AN EPIDEMIOLOGIC MODEL TO FREQUENT HOSPITAL READMISSIONS OF ELDERLY CONGESTIVE HEART FAILURE CLIENTS: The Ellis Model

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By

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ABSTRACT

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Congestive heart failure (CHF) is one of the most neglected medical diagnoses. The result is a condition characterized by a continuous cycle of acute crisis, and subsequent hospital admissions. It is one of the most frequent causes for hospitalization of the elderly population over 65 years of age. CHF is associated with a reduction in quality of life, a high number of hospital readmissions, and death. Current research indicates that sixty-two percent of the men and forty-three percent of the women with CHF die in the first five years following diagnosis. Current literature does not show a conceptual model which identifies and links contributing factors to readmissions of CHF clients. In this project, the "Web of Causation", an epidemiologic model is used to organize the factors that contribute to the frequency of readmissions of clients with CHF and to identify potential intervention points to prevent readmission. The result of its utilization is the Ellis Model. Implications for the Advanced Practice Nurse (APN) are presented; discussion focuses on areas of practice, education, and research.

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It was through the committee's enthusiasm and approval that I was able to concentrate on the problem of congestive heart failure and hospital readmissions of the elderly. The support of these three first-class educators and nurses allowed it to happen.

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I also need to thank my co-workers for all their encouragement and assistance at work in allowing me to complete this important project.

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INTRODUCTION

Congestive heart failure (CHF) is a major public health problem. According to the National Health and Nutrition Examination Surveys (1991), an estimated 4.8 million Americans have CHF, while 200,000 related deaths occur annually in the United States (Reis et al., 1997). This number reflects approximately equal numbers of men and womven with almost 1.4 million being over 60 years of age. CHF is present in two percent of persons age 40-59, more than five percent of persons ages 60-69, and ten percent of persons age 70 and older (National Institute of Health (NIH), 1996). CHF is the fastest growing cardiovascular disorder in the United States, the only one increasing in incidence and prevalence, and the leading cause of hospital admission and readmission in Americans aged over 65 years of age (Blyth, Lazarus, Ross, Price, Cheuk, & Leeder, 1997). In 1990, CHF cost the United States economy $8 billion, and accounted for five million hospital bed days (Blyth et al., 1997).

CHF is currently a significant problem, but it's magnitude is expected to exacerbate as more and more cardiac patients live longer with their disease. The growth of the elderly population will likely contribute to the numbers of persons with this condition regardless of trends in coronary disease morbidity and mortality (Strobeck, 1995).

Various authors report that patients with CHF continue to have difficult management problems, i.e., a high readmission rate of 20% to 47% within two to six months of the initial discharge (Ghali, Cooper, & Ford, 1990; Newkirk & Leeper, 1995; Reed, Pearlman, & Buchner, 1991; Rich, 1993; Rich, Gray, Beckham, Wittenberg, & Luther,

1996; Shah, Der, Ruggerio, Heidenreich, & Massie, 1998; Vinson, Rich, Sperry, Shah, & McNamara, 1990). However, the consequences of unplanned readmission extend far beyond the financial issue. Frequently readmitted clients are at increased risk for morbidity and mortality related to hospitalization (Reed et al., 1991). The rate varies greatly among different chronic disease categories. In general, CHF can be characterized as a commonly occurring diagnosis in the elderly population with high ratios of multiple to single discharges (Wray et al., 1988).

STATEMENT OF THE PROBLEM

One aspect of medical care that evokes both economic concerns and quality consideration is the early readmission of clients to the hospital. Little is actually known about how being hospitalized for CHF affects various critical outcomes, e.g., changes in functional status, readmission for CHF, and/or mortality among older people. Because CHF has a higher incidence among the elderly and can cause disabling symptoms, it becomes an increasingly important clinical problem and policy challenge as the population ages (Chin & Goldman, 1996).

The identification of the individuals at highest risk for readmission could attract the attention of clinicians and administrators seeking to decrease morbidity, mortality, and costs. That is, if health care providers could identify clients at high risk for readmission, interventions to improve the quality of care and reduce costs could be targeted (Chin & Goldman, 1997). Therefore, it is important to identify these factors in a way that health care providers can use them as they provide care for the CHF client. Presently, there is no model which incorporates these contributing factors and their relationships.

PURPOSE OF THE PROJECT

The purpose of this project is to develop a conceptual model of risk factors which contribute to morbidity, mortality, and frequency of readmissions of clients with CHF. Knowledge about the most significant contributing factors should enable primary care providers to focus their assessments, intervene with treatment, teach more appropriately, and anticipate long-term issues. While present literature indicates frequent readmissions of clients with CHF and identifies a population at risk, there is no conceptual model that identifies the major contributing factors and the connections between them. Thus, the product of this project is an epidemiological model for primary care providers which identifies the risk factors contributing to frequent hospital readmissions of the CHF client. Identification of the major factors and their relationships would enable primary care providers to identify points of intervention which could reduce the number of hospital readmissions of clients with CHF. The primary care provider, including the advanced practice nurse (APN), can play a key role in achieving this outcome.

CONCEPTUAL FRAMEWORK

Review of Conceptual Models

Three existing models considered to be relevant to the problem of frequent readmissions of clients with CHF were considered for this project. Each is presented and described: (1) the Interaction Model of Client Health Behavior (Cox,1982); (2) the Sunrise Model (Reynolds & Leininger, 1993); and (3) the Web of Causation (Timmreck, 1994). However, the Web of Causation has been chosen as the framework for this project.

The Interaction Model of Client Health Behavior. This model (Figure 1) focuses on both the characteristics of the client and factors external to the client which provide a comprehensive explanation of actions directed toward risk reduction and health promotion. The element of client background includes the variables of demographic characteristics, social influence, previous health care experience, environmental resources, intrinsic motivation, cognitive appraisal, and the affective response of the client in regards to a particular behavior. The background variables interface with the elements of client-professional interaction and thus affect health outcomes. Critical elements of health outcomes are: use of health care services, clinical health status indicators, severity of health care problems, adherence to the recommended care regimen, and satisfaction with care.

Leininger's Sunrise Model. As the United States is confronted daily with the evolving perspective of caring for people in a "universal" village, it seems critical that the visionary work of Madeleine Leininger (1985) and her theory of Culture Care Diversity and Universality be utilized as a foundation for nursing practice, education and research and considered for this project.

Relational propositions are depicted in the Sunrise Model (Figure 2). Leininger developed the concept of cultural care as the subjectively and objectively learned and transmitted values, beliefs, and patterned lifeways. These assist, support, facilitate, or enable another individual or group to maintain their well-being and health, to improve

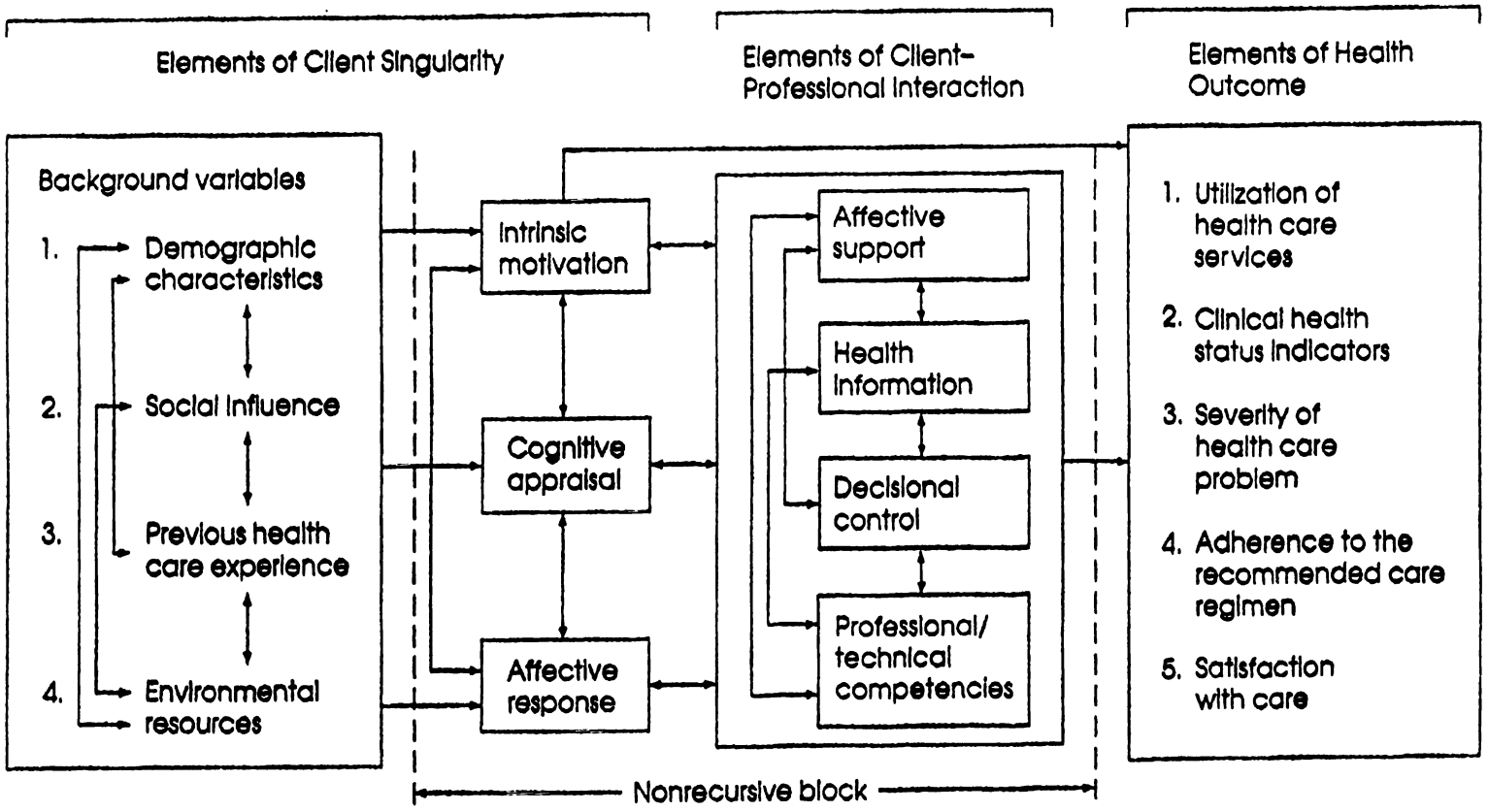

Figure 1. Interaction model of client health behavior (Cox, 1982).

