest patients, as shown by the ISS scores, and they were more likely to have longer hospital LOSs. So even if the team did decrease hospital LOS for the sicker patients, this could not be measured due to the design of the study.

Inaccurate, incomplete, or inconsistent documentation by the various members of the multidisciplinary team could

have affected the data concerning timeliness of initial assessment. It would have been better to use the time of the first intervention by a team member, rather than the initial assessment, because it is the intervention that can actually affect the healing process. But that type of documentation was not consistently available at this trauma center.

Timing of initial, individual team assessment began when the unit secretary noted the team order, but it may have been better to use the time of admission to the unit. Although the study method looked at how quickly the team member assessed the patient after being notified by the ICU, the patient may have been in the ICU for two or three days before the order was written. In that case, the focus was really on the team member's response time. By using admission time instead, the focus would be primarily on the patient. For if the patient had to wait for two or three days after admission to receive an initial team assessment, this might show up in the data as a big delay of care with possible negative effects on patient outcomes.

Another limitation in the study was that timing of initial team assessment was condensed into 24-hour time blocks for ease of statistical analysis. For patients in the ICU, a 24-hour time frame might be too long since patient

conditions can change rapidly. It may have been more accurate to use the actual number of hours for calculations.

The variables chosen for this study were ones that could have potentially affected hospital LOS. But they were selected only if they could be obtained from data in the trauma registry, which limited the choices. Some other variables that could have been used but were not available in the trauma registry and may have affected LOS were (1) financial status (2) nutritional status, and (3) drug use (Lutjens, 1993).

Implications for Practice

Even though this study did not support the theory that multidisciplinary teams can decrease the hospital LOS, the team patients were shown to be more severely injured than the non-team patients, as determined by the ISS. This could have increased the number of days of hospitalization for the patients on the team. Multidisciplinary teams need to be aware that they may positively affect hospital LOS for the sicker patients.

A positive change in practice would be improvement in documenting times of interventions, so that accurate measurements for team studies could be done. Improved responses by the social workers would enhance good patient

care and provide needed information to the rest of the team.

Nursing leaders can impact hospital LOS by encouraging advanced practice nurses to use a multidisciplinary approach to patient care. They can inspire nurses to lead team conferences and to role model for all disciplines. Nurses who base their practice on the Neuman Systems Model (Neuman, 1995) have a framework for nursing practice that encompasses the ideals of the multidisciplinary team concept. This model also provides nurses in all areas of service with the opportunity to educate patients and families about injury prevention. Overall, this study affirms the roles of the clinical nurse specialist and the speech-language pathologist in the multidisciplinary team management of multiply injured patients.

This study shows that the earlier that initial assessment by the CNS occurs, the shorter the hospital LOS for elderly trauma patients. By relying on a multidisciplinary approach to patient care, the CNS can access multiple resources and services early in the hospital stay, integrate care, provide continuity of care, and facilitate appropriate levels of treatment, according to the individual role. The CNS also must be able to order the team whenever appropriate without the approval of the physician.

Future Recommendations

Ongoing research in the area of geriatric trauma could lead to improved outcomes, increased survival, and decreased hospital days as the population continues to age. A focus on patient outcomes after hospital discharge merits further studies by nursing researchers. This type of information could help multidisciplinary teams improve their strategies for better patient care. Shorter hospital stays do not necessarily equate with better care. Studies should be done that look at re-admissions--how many, why they occurred, how soon after discharge patients were re-admitted, and cost. Patients may be discharged sooner, but what is the quality of life at home after a severe trauma? What is the quality of life and survival rate one year later? Nursing researchers who focus on these questions could have a great impact on patient care, both in the hospital, in the home, and in the community environment.

Future recommendations to improve this study include using a larger sample or a sample from several urban and rural trauma centers. Perhaps the outcomes of this study would have been different if timing of initial *intervention* by the multidisciplinary team, rather than timing of initial *assessment*, had been measured, for it is probably the

interventions by team members that most impact hospital LOS. Occasionally, initial assessment included an intervention, but that was not a consistent practice. Using admission time rather than the time the team order was noted by the ICU secretary might produce more patient-centered results. Utilizing actual hours rather than condensed 24-hour time periods could also yield more accurate outcomes. Adding other variables that have a potential to decrease hospital LOS could be examined. Because a retrospective analysis often depends upon adequate documentation in the patient chart by team members, with improved documentation a prospective study could provide valuable information concerning the impact of multidisciplinary teams on hospital LOS for geriatric trauma patients.