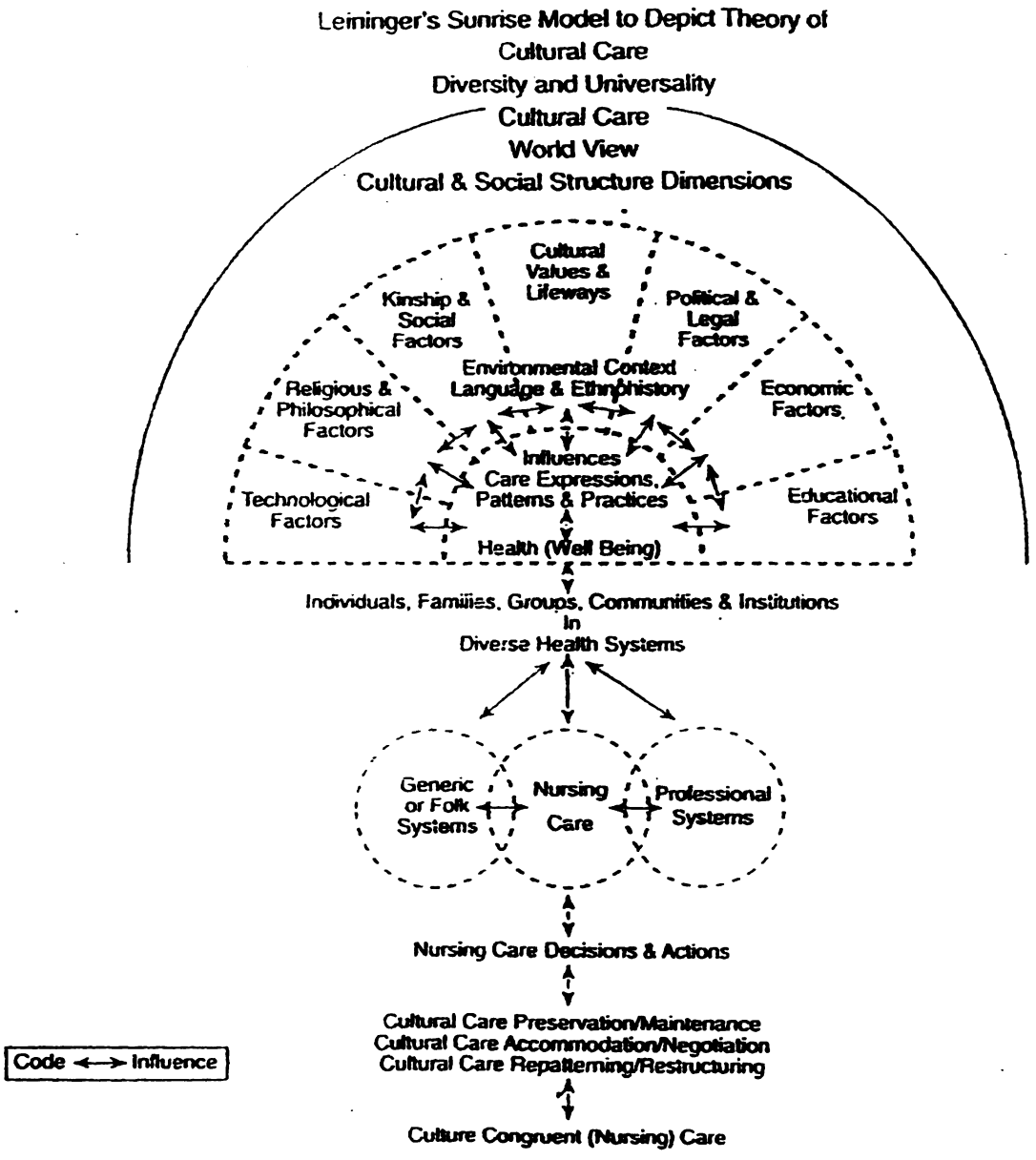

Figure 2. Leininger's Sunrise model (Leininger, 1991).

their human condition and lifeway, or to deal with illness, handicaps, or death (Reynolds & Leininger, 1993). The Sunrise Model depicts the components that influence care and health status of individuals, families, groups and sociocultural institutions. This model reminds the reader to keep in mind the diverse influences used to describe and explain care which have health and well being outcomes (Reynolds & Leininger, 1993).

Reynolds and Leininger (1993) explain that the model symbolizes the "rising of the sun (care)". The upper portion of the circle displays the world view and cultural and social dimensions "that influence care and health through language and environment" (p.60). The lower part of the diagram shows the care systems and the dimensions or modalities of cultural-congruent nursing care. Together, "the upper and lower parts of the model depict a full sun--or the universe that nurses must consider to know human care and health" (p. 61).

The double-headed arrows in the diagram (<->) symbolize a flow in different areas and across major factors to depict the interrelatedness of factors and the fluidity of influencers (Reynolds & Leininger, 1993). The broken lines (---) indicate an open world or system of living thoughtful of the innate world of most individuals. The Sunrise Model illustrates the many reciprocal relationships among the concepts of the Theory of Culture Care Diversity and Universality. The broad scope of the theory of culture care diversity and universality as proposed by Madeleine Leininger makes it useful in many nursing settings and situations (Reynolds & Leininger, 1993).

The Web of Causation. The "web of causation" is an epidemiologic model that forms a graphic representation of complex sets of events or conditions caused by an array of

activities connected to a common experience or event. In the "Web of Causation" model, the final outcome is the disease or condition. A "web" may reflect many factors that are somehow interconnected or interrelated to the outcome (Timmreck, 1994). The multiple risk factors and their sources make for a complex web of causation. Figure 3 is a "web" visualization of myocardial infarction. It illustrates the complexity of a chronic disease and the multitude of factors that need to be considered (Timmreck, 1994).

This model is useful in identifying the risk factors of chronic conditions as CHF, the chain of events and exposures necessary and sufficient to produce the disease or condition. The source of the risk factors for CHF are behavioral, physiological/genetic, environmental and social. These risk factors are those experiences, behaviors, acts or aspects of lifestyle, that increase the chances of acquiring or developing a chronic condition such as CHF. Many lifestyle, environmental, and behavioral caused risk factors come from an array of influences and sources that are not always well defined, including choices in lifestyle, living conditions, social influences, and environmental exposures (Timmreck, 1994).

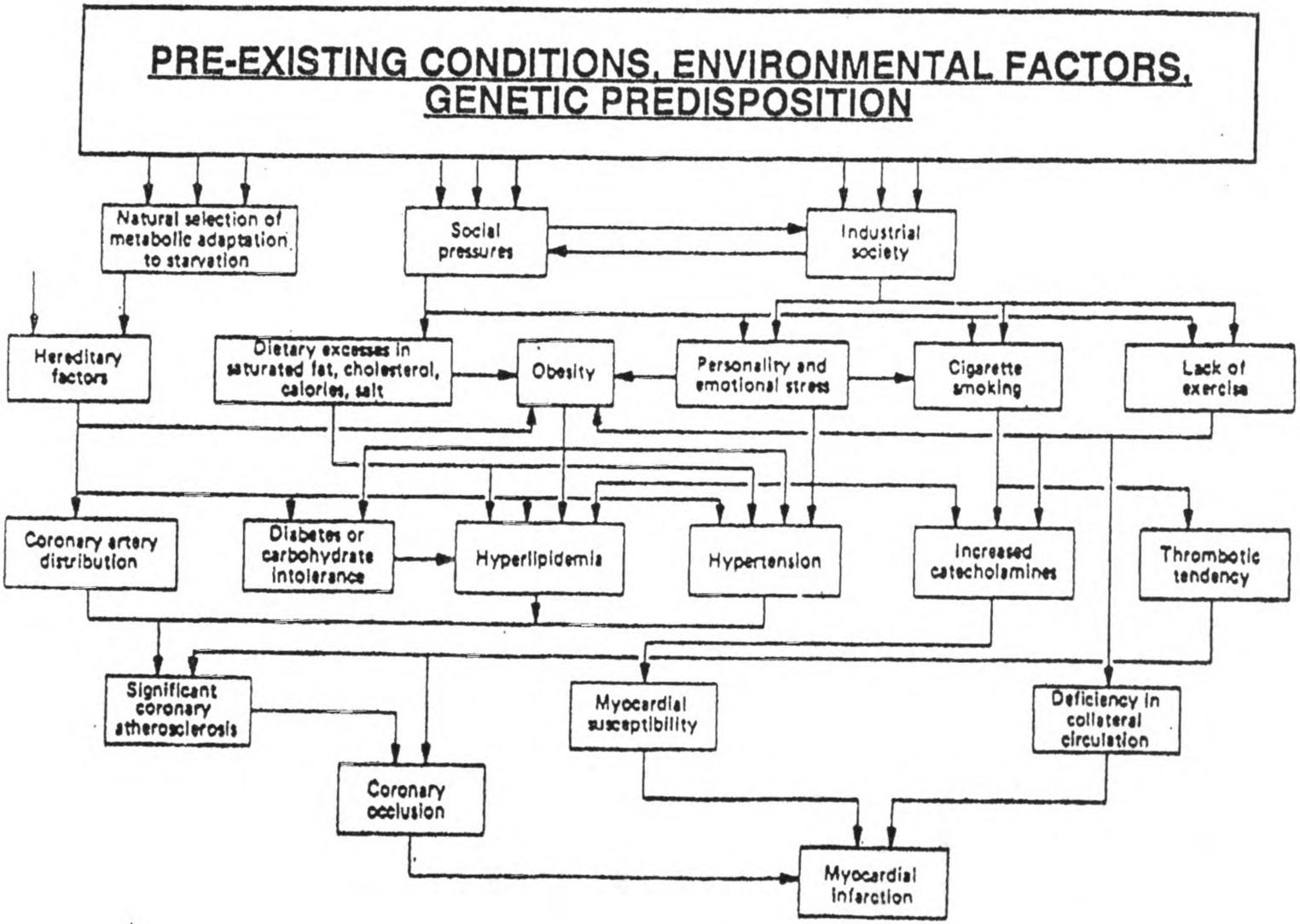

Figure 3 The "Web of Causation" for myocardial infarction (Friedman, 1974).

THE PROPOSED MODEL

Although each of the previously described possible models is applicable to the problem of concern, i.e., frequent hospital readmissions of elderly CHF clients, the "web of causation" model was selected. The complexity of the factors that contribute to understanding CHF requires a model that in fact works with these complexities. A model which has an epidemiological approach, i.e., "web of causation", can appropriately reflect elements identified in the literature review related to frequent hospital readmissions of CHF clients. The Ellis Model (EM) utilizes the "web" model characteristics and is the product of this project; its components are described in the section titled "Development of the Ellis Model".

DEFINITIONS OF THE CONCEPTS

The key terms related to this scholarly project that need conceptual/operational definitions are: congestive heart failure, readmission, primary care, primary care provider and elderly. In addition, two other supportive concepts are defined, i.e., morbidity and mortality. Additional information is included in the literature review.

Congestive heart failure (CHF). CHF is a syndrome that develops whenever the heart's ability to pump blood is decreased below that required to maintain adequate circulation (Vinson, 1990). The diagnosis is established by the presence of definite radiographic evidence as determined independently by a staff radiologist and/or cardiologist, or by the presence of a compatible history and typical physical findings with subsequent improvement after diuresis, as indicated by weight loss or a net negative fluid balance.

There are two major components of CHF and either or both can be present. The heart may have poor output, decreasing blood supply to vital organs like the brain or kidneys. Alternatively, the heart may "back-up," leading to excess fluid in the lungs, veins, and swelling of the ankles. This fluid retention is aggravated by hormones released by the kidneys. Since the kidneys are receiving less blood flow, they react as though the body is dehydrated. They release hormones to save salt and water, resulting in even more fluid back-up. The most common symptoms of CHF relate to poor output (decreased urine production, fatigue, and confusion) and to "back-up" (shortness of breath, and swollen ankles or abdomen distended with fluid) (Ferrini & Ferrini, 1993).

Readmission. Readmission is a non-scheduled hospitalization of an individual for the same or a related condition within 31 days of initial inpatient discharge from the same facility. There are many possible root causes for unscheduled readmissions such as premature discharge, inadequate discharge planning, discharge plan delay or failure, patient non-compliance, lack of community resources, or insufficient patient education. Some of these causes may be under the direct control of the facility, while others may at least be within the facility's influence (Ashton, Kuykendall, Johnson, Wray, & Wu, 1995).

Primary care. There are multiple definitions for primary care. The current accepted definition used most frequently is the Institute of Medicine (IOM) which is the integrated, accesible, health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained

partnership with patients, and practicing in the context of the family and the community (IOM, 1996).

Primary care refers to integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, who develop a sustained partnership with clients, and who practice in the context of family and community (Donaldson, Yordy, Lohr, & Vanselow, 1996).

Collado (1992) defines primary care as essential health care which is practical, scientifically sound, and socially acceptable. This care is universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford which promotes self-reliance and self-determination. It forms an integral part of the health system of the United States; it is the central function and main focus of the overall social and economic development of the community.

According to Silver (1997), primary care includes the initial contact of the client with the health-care system and encompasses a full range of basic health services. It should be readily accessible, client oriented, high quality, comprehensive, individualized, and based on a firm foundation which integrates knowledge of the medical, biological, physical, social psychological, and behavioral sciences. Primary care may be provided by a variety of health professionals, working either singly or in teams; Silver's definition has been selected for this project because of the emphasis on the essential elements of care regarding the client.

Primary care provider. A primary care provider is a family physician, a pediatrician, an internist, a gynecologist, or an advanced practice nurse (APN) (Starfield, 1992). Primary care providers devote the majority of their practice to providing primary care services to a defined population of clients. The style of primary care practice is such that the personal primary care provider serves as the entry point for substantially all of the client's medical and health care needs--not limited by problem origin, organ system, gender or diagnosis. Primary care providers are advocates for the client in coordinating the use of the entire health care system to benefit the client (Skeff & Mutha, 1998).

The APN is a registered nurse with the advanced education and clinical competency necessary to deliver comprehensive and coordinated health and medical care. The APN is prepared for advanced practice which involves being accessible to individuals and families throughout the lifespan and across the health continuum. In the advanced practice role, the APN demonstrates autonomous and collaborative decision-making, and holds direct accountability for clinical judgment. Serving as the total health care provider for children and adults during health and illness, the APN emphasizes health promotion and disease prevention, as well as diagnosing and managing acute and chronic diseases. In addition, the APN serves as a health care resource, interdisciplinary consultant and client advocate (Singh, 1998). For the purpose of this project, a primary care provider is an APN who specializes in family practice and holds specialty certification.

Elderly. An elderly individual is anyone 65 years and older (Hobbs, 1999). Because the literature suggests that most of the people with CHF are 65 years and over, the definition by Hobbs has been selected.

Morbidity and Mortality. CHF is associated with 100% morbidity and high mortality. Morbidity refers to the extent of illness or disability in a defined population and is usually expressed in general or specific rates of incidence of prevalence (Timmreck, 1994). Mortality is the epidemiological and vital statistics' term for death. In our society there are generally three things that cause death: (1) degeneration of vital organs and related conditions; (2) disease states; (3) results of society or the environment (Timmreck, 1994).

LITERATURE REVIEW

The literature review provides a detailed picture of the factors contributing to CHF readmission and thus assists in the identification of potential intervention points which could decrease readmission and promote continuity of care. There are numerous factors contributing to CHF; these are divided into the following sub-categories: (1) individual, (2) provider, and (3) system. Their respective key points follow.

Individual factors. The incidence of CHF and related hospitalizations is increasing dramatically and rapidly. CHF is the only cardiovascular problem believed to be increasing in prevalence; its incidence doubles in the general population with each decade over age 55. One of the most important contributing factors identified involves the elderly over the age of 65 years; it is thought that more than half of the symptomatic

CHF clients are over this age. Almost 6 million symptomatic CHF clients are anticipated in 2030 (Mills & Young, 1998).

CHF is the third leading cause of hospitalization for all clients in the U. S. and as stated the principal cause in those over 65 years of age. More than four out of every five older adults, i.e.,>65, have at least one chronic disease and many typically manifest multiple chronic conditions. The number of diseases per person increases with advancing age. Thirty-five percent of men and 45 percent of women age sixty to sixty-nine have more than one disease, while 70 percent of women and 53 percent of men over eighty suffer from more than one chronic illness. Statistically, the greater the number of illnesses, the greater the proportion of disability and dependence (Ferrini & Ferrini, 1993).

Although the average life expectancy has advanced, socioeconomic differences in mortality have persisted. Poverty is a significant contributing factor among the elderly. In 1960, one in every three older Americans was poor. That rate was twice that of the non-elderly adults. During the 1970s and 1980s, substantial gains occurred in the average income of the elderly due to a general increase in the standard of living and specific improvements in Social Security and employer sponsored pension benefits (Meyers, 1997).

Today, the resulting improvement in the economic status of the elderly is significant. However, these economic gains are not consistent among all the elderly. While many middle and upper class elderly are now more adequately protected from hardship, those at the bottom are not. More than one out of five elderly with incomes below the poverty

line reported times when they could not afford food. A similar percentage below poverty could not afford needed medical care. So while a number of the 65 and over population are better off economically than twenty years ago, a significant percentage have very real struggles to make ends meet (Meyers, 1997).