APPENDICES

APPENDIX A

PERMISSION FROM BETTY NEUMAN, PH.D.

May 21, 1998

Betty Neuman, Ph.D.
Box 488
Beverly, Ohio 45715

Dear Dr. Neuman:

I am a master's student in nursing at Grand Valley State University in Allendale, Michigan, and I am currently working on my master's thesis. In my thesis I am studying the effect that a multidisciplinary approach to trauma care may have on hospital length of stay for geriatric patients in the intensive care unit. I am using the Neuman Systems Model as a basis for my study.

I would like permission to modify your schematic model drawing on page 17 of your book entitled "The Neuman Systems Model" (3rd. edition, published in 1995) to include in my thesis. I have enclosed a copy of my modifications.

I was not in Michigan when you visited our campus in April, and I very much regret not being able to meet you. I heard wonderful things about you and your visit.

I would greatly appreciate receiving permission to adapt and use your model in my thesis.

Sincerely,

[redacted]

Beth Ramsey, BSN, RN
9499 Kalamazoo Avenue
Caledonia, Michigan 49316

Permission granted as requested 5/27/98. [redacted]

APPENDIX B

Multidisciplinary Team Data Form

Record # _ _ _ _ Identification # _ _ _ _ _ _ _ _ _

Admission Month _ _

Admission Date of Month _ _

Admission Time _ _:_ _ AM
_ _:_ _ PM

Admission Day of Week
- ☐ Sunday
- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☐ Thursday
- ☐ Friday
- ☐ Saturday

Admitted to Trauma Service Yes No
(Admitted to one of the eight Trauma Surgeons)

Team Ordered Yes No

Time order for team activated by ICU Secretary _ _:_ _ AM
_ _:_ _ PM

Team Response Times

	Month	Day	Time	Total Hours	Total Minutes	Not Charted
Clinical Nurse Specialist						
Physical Therapist						
Occupational Therapist						
Speech Therapist						
Social Worker						
Registered Dietician						

Age _ _ _

Gender Male
Female

Mechanism of Injury
- ☐ Motor Vehicle Crash
- ☐ Fall
- ☐ Pedestrian Hit By Car
- ☐ Assault
- ☐ Penetrating Injury
- ☐ Other

ISS _ _

Number of Complications _ _

Discharge Disposition
- ☐ Home
- ☐ Against Medical Advice
- ☐ Acute Care Facility
- ☐ In-Patient Rehabilitation

Center
- ☐ Skilled Nursing Home
- ☐ Residential Nursing Home
- ☐ Morgue

Total ICU Days _ _

Total Hospital Days _ _

Type of Injuries:

APPENDIX C

APPROVAL FOR RESEARCH FROM THE TRAUMA CENTER

GRAND VALLEY STATE UNIVERSITY

1 CAMPUS DRIVE • ALLENDALE, MICHIGAN 49401-9403 • 616/895-6611

July 16, 1998

Beth Ramsey
9499 Kalamazoo Ave.
Caledonia, MI 49316

Dear Beth:

Your proposed project entitled "***Can a Multidisciplinary Team Decrease Hospital Length of Stay for Geriatric Trauma Patients?***" has been reviewed. It has been approved as a study which is exempt from the regulations by section 46.101 of the Federal Register 46(16):8336, January 26, 1981.

Sincerely,

[redacted]

Robert Hendersen, Chair
Human Research Review Committee

APPENDIX D

APPROVAL FOR RESEARCH FROM GVSU

Spectrum Health

East Campus
1840 WEALTHY SE GRAND RAPIDS MI 49506
616 774 7444 *www.spectrum-health.org*

June 17, 1998

Beth Ramsey, RN
Spectrum Health - East Campus
1840 Wealthy SE
Grand Rapids, MI 49506

Dear Beth,

I am pleased to inform you that your proposed study, "Can A Multi-disciplinary Team Decrease Hospital LOS For Geriatric Trauma Patients?" has been approved by the Spectrum Health - East Campus Nursing Research Committee. You may begin your data collection at your convenience.