Despite improvements in absolute living standards in recent years, relative poverty among the elderly has been well documented. Over half of those retired have been found to be in households living in poverty or on the margins of poverty (Kennie, 1993).

Poverty influences health by limiting choice and altering one's ability or willingness to purchase items, such as glasses, dentures, drugs, nutritious food or fuel for warmth (Kennie, 1993). In essence, a basic dilemma of modern medicine is that as more sophisticated health care interventions are developed, society may not be able to afford to continue to provide them to the few.

CHF is forever; it is a lifelong condition for the elderly, as well as a lifelong issue for the family. It takes time for an elderly client to adjust to a new lifestyle from an unhealthy one. On some days, living with CHF is an inconvenience; on other days, it is a significant problem. The challenge of living with CHF is to try to maximize the periods of inconvenience and reduce the problem times. Although this is easy to say, Mills and Young (1998), state it is difficult to actually do.

Once diagnosed with CHF, the elderly client is typically advised to make some lifestyle changes. These are behavioral changes that are positively associated with reducing the risk or possibly retarding the advancement of CHF. They include changes in

diet, smoking, and exercise (Mills & Young, 1998). The elderly's lack of decision and/or inability to alter lifestyle is a contributing factor for hospital readmission.

A change in dietary habits is an example of a strategy that may positively effect the elderly CHF client's health. While there is no conclusive evidence that extreme changes in diet will guarantee a longer healthier life, dietary modifications may prove beneficial. Changing one's eating habits may be frustrating and inconvenient, but may reduce the risk for further problems in the long run (Mills & Young, 1998).

Perhaps the most difficult habit to change is cigarette smoking. Many elderly CHF clients express concern that since they have smoked for so long, there may be no real value in quitting. Enlisting the support of family members is very important. If the client and spouse both smoke, their commitment to cessation may be greater if they stop together; thus giving each other reinforcement. Continued cigarette use will increase the risk of further cardiovascular events and the associated complications (Mills & Young, 1998).

Noncompliance was first recognized as a problem in the early 1970's, but continues to be a growing concern today (Eraker, Kirscht, & Becker, 1984). According to interviews of 315 elderly clients admitted to an acute care hospital, the proportion of clients with a history of noncompliance (31%) was highest among those with CHF (Ashton, Kuykendall, Johnson, Wray, & Wu, 1995).

The literature suggests that noncompliance refers to errors of omission, unintentional and intentional overdosing, errors in dosing frequency, medications taken for the wrong purpose, incorrect administration of medications, and using drugs prescribed for others.

However, this author believes the issue is broader and that noncompliance refers to all the factors that promote and/or hinder the client's ability to comply with the health care provider.

Many authors, such as Monane (1994), Col (1990), and McDermott (1997) have focused heavily on noncompliance of the elderly as the real issue regarding frequent hospital readmissions for CHF. They believe that the real problem has been shifted to the individual while very little has focused on the system and provider factors. This one sided approach was used until Medicare came to the forefront and the focus shifted to the provider and the system as other factors contributing to this problem.

Literacy (the ability to read and write) is a significant issue that leads to noncompliance. There are more than forty million functionally illiterate adults in the United States. According to the National Education Association (1996), 41% of illiterate people are white; 22% are English-speaking African Americans; 22% are Spanish speaking; and 15% are other non-English speaking people. The majority of the illiterate are poor and dependent on public financial support (Rivas, 1996).

Apart from other social disadvantages, this means that the illiterate are at a disadvantage in understanding written prescriptions or possibly health care instructions. This ultimately results in individuals in poorer health, higher health care costs, more frequent hospitalizations, and an inability to assimilate information needed that could improve their health (Rivas, 1996).

Elderly who live alone are at greater risk of rehospitalization. Current U.S. statistics indicate that this number is increasing. Almost one-third of elderly live alone; Forty-one

percent of these elderly are women and 16 percent are men. Most elderly choose to live alone and prefer this lifestyle to living with adult children. However, living alone can be a liability because these individuals are more likely to have lower incomes and are at greater risk of being rehospitalized for CHF than those who live with their families. For both owners and renters, the percentage of income spent on housing is higher for the elderly than younger adults (Ferrini & Ferrini, 1993).

Lack of social support is a significant contributing factor. For the elderly who face an increased threat of disability, chronic illness, and loss of support with advancing age, the issue of social support assumes inordinate importance. As social support declines, so does the likelihood of independent functioning. As an individual ages, the total number of individuals available to absorb the burden for support becomes smaller. The elder becomes progressively unable to independently replace losses within the social network which results in a smaller social network to provide more direct care (Mills & Young, 1993).

Because medications are not covered by Medicare or by most other insurance plans, drugs are also one of the highest out-of-pocket health care expenses for the elderly. Therefore, noncompliance may be an even greater concern in clients without access to medications.

Altered functional capacity in clients with CHF is also an important contributing factor. Functional capacity has a direct impact on client well-being and quality of life; it is a predictor of mortality in clients with CHF. Emotional, social and cognitive factors may have a strong effect on the client's capacity to adhere or respond to a therapeutic

regimen and may be adversely affected by the underlying disease or its treatment (Williams et al, 1995).

An elderly client suffering from CHF may fall into a cycle of reduced physical activity. The cycle is initiated by the onset of CHF which results in deconditioning and its associated symptoms, which leads to fatigue and further decreases physical activity. Motivating the client to initiate and maintain a systematic exercise program is very difficult. The client may believe their situation is hopeless, or the exercise may temporarily worsen their discomfort by causing fatigue, pain, and breathlessness (Ferrini & Ferrini, 1993).

Many elderly are unaware of the value of exercise. It is far easier to take a pill to reduce disease symptoms than perform daily exercises when the benefits from the latter may not be immediately apparent. These elderly may be poorly educated about the benefits of exercise. In general, they are likely to believe their need for exercise diminishes as they grow older. These attitudes may reflect the common belief that one should slow down in old age (Ferrini & Ferrini, 1993).

Inability to manage taking one's own medication is a contributing factor to noncompliance. Rich, Gray, Beckham, Wittenberg, and Luther (1996) conducted a study on prevention of readmissions in elderly clients with CHF. Compliance rates with medications tended to be lower in those living alone and in those responsible for administering own medications. The association between living alone and reduced self-administration and thus increased noncompliance suggests that the presence of a spouse or other caregiver can increase compliance either through medication reminders

or by direct supervision of medication administration. The inference between compliance and presence of a spouse or caregiver warrants further investigation. This support person may be elderly, e.g., the spouse, and may also require physical assistance; thus adding an additional issue regarding compliance. Contrary to popular belief, the oldest elderly clients, those aged 85 years and older, are the most compliant group, perhaps because they were more likely to have caregiver assistance with the drug regimens (Monane et al., 1994).

Carney, Freedland, Eisen, Rich and Jaffe (1995) conducted numerous studies documenting a high prevalence of depression in elderly CHF clients at the Washington University Medical Center. Their findings indicated that depression in the elderly is associated with poor social support, functional impairment, heightened sensitivity to physical discomforts including medication side effects, and impairment of attention, concentration, and memory. Despite its well documented prevalence, depression is seldom treated in elderly medical clients.

Koenig (1998) reported that major depression is common among patients who have been hospitalized with CHF, but most older depressed patients receive neither antidepressants nor psychotherapy. Based on records of 542 clients aged 65 and over screened for depression upon admission to Duke University Medical Center, 58% admitted for CHF were depressed.

In the elderly age group, both health care providers and clients may incorrectly attribute depressive symptoms to the aging process. The particular constellation of symptoms may differ because the elderly may more readily report somatic symptoms

than depressed mood. Because both the client and the evaluating health care provider are often more concerned about concurrent medical conditions, depressive symptoms may be overlooked. As a result, depression is often underdiagnosed in elderly CHF clients, despite a high frequency of potentially treatable depressive symptoms (Lebowitz et al. 1997).

Impaired cognitive function is also a very important individual contributing factor because it affects virtually every aspect of an individual's life. The ability to live independently, conduct financial affairs, drive an automotive vehicle, and be medically compliant may all be impaired due to impaired cognitive function. Alterations in cognitive function with age are variable and difficult to separate from the overlays of disease or altered intellectual activity that may accompany aging (Ferrini & Ferrini, 1993).

In a study that evaluated reasons for hospitalization, the elderly client's risk of hospitalization as a result of noncompliance with their medication regimen was significantly associated with poor recall of the medication regimen (Wolfe & Schirm, 1992). Poor recall of the medication regimen is a related issue found frequently in the elderly. Elders usually remember less than one-half the instructions concerning the proposed regimen and one-third of the explanation about the illness to be treated. Clients may take drugs at the wrong times and in the wrong dosages, or may discontinue the drug therapy before it is appropriate (Ferrini & Ferrini, 1993).

Undesirable medication side effects is another factor contributing to noncompliance. Side effects are undesirable and unexpected responses to a medication

that occur when a drug is used routinely and appropriately to prevent, diagnose, or treat a disease state. Gastrointestinal disturbances are the most common side effect. Many of the side effects conform to the stereotypes of old age. As a result, side effects may be ignored by the elderly, their families, and sometimes health professionals; as a result the drug(s) continue to be taken. However, an alternative frequently occurs, i.e., the elderly and/or families reduce the dosage of the medications prescribed or discontinue the medication(s) altogether. The incidence of side effects of the drugs also increases significantly in the elderly (Ferrini & Ferrini, 1993). Health problems from medication taken by elderly arise from medication side effects. The risk to the elderly of taking medication is considered to be global (Kennie, 1993).

Thus, the key contributing individual factors for inclusion in the Ellis Model are: age >65, multiple chronic conditions, socioeconomic status, and unhealthy lifestyle. Other factors are literacy; living alone; lack of social support; inadequate financial resources to purchase drugs; altered functional capacity; inability to manage taking own meds; depression; impaired cognitive function; lack of understanding drug regimen; and undesirable medication side effects all contribute to noncompliance. The focus of this section now moves from the individual factors to the provider factors which contribute to frequent hospital readmissions of CHF clients.

Provider factors. Effective communication between client and provider is essential if the client is to receive proper health care. Thus, an important provider factor is the ability to communicate information appropriately and according to the various

characteristics of client, e.g., client receptivity, and client functional and cognitive abilities.

The care of CHF clients is increasing in technical complexity and the volume of new data from clinical research is considerable. This leads into the next factor--the lack of knowledge of the primary care provider regarding the elderly as well as CHF. An individual practitioner cannot assimilate all of the available literature and base his/her practice on scientific evidence. In fact, many providers do not alter their prescribing habits significantly once they leave school.

The complexity of CHF along with the complex regimen associated and narrow margin of error leads to the next factor, prescribing patterns. Many primary care providers do not understand the complex action of drugs on elderly clients. This problem is compounded by the fact that the effects of many drugs in the body differ in the elderly (Harper, 1991).

One drug in particular is angiotensin converting enzyme (ACE) inhibitor. With the huge amount of evidence showing the positive effects this class of drugs has on the quality of life and survival of such clients, it is unclear why health care providers do not use them more often (Pitt, 1997). In fact there is significant evidence that ACE inhibitors are grossly underprescribed raises concern for the future (Mills & Young, 1998).

ACE inhibitors have been found to be effective in CHF clients because they slow down the ACEs which are part of the renin-angiotensin system naturally found in the body. This system helps control blood pressure, kidney function and blood volume. ACEs break down the chemicals in the body that expand the blood vessel and constrict

the blood vessels. This means they raise the blood pressure by increasing the resistance the heart pumps against. ACE inhibitors stop the natural ACEs from doing this (Pitt, 1997). Use of the ACE inhibitors has become the number one pharmacological intervention of choice for clients with CHF.

According to a new report from the Pew Health Professions Commission, tougher federal standards are needed to guarantee the competence of primary care providers. The commission issued this report because it was convinced that there exists today in the field of health professionals' regulation a public system that is not protecting the public (Mills & Young, 1998).

Educating the client and caregiver about CHF is important--knowledge deficit is a major factor contributing to trips to the emergency department and readmission to the hospital. Evidence suggests that primary care providers do not adequately educate the CHF client and his/her family regarding the disease and its management including medication. The educational process is a challenge since the elderly usually remember less than one-half the instructions concerning a proposed regimen and one-third of the explanation about the illness to be treated (Ferrini & Ferrini, 1993). Thus, it becomes another factor.

The next contributing factor related to the primary care provider is that of unclear, error-prone medication regimens the provider gives to CHF clients. The primary issue is the importance of prescribing medication which is tailored to the particular client. Nikolaus et al., (1996) recognized the need for accurate and clearly written medication schedules after discharge. This study revealed that often prescriptions were written

illegibly or the drugs and dosages which were verbally discussed with the clients were different from those written and given to the client.

Sometimes the primary care provider gives the client certain prescriptions based upon their financial circumstances. The cost of a drug differs from one pharmaceutical company to another. Although containing the same substance, the package, size and color of medications may also differ between the companies; thus, this may lead to increased confusion by the elderly, i.e., although the same medication it "looks different". Because the elderly often takes multiple drugs, keeping track of the complicated schedules and interpreting them to the elderly or their family can be a major impediment (Nikolaus, et al. 1996).

Polypharmacy is another contributing factor related to the primary care provider. It is the practice of using medications excessively and unnecessarily. Duplicate medications used simultaneously create excessive drug concentrations in the body and the potential for drug interactions. Polypharmacy can be linked to having multiple health care providers (Ferrini & Ferrini, 1993). Polypharmacy is not uncommon in the elderly. It can lead to serious complications in the elderly and has been associated with an increase in morbidity as well (Meader, 1998).

In primary care, polypharmacy places an unwarranted social burden on the elderly trying to be responsible for their health and has led to mismanagement of care by health care provider (Lee, 1998). According to Esposito (1995), about one-third of the one to five billion prescriptions written annually are for people older than 65. While the general philosophy related to the care of elderly clients is to use the fewest drugs possible, it

appears that elderly clients are receiving an increasing number of medications. This issue may be further complicated when inadequate communication between the primary care provider and the client occurs.

The last of the contributing provider factors is inadequate assessment and treatment of depression of the CHF client. The elderly CHF client living in the community is typically seen by a primary care provider at least once a year, yet at the same time unrecognized, undiagnosed, and untreated depression is prevalent. The care currently provided to elderly depressed CHF clients is inadequate, fragmented, and passive. Ageist attitudes among some primary care providers compromise their ability to recognize depression in their elderly clients and to intervene in an appropriate and timely fashion (Friedhoff, Ballenger, & Bellack, 1997).

The subsequent decline in the CHF client's condition can justifiably be attributed to a decline in cardiac functioning; thus, little attention is paid to the contribution of underlying anxiety or depression. More often than not, depression in clients with CHF goes undiagnosed. A complicating aspect is that even when recognized, depression may be considered a normal concomitant of CHF that requires no special attention or treatment. Left untreated, the true needs of the client remain unresolved, and may lead to ineffective care and frustration for both the client and provider (Mills & Young, 1998).

In conclusion, the key contributing provider factors for inclusion in the Ellis Model are: inadequate communication between client and provider; lack of knowledge of the primary care provider related to CHF, drugs, and the elderly ; prescribing regimen; inadequate education of client by provider; unclear, error-prone medication regimens;

polypharmarcy; use of multiple providers; and inadequate assessment and treatment of depression. The focus now moves from the provider factors to the system factors contributing to the frequent hospital readmissions of CHF clients.

System factors. Managed care insurance coverage is an important system factor. In 1999, more than six million elderly individuals are participating in managed care through the Medicare program; this is more than double the number only five years ago (Feder & Moon, 1997). Since virtually all elderly get health insurance through Medicare, Medicare policies toward managed care determine its role and define the services it provides. Medicare beneficiaries have had the option to enroll in managed care from the program's beginning. However, until recently, both plan participation and enrollment have been quite limited. As recently as 1990, only about 2 million Medicare beneficiaries (6 percent) were enrolled in managed care plans. In 1997, that number had more than doubled to 5.5 million (14 percent). Increased enrollment likely reflects beneficiaries' difficulty in finding an affordable means to fill in gaps in the basic Medicare benefit (Feder & Moon, 1997).

As identified earlier under "individual" factors, CHF is a chronic progressive illness with considerable mortality and morbidity; thus the nature of CHF leads to an important system factor, i.e., inadequate pre-emptive hospital admission from out-patient services. Even if the frequency of outpatient visits was appropriate for the HMO Medicare beneficiaries and hospital utilization is curtailed, it is possible that clients with CHF may not receive timely, pre-emptive hospital admission from an outpatient service. Thus,

they may have to seek urgent hospital admission via the emergency department (Ni et al., 1998).

The rate of early readmission suggests that inadequate discharge planning is another important system factor. There is evidence that shows that effective discharge planning can facilitate the timely discharge of the elderly client, can ensure that appropriate care is available in the home to prevent readmission, can lessen the burden of care on families, and thus reduce costs (Naylor et al., 1994). It is also known that the elderly need quality discharge planning because they are substantial users of services after discharge and are at high risk for poor outcomes after discharge. Unfortunately, experts rated the quality of discharge planning available to this group as very poor (Naylor et al., 1994). Elderly clients in this study exhibited increased vulnerability to poor outcomes especially during the first few weeks after hospital discharge. These findings reinforce the importance of adequate discharge planning plus follow-up after discharge to address the client's needs associated with functional decline. Together, these should prevent the use of more costly health services.

Hospital readmissions represents a potentially useful indicator for monitoring quality (Feder & Moon, 1997). The rate of readmission has a presumed relationship to quality of care and discharging clients prematurely, i.e., before completing all necessary medical care or before performing adequate planning for postdischarge care needs (Thomas & Holloway, 1991). This is where the system has broken down, and as a result gets very costly and resource intensive.

The Balanced Budget Act of 1997 mandates the implementation of a per diem Prospective Payment System (PPS) for skilled facilities covering all costs related to the services furnished to beneficiaries under Part A of the Medicare program (Mills & Young, 1998). Clients discharged from the hospital frequently require care too complex for their families to provide; this places a difficult burden on the families and the health care system. Thus, the next important system factor, clients being discharged in unstable conditions, is identified. A national study by Rogers et al. (1990) of the effect of the Prospective Payment System (PPS) indicated that the number of elderly clients discharged in unstable condition has increased (Naylor et al., 1994).