The Nursing Research Committee requests that you submit a bound copy of your completed thesis for inclusion in our nursing library.

Should you need assistance, please contact Linda Urden, RN, DNSc at 391-1625.

Sincerely,

[redacted]

Yvonne Ford, RN, MS

cc: Linda Urden

LIST OF REFERENCES

References

Adams, P.F., & Marans, M.A. (1994). Current estimates from the national health interview survey, 1994. Vital and Health Statistics, 10(193). Washington, DC: U.S. Department of Health & Human Services. National Center for Health Statistics.

Brita-Rossi, P., Adduci, D., Kaufman, J., Lipson, S.J., Totte, C., & Wasserman, K. (1996). Improving the process of care: The cost-quality value of interdisciplinary collaboration. Journal of Nursing Care, 10(2), 10-16.

Broos, P.L.O., D'Hoore, A., Vanderschot, P., Rommens, P.M., & Stappaerts, K.H. (1993). Factors influencing outcomes: Importance of aggressive care. Injury, 24, 365-368.

Cales, R.H. (1997). Trauma!: User manual and sample reports (version 4.3). Alameda, CA: Cales & Associates.

Carrillo, E.H., Richardson, J.D., Malias, M.A., Cryer, H.M., & Miller, F.B. (1993). Long term outcome of blunt trauma care in the elderly. Surgery, Gynecology & Obstetrics, 176, 559-564.

Collier, P., & Early, A. (1995). A team approach to geriatric case management. Journal of Case Management, 4(2),

66-70.

Covington, D.L., Maxwell, J.G., & Clancy, T.V. (1993). Hospital resources used to treat the injured elderly at North Carolina trauma centers. Journal of the American Geriatrics Society, 41, 847-852.

DeKeyser, F., Carolan, D., & Trask, A. (1995). Suburban geriatric trauma: The experience of a level I trauma center. American Journal of Critical Care, 4, 379-382.

Evans, R.L., Hendricks, R.D., Lawrence-Umlauf, K.V., & Bishop, D.S. (1989). Timing of social work assessment and medical patients' length of hospital stay. Health and Social Work, 14, 277-282.

Farren, E.A. (1991). Effects of early discharge planning on length of hospital stay. Nursing Economics, 9(1), 25-30,63.

Garthe, E., & Mango, N. (1998). Overview of trauma registries in the United States. Journal of American Health Information Management Association, 68(7), 26-31.

Haddock, K.S. (1994). Collaborative discharge planning: Nursing and social services. Clinical Nurse Specialist, 8, 248-252,288.

Hickey, J.V., Ouimette, R.M., & Venegoni, S.L. (1996). Advanced practice nursing: Changing roles and clinical

applications. Philadelphia: Lippincott.

Hofmann, M.T., Nahass, D., Felipe, M.N., Glew, C., Suarez, M.G., Landsberg, L., McCully, K., & Posner, J. (1997). The effect of a multidisciplinary geriatric assessment team on length of hospital stay and utilization of hospital resources. Annals of Long-Term Care, 5, 444-449.

Jecker, N.S. & Schneiderman, L.J. (1992). Futility and rationing. The American Journal of Medicine, 92, 189-196.

Kilaru, S., Garb, J., Emhoff, T., Fiallo, V., Simon, B., Swiencicki, T., & Lee, K.F. (1996). Long-term functional status and mortality of elderly patients with severe closed head injuries. The Journal of Trauma: Injury, Infection, and Critical Care, 41, 957-963.

Knaus, W.A., Wagner, D.P., Zimmerman, J.E., & Drapes, E.A. (1993). Variations in mortality and LOS in ICU units. Annals of Internal Medicine, 118, 753-761.

Lutjens, L.R.J. (1993). Determinants of hospital LOS. Journal of Nursing Administration, 23(4), 14-18.

Matteson, M.A., McConnell, E.S., & Linton, A.D. (1997). Gerontological nursing: Concepts and practice (2nd ed.). Philadelphia: W.B. Saunders.

McGinley, S., Baus, E., Gyza, K., Johnson, K., Lipton, S., Magee, M.C., Moore, F., & Wojtyak, D. (1996).

Multidisciplinary discharge planning: Developing a process. Nursing Management, 27(10), 55,57-60.