Clients with chronic conditions such as CHF are at a higher risk for further deterioration of their original condition when both hospitalized and bedridden. These clients are all in poor physical health and generally unable to care for themselves after discharge (Victor & Vetter, 1995). The quality of inpatient care and discharge planning exerts a substantial influence on the risk for hospital readmission (Ashton et al., 1995).

It is clear from the literature review that managing clients with CHF has become more challenging as insurance companies demand lower costs and negotiate set rates per procedure and diagnosis. This leads to the next contributing system factor, i.e., the limited hospital stay related to DRG. In today's managed care environment, any provider who exceeds the contracted amount won't be reimbursed for the over run, i.e., a system developed for "prospective payment" (meaning that the payment level is predetermined according to the diagnosis, as opposed to according to how many services are used) for hospitalization of persons on Medicare (Harrington & Estes, 1997). Consequently,

providers are constantly challenged to find more cost-effective ways to care for CHF clients without compromising quality of care (Newkirk, 1995). At this time the allotted length of hospital stay for CHF, i.e., DRG #127, is 6.7 days--that is Medicare reimburses a hospital for care given to a CHF client for 6.7 days, the maximum number allotted (Newkirk, 1996).

There is also a lack of appropriate, available, and coordinated community service, i.e., which is another contributing system factor. The effectiveness of CHF management in the outpatient setting is limited due to the lack of systematic, co-ordinated monitoring of the CHF client after discharge. Elderly with CHF exhibit increased vulnerability to poor outcomes during the first few weeks after hospital discharge. Some elderly who are at high risk for poor outcomes after discharge require intensive follow-up. A critical need exists for interventions that facilitate the discharge of the elderly to their homes, that prevent poor outcomes after discharge, and reduce health care costs (Naylor et al., 1994).

Although the premise is that managed care has considerable potential to enhance access to primary care, the next factor, minimal financial and management incentives to reduce hospitalization, seem to promote desirable coordination of care for some, but also promote undesirable restrictions on care for others. Whether managed care is a promise to improve the health care system or a threat to its achievements will be determined by how it actually operates and how it is held accountable.

Clients with CHF, like those with other chronic medical diseases, are likely to require more frequent primary care provider visits for optimal management. However,

reimbursement to HMO Medicare is capitated on a per-patient per-month basis. Although the fiscal incentives of such a capitated HMO Medicare health plan are clearly to improve the quality of outpatient care and thereby decrease hospital and emergency department utilization, it appears that primary care providers of the plan have little individual fiscal incentive to achieve this end. For example, primary care providers may not receive reimbursement directly related to the frequency of outpatient care or the severity or comorbidity of chronic diseases such as CHF (Ni et al., 1998).

People enrolling in managed care generally agree to forego their access to the providers, services, and specialists of their choice. For the elderly, it would be naive to assume that the same health care delivery system would effectively serve them. The elderly have become increasingly dependent on ready access to the specialists and treatments of their choice. Their expanded reliance on prescription drugs and advanced treatments may put them at odds with a Health Maintenance Organization (HMO) looking squarely at the bottom line. The refusal of HMOs to cover routine, urgent care can place elderly in a difficult bind (Feder & Moon, 1997).

Readmission to an acute care hospital within 30 days following a previous discharge represents an adverse outcome for both the client and system. This is an important and costly system factor. Medicare, which pays for the majority of CHF hospitalizations (the typical CHF client is elderly) has determined that the way to discourage "churning", i.e., discharging clients too soon in order to readmit them again and collect another fee, is to refuse to pay for any CHF re-admission that occurs within that 30 day window. Thus, if a

client is readmitted within this window, the hospital has to assume the cost of the client's care (McCarthy, 1997).

The key contributing system factors for inclusion in the Ellis Model are: inadequate pre-emptive hospital admissions from out-patient services; inadequate discharge planning; CHF client discharged in unstable condition; limited hospital stay related to the DRG; lack of appropriate, available & coordinated community based resources; minimal financial and management incentives to reduce hospitalization; and readmission to the acute care setting within 30 days of previous discharge.

This completes the literature review; the next section addresses the development of the Ellis Model.

DEVELOPMENT OF THE ELLIS MODEL

The goal of this project is the development of an epidemiological model related to the contributing factors for frequent hospital readmissions of CHF clients. This section identifies and describes the contributing factors and provides a visualization of the factors. The Ellis Model (Figure 4) is presented as a "web of causation". This model reflects the three sub-categories described in the literature review; i.e., individual, provider, and system; these provide the organizing framework for the The Ellis Model. Factors that are linked or interrelated are depicted by the double-headed arrows in the diagram (<->) while contributing factors are depicted by a single arrow (->).

In addition to utilizing the "web of causation", this author recognizes that typically a web is created in a way which identifies factors as future points of intervention. Thus, the factors are arranged to reflect the epidemiological concept of "levels of prevention"

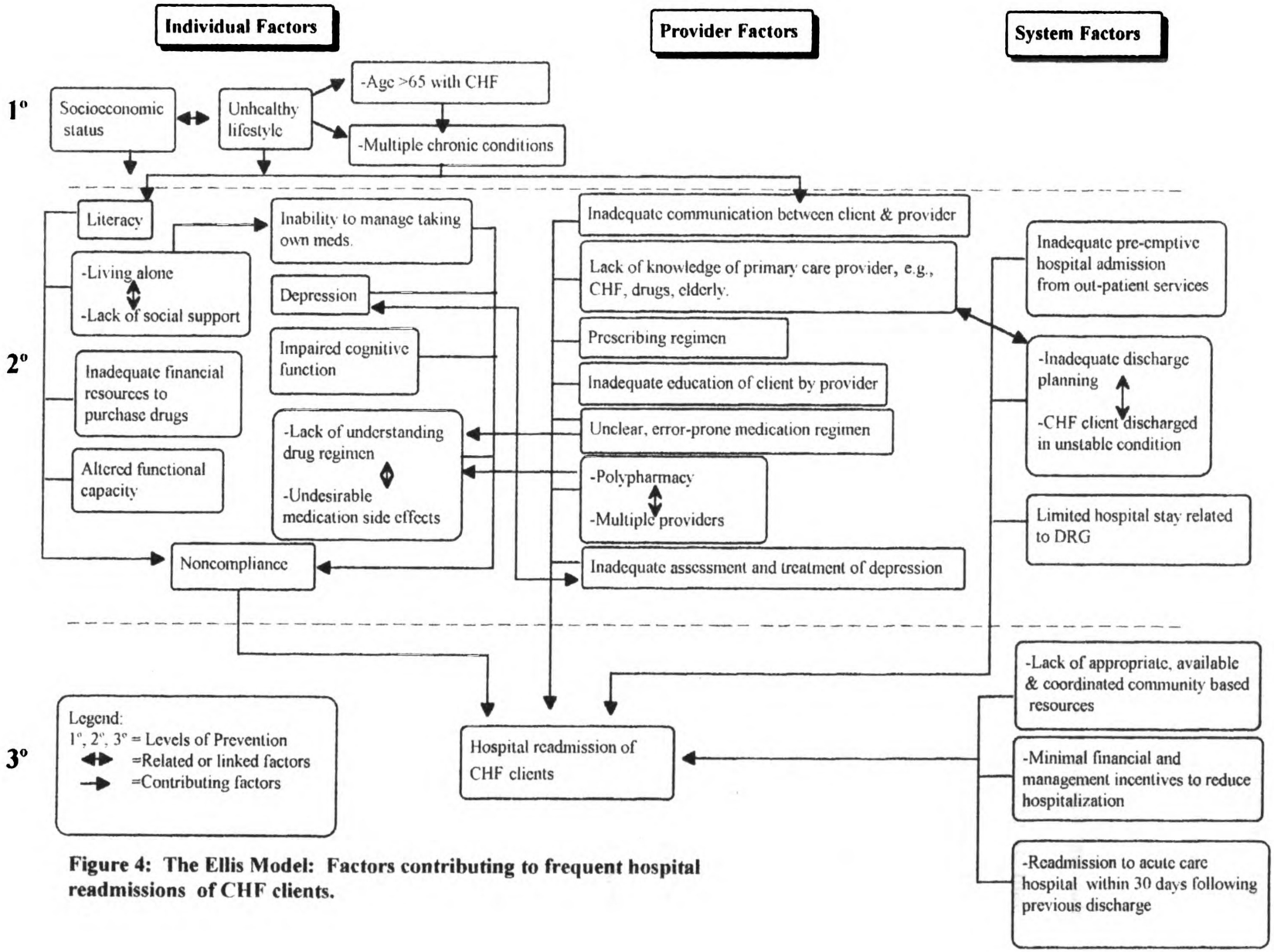

Figure 4: The Ellis Model: Factors contributing to frequent hospital readmissions of CHF clients.

which are referred to as primary, secondary and tertiary. These levels are depicted on the model as broken lines (---) to separate the contributing factors within each level.

Primary Level of Prevention

Timmreck (1994) describes primary prevention as activities/actions which can halt the occurrence of a disease, disorder, or condition. The current literature suggests that there are three individual factors which contribute to hospital readmission of the CHF client and are appropriate for this level.

Clients >65 with CHF contributes to ***multiple chronic conditions*** in this model (Hansen, 1997). Further support of this relationship is suggested by Mills and Young (1998) who anticipate that almost 6 million symptomatic ***CHF clients >65 years*** with ***multiple chronic conditions*** will occur by the year 2000. The literature also suggests that a strong relationship occurs between ***socioeconomic status*** and ***unhealthy lifestyle*** (Smith & Kington, 1997). ***Unhealthy lifestyle*** shows a contributing relationship to ***multiple chronic conditions*** and ***age >65 with CHF*** according to the literature (Pfeffer, 1995).

These individual factors under primary prevention strongly influence the individual and provider factors under the secondary level of prevention. This literature review failed to identify provider/system factors appropriate to this level.

Secondary Level of Prevention

Secondary prevention has the aim of blocking the progression of a disease, injury or condition from developing into an impairment or disability. This includes early detection to slow its progression and immediate treatment or intervention of the acute episode.

Secondary preventive activities can reverse ***unhealthy lifestyles*** through health education and behavior change programs, such as smoking cessation, weight loss, stress reduction, or health counseling (Timmreck, 1994).

Several contributing individual risk factors are identified at this level, and each contributes to client ***noncompliance***. ***Literacy*** is a significant issue; the client cannot comply when he/she cannot comprehend the information given. There are 40 to 44 million Americans who are functionally illiterate according to the National Adult Literacy Survey. They are unable to read and comprehend adequately to function in society (Marwick, 1997). ***Literacy*** and ***inadequate communication between the client and provider*** are interrelated due to language barriers present and/or a lack of the individual's understanding of the health care provider's instructions (Marwick, 1997).

The Ellis Model shows a link between ***living alone*** and ***lack of social support***. The literature suggests that as individuals age, they experience the death of family members and close friends and are left alone without the social support that is especially needed at this time. Activities which are not supervised promote ***noncompliance*** (McConnell, 1996). This link between ***living alone*** and ***lack of social support*** contributes to the individual's ***inability to take medications*** and typically results in an inability to self-administer medications accurately or independently (McConnell, 1996).

The literature also indicates that ***inadequate financial resources to purchase drugs*** contributes to ***noncompliance***. Economics influence drug taking in the elderly; many live on fixed incomes and take increasingly higher numbers of drugs. They may reduce

the number of tablets taken or omit medications before altering more basic necessities (McConnell, 1996).

Altered functional capacity also contributes to ***noncompliance*** due to the individual's inability to perform the functional tasks necessary to meet the demands of daily life. This creates the inability of the individual to care for themselves within a limited environment with the end result being ***noncompliance*** (Mayo Foundation, 1996).

Depression contributes to ***noncompliance*** in that it is a response to chronic cardiac disease. The end result is a feeling of lack of control over life and refusal to comply (Mills & Thompson, 1998). There is evidence of an interaction between the individual factor of ***depression*** and the provider factor of ***inadequate assessment and treatment of depression***. Little attention is paid to depression and it often goes undiagnosed. When and if it is recognized, it may be considered a normal concomitant of heart disease that requires no special attention or treatment (Mills & Thompson, 1998).

The literature suggests that ***impaired cognitive function*** of the individual also contributes to ***noncompliance***; it contributes to health maintenance alteration due to memory and judgment being affected (McConnell, 1996). ***Alterations in cognitive function*** of the elderly are variable and difficult to separate from the overlays of disease or lack of intellectual activity that may accompany aging. Declining cognitive function is a stereotype of growing old (Ferrini & Ferrini, 1993).

The individual factors of ***lack of understanding drug regimen*** and ***undesirable medication side effects*** are linked in this model and contribute to ***noncompliance*** because of the complexity of multiple medications and their medication regimen. This

results in improper ingestion by both type and time. There is also support that ***unclear, error-prone medication regimens*** along with ***polypharmacy*** and ***multiple providers*** (provider factors) contribute to this problem. ***Polypharmacy*** is seen among elderly who take a number of medications to treat ***multiple chronic conditions*** and encompasses a number of drug-taking behaviors. Schedules are such that a person might take medications unnecessarily; duplicate medications may be taken simultaneously from ***multiple providers*** which create excessive drug concentrations in the body; or clients visiting more than one provider without telling about the drugs prescribed by another provider (Osler, 1994).

All individual factors at the secondary level of prevention contribute to ***noncompliance*** which in turn contribute to the ***hospital readmission of the client with CHF***. However, these factors do not stand alone; they are related to provider and system factors. The provider factors are appropriate for inclusion in the secondary level because they are related to the need for early detection, referral, and prompt treatment and management (Timmreck, 1994). ***Inadequate communication between client and provider*** as discussed previously contributes to ***literacy*** an individual factor. Stewart et al. (1997) indicate that communication includes assessment of language barriers/literacy, however, health care providers fail to include this assessment routinely.

Lack of knowledge of primary care provider contributes to hospital readmission for CHF. The literature suggests that providers are unable to sort out normal aging features from the indicators of disease, and that providers view the treatable and reversible medical problems as part of growing old and thus they are left untreated

(Rutledge, 1996). A relationship between the provider factor of ***lack of knowledge of primary care provider*** and the system factor of ***inadequate discharge planning*** and ***CHF client discharged in unstable condition*** is reflected in the model. The literature suggests the primary care provider focuses on acute rather than rehabilitative care and fails to communicate with other health professionals (Matteson & McConnell, 1996). The arrow indicates that the system is a major influencing force on the provider's behavior and that ***lack of knowledge by the provider*** is reflected in ***inadequate discharge planning***.

Providers are often confused about which clients would benefit the most. As a result, life-prolonging drugs, such as ACE inhibitors, are ***underprescribed*** and contribute to ***hospital readmission of CHF clients***.

The provider factor of ***inadequate education of client by provider*** identified in the model contributes to ***readmission of CHF clients***. The literature suggests that providers do not adequately assess or know the elderly individual's exposure to information, their inability to recall information, their interpretation of information received from the provider or the demands of their daily living (McConnell, 1996).

Unclear, error-prone medication regimens, ***polypharmacy*** and ***multiple providers*** as discussed earlier contribute to ***lack of understanding of drug regimen*** and ***undesirable medication side effects***. However, ***polypharmacy*** and ***multiple providers*** are also contributors. The literature suggests that ***polypharmacy*** is a problem which arises when ***multiple providers*** provide health care to the elderly CHF client (Ferrini & Ferrini 1993) and are interrelated. The factors ***inadequate assessment and treatment of depression***, a provider factor, and ***depression***, an individual factor, are linked and previously discussed.

The literature clearly reflects that the seven provider factors contribute to readmission for CHF.

The system factors which contribute to the readmission for CHF are ***inadequate pre-emptive hospital admission from out-patient services***, ***inadequate discharge planning***, ***CHF client discharged in unstable condition***, and ***limited hospital stay related to DRG***. Ashton et al. (1995) concluded that when a primary care provider does not adhere to standards of care for admission and discharge from acute care facilities, the elderly client's chances for unplanned hospital readmission increase. The literature suggests the use of Diagnosis-Related Groups (DRGs) in planning hospital discharge and that the elderly receive minimal discharge planning (Harrington & Estes, 1997).

Tertiary Level of Prevention.

Tertiary prevention refers to factors which block the progression of the disease/condition in order to keep it from becoming advanced and in need of excessive care. Tertiary prevention consists of limiting any disability by providing monitoring to prevent additional deterioration where the disease/condition has already occurred and has caused damage. At this level the goal is to avoid wasteful use of health care services by appropriately using resources (Timmreck, 1994).

There were no tertiary factors identified for the individual and provider. While factors may indeed exist, the current literature did not provide evidence for identification. However, multiple system factors do contribute to the readmission of the CHF client.

Inadequate discharge planning and ***CHF client discharged in unstable condition*** are linked in the model. The literature suggests that the institution of DRGs has

prompted early discharge of unstable elderly CHF clients (Smith, 1996). The elderly are substantial users of services after discharge and are at high risk for poor outcomes after discharge. According to Smith (1996) there is a ***lack of appropriate, available and coordinated community services*** (Smith, 1996). Experts have rated the quality of discharge planning available to the elderly as very poor (Naylor et al., 1994). ***Minimal financial and management incentives to reduce hospitalization*** also contribute to ***hospital readmission of CHF clients***. According to the literature, providers have little incentive to improve the quality of outpatient care which would decrease hospital readmissions. Elderly clients with CHF require more frequent primary care provider visits for optimal management, however, there is little incentive to decrease hospital and emergency department utilization (Ni et al., 1998).

Readmission to acute care hospital within 30 days following previous discharge suggests that lack of access to medical management and inadequate rehabilitation are reasons for readmission (Smith, 1996). The elderly have lost that ready access to specialists and treatments of their choice which they have had to forego through managed care; thus, an ineffective health care delivery system has put them in a difficult bind (Feder & Moon, 1997).

In summary, individual, provider, and system factors contributing to the ***hospital readmission of CHF clients*** as reflected in the current literature have been identified. The Ellis Model depicts the relationships between and among these factors through a visualization of the complexity of the problem.

IMPLICATIONS

There are many implications for the application of the EM in a primary care setting. The EM provides insights into possible intervention points to alter the problem of hospital readmission of CHF clients. The model provides a visual aid to illustrate current contributing factors; it can assist health care professionals and specifically the APN in practice, education and research. These are discussed in this section.