Morris, J.A., MacKenzie, E.J., & Edelstein, S.L. (1990). The effect of preexisting conditions on mortality in trauma patients. The Journal of the American Medical Association, 263, 1942-1946.

National Safety Council. (1997). Accident facts: 1997 edition (Library of congress Catalog Card Number: 91-60648). Itasca, IL: Author.

Neff, J.A., & Kidd, P.S. (1993). Trauma nursing: The art and science. St. Louis: Mosby.

Neuman, B. (1995). The Neuman systems model (3rd ed.). Norwalk: Appleton and Lange.

Phillips, S., Rond, P.C., Kelly, S.M., & Swartz, P.D. (1996). The failure of triage criteria to identify geriatric patients with trauma: Results from the Florida trauma triage study. The Journal of Trauma: Injury, Infection, and Critical Care, 40, 278-283.

Perdue, P.W., Watts, D.W., Kaufmann, C.R., & Trask, A.L. (1998). Differences in mortality between elderly and younger adult trauma patients: Geriatric status increases risk of delayed death. The Journal of Trauma: Injury, Infection, and Critical Care, 45, 805-810.

Polit, D.F., & Hungler, B.P. (1995). Nursing research: Principles and methods (5th ed.). Philadelphia: Lippincott.

Practice Management Information Corporation [PMIC]. (1997). International classification of diseases (9th Revision). Los Angeles: Author.

Rauen, C.A. (1992). Trauma and the elderly: The impact on critical care. AACN: Clinical Issues in Critical Care Nursing, 3, 149-154.

Reiley, P., & Howard, E. (1995). Predicting hospital LOS in elderly patients with congestive heart failure. Nursing Economics, 13, 210-216.

Santora, T.A., Schinco, M.A., & Trooskin, S.Z. (1994). Management of trauma in the elderly patient. Surgical Clinics of North America, 74(1), 163-186.

Schiller, W.R., Knox, R., & Chleborad, W. (1995). A five-year experience with severe injuries in elderly patients. Accidental Analysis & Prevention, 27(2), 167-174.

Schwab, C.W., & Kauder, D.R. (1992). Trauma in the geriatric patient. Archives of Surgery, 127, 701-706.

Schwartz, R.J., Jacobs, L.M., & Yaezel, D. (1989). Impact of pre-trauma center care on LOS and hospital charges. The Journal of Trauma: Injury, Infection, and Critical Care, 29, 1611-1615.

Smith, D.P., Enderson, B.L., & Maull, K.I. (1990). Trauma in the elderly: Determinants of outcome. Southern Medical Journal, 83, 171-177.

Smith, E.J., Ward, A.J., & Smith, D. (1990). Trauma scoring methods. British Journal of Hospital Medicine, 44(2), 114-118.

Spectrum Health-East Campus. (1993). Multidisciplinary assessment team for trauma patients. Grand Rapids, MI: Author.

Vestrup, J.A. (1990). Update on trauma registries and trauma scoring. Canadian Journal of Surgery, 6, 461-463.

Webb, D.J., Fayad, P.B., Wilbur, C., Thomas, A., & Brass, L.M. (1995). Effects of a specialized team on stroke care: The first two years of the Yale stroke program. Stroke, 26, 1353-1357.

Welch, E., & Anastasas, M. (1996). Critical care, critical choices: Is there a future for patients in critical care? PT Magazine of Physical Therapy, 4(3), 75-77.

Wilson, R.F., & Walt, A.J. (Eds.). (1996). Management of trauma: Pitfalls and practice. Baltimore: Williams & Wilkins.

U.S. Bureau of the Census. (1993). Projections of the population of the United States, by age, sex, race, and

Hispanic origin: 1993 to 2050. Current Population Reports (P25-1104). Washington, DC: Government Printing Office.

vanAalst, J.A., Morris, J.A., Yates, H.K., Miller, R.S., & Bass, S.M. (1991). Severely injured geriatric patients return to independent living: A study of factors influencing function and independence. The Journal of Trauma: Injury, Infection, and Critical Care, 31, 1096-1102.

Zietlow, S.P., Capizzi, P.J., Bannon, M.P., & Farnell, M.B. (1994). Multisystem geriatric trauma. The Journal of Trauma: Injury, Infection, and Critical Care, 37, (985-988.