Implications for practice

Frequent hospital readmissions of CHF clients is a complex and costly issue with a vast amount of literature written on the topic. There are numerous studies which offer suggestions and interventions, but no study has addressed the complexity of the issue nor the array of individual, provider, and system factors. The visualization of the contributing factors presented in the EM can assist health care providers, including the APN, in identifying clients at risk for readmission in the primary care setting. This section identifies potential points of intervention appropriate to the primary, secondary, and tertiary levels of prevention related to practice.

The health care provider as an individual can impact a number of the factors identified on the EM. One suggested intervention at the primary level of prevention is to increase the number of APNs as practitioners in primary care settings. Growing specialization among physicians, faster discharge of hospitalized clients to other sites in the community, and an acceleration to managed care and cost-efficiency are fueling the demand for APNs even further (AACN, 1996).

In a 1994 report, the Pew Health Professions Commission called for doubling the number of APNs by the year 2000 to offset the shortages of primary care physicians in major metropolitan centers, rural sites, and inner cities (AACN, 1996). By increasing the number of APNs as primary care providers, the factors of ***age***, ***multiple chronic conditions*** and ***socioeconomic status*** may be indirectly affected. APN services could focus on the at-risk population of elderly CHF clients with ***multiple chronic conditions*** and minimal finances (AAN, 1993). While these client factors can not be directly changed, they may be impacted by the availability of providers in larger numbers and the primary prevention services they provide.

Health care providers can also advocate to secure funding for the health care needs of the CHF client. One example in which an APN can affect funding is to communicate with local legislators about the needs of elderly CHF clients who do not receive adequate health care. It is through this client advocacy role that an APN may affect the health status of both the individual and the community. Legislators need to be aware of the issues. APNs can also affect legislation by registering to vote and than doing it. They can also be active members of their nursing organizations and as such can raise issues relevant to elderly clients. Communicating the crucial need to increase funding for elderly health at the national level could have a broader national impact. This can be done by joining the Michigan Nurse Association (MNA)/American Nurse Association (ANA) where numbers speak loudly. Presenting these issues at the state organizational level of MNA is another effective way to increase awareness of this problem by other practicing nurses.

A point of intervention at the secondary level of prevention is related to **literacy**. Since the elderly have a greater burden of chronic problems and are more likely to need health care services, their higher prevalence of illiteracy takes on even greater significance. Much can be done by health care providers including the APN in mitigating the negative effects of low literacy on health care. The first step toward solving the problem of caring for illiterate elderly is to acknowledge its existence and routinely assess its presence when working with clients.

Another important point of intervention at the secondary level of prevention relates to ***lack of social support***. It is well established that the presence of social support promotes health. ***Isolated adults*** have a significantly higher death rate than those with social ties; the more ties, the lower the death rate (Ferrini & Ferrini, 1993). Again, health care providers can affect this by routinely assessing its presence and by using peer support services which can create a supportive social environment.

Inadequate financial resources to purchase medications is another point of intervention at the secondary level of prevention for the health care provider and APN. Prescription drugs are a significant ***out-of-pocket expense*** for the elderly. Because most elderly pay for their drugs themselves and the cost of the drugs represents a significant budget item for many, it is of crucial importance to maximize the cost effectiveness of drug therapy. It is important that health care providers and APNs assess the financial resources of the client as well as the cost of the elderly's medications. The pharmacist can be an excellent source for this information. Other interventions that can be used

include using generic medications when possible and using the lowest dose necessary for the desired effect.

An intervention at the secondary level of prevention for the individual focuses on ***depression. Depression*** remains a central concern to the elderly CHF client, their families, and the health care providers who take care of them. Onset of depression should be viewed as a perceived event that increases the risk for subsequent declines in health status and functional ability. Early recognition, diagnosis, and initiation of treatment of depression in the elderly CHF client presents opportunities to the health care provider for improvements in the client's quality of life and maintenance of optimal levels of function and independence for the client. ***Depression*** in the elderly is often viewed as part of the nature of the aging process; thus, the individual, family, and health care provider fail to recognize the symptoms of depression in the elderly. Treatment for depression can consist of counseling, and the use of anti-depressants. The Beck Depression Inventory and the Zung Self-Rating Depression Scale have been used extrensively in primary care (Uphold & Graham, 1998). Health care providers, including the APN, need to conduct comprehensive assessments of cognitive function. Use of the mini-mental examination as part of the health care provider's routine assessment could identify at-risk clients.

Another point of intervention at the secondary level of prevention is related to the elderly clients' ***compliance with their medication regimen***. The key to successful health care delivery is spending time on education in relation to understanding the medication and instruction on the administration of medication. One way to accomplish this is by

simplifying drug regimens and avoiding unnecessary doses or variations in scheduling that make it ***difficult for the elderly to manage their own meds.*** One example in which the APN can affect compliance with the medication regimen is through discussion of the importance of compliance at followup visits and assisting clients to remove barriers to compliance (e.g. cost, ***side effects***, or ***complexity of the medical treatment regimen***). Utilization of the use of various programs from drug companies for low-income persons needs to be encouraged.

Polypharmacy which is linked with ***multiple providers*** is associated with adverse complications. The precise number of drugs the client is taking appears to be less important than the health care provider's ability to relate the use of each drug to the client's medical, social, and economic circumstances. It is imperative that health care providers recognize and manage ***polypharmacy*** aggressively (Lee, 1998). One major intervention which the health care provider, i.e., the APN can utilize is to ask the elderly client to bring all the medications they take (prescribed and non-prescribed) to the office visit to ascertain possible drug interactions and reactions.

Health care providers can impact a number of factors identified on the EM. Health care providers have not acknowledged the relationship between ***lack of knowledge of the provider*** with the ***inadequate education of client by provider.*** Health care providers knowledge about the elderly is often inadequate, and thus, ***inappropriate prescribing*** is common. One example in which an APN can affect knowledge is to take a holistic approach in diagnosing and treating CHF in addition to preparing the client for the effects the disease will have on day to day life. The interaction between an elderly client and a

more knowledgeable health professional, such as the APN, should enhance the client's ability to understand the related issues. Thus, the ***inadequacy of communication between the client and provider*** should be improved.

Another intervention at the secondary level of prevention for health care providers is to provide opportunities for continuing education, attendance at professional meetings, participation in a group practice and peer consultation related to CHF and health care needs of the elderly. One way of accomplishing this is by telemonitoring and education programs that focus on nationally recognized guidelines on CHF management (Roglieri, 1997).

Health care providers can impact the system factors identified on the EM. An important factor is ***inadequate pre-emptive hospital admission from the outpatient services.*** One suggested intervention at the secondary level of prevention is to enable higher provider continuity which should positively effect health care utilization and outcomes. The elderly clients who have provider continuity are more satisfied with their care and are more likely to have problems identified by their provider (Gill, 1998).

Health care providers who do ***inadequate discharge planning*** do not recognize when symptoms of CHF have been adequately controlled or reversible causes of morbidity have been treated or stabilized. The APN can affect the system by taking a stronger position on the need to coordinate the care of elderly clients with CHF in the outpatient and home setting. In order to assure that quality outpatient care is provided to the elderly and to guard against ***minimal financial and management incentives to reduce hospitalization***, quality standards should be established in health plans. The APN along

with other health care professionals can work with Congress, the Health Care Financing Administration, and health plans to develop and design appropriate quality standards.

Health care providers can also impact the system factors identified on the EM at the tertiary level of prevention. One example is by ensuring that appropriate care is available in the community prior to client discharge. The health care provider needs to be aware that the elderly with ***limited hospital stays related to DRGs*** are at high risk for ***poor outcomes after discharge***. Without follow-up after discharge, the elderly clients are at risk for functional decline which in turn increases their potential for deficits in activities of daily living (bathing, dressing, feeding, transfers, continence, and ambulation), and instrumental activities of daily living (housekeeping, shopping, taking medicines, using transportation, cooking, and managing money). An example of one way the APN as a clinician can affect the client after discharge from the hospital is by taking the leadership and developing an outpatient CHF clinic. The APN could ensure that appropriate resources are identified, roles are clarified, and systems are in place to monitor the client's clinical status which should in turn reduce and/or prevent hospital readmissions. In order for this to be successful other health care providers would need to be involved with the plan.

Implications for education

There are a number of factors in the EM that can be influenced by health care providers and are related to education. An important aspect at the primary level of prevention is for the APN to educate the community about CHF. This could include information about the importance of maintaining a medication regimen and monitoring

blood pressure. Community education involves the APN speaking at various groups, such as senior centers and church groups and contacting local newspapers and talk radio programs. These audiences are comprised of a large part of the elderly population.

At the secondary level of prevention health care providers need to recognize that ***noncompliance*** may be the most significant problem facing the elderly CHF client today. In order to be effective, the teaching-learning plan must be individualized to fit the needs and lifestyle of the client and include mutually acceptable goals. The health care provider must focus not only on the existing medical problems, but also on the functional problems that are common to the elderly. The current ***functional capacity*** must be accurately assessed; if unrecognized, functional losses will impede the teaching-learning process and lead to ***noncompliance.*** The health care provider has the potential to make an important contribution to outcomes by using valid and reliable tools in assessment of the client's functional status. The APN as educator can identify clients at risk and develop measures to meet the educational needs to improve outcomes.

The first goal of therapy for health care providers is client education. Education is particularly important because elderly clients with CHF are generally first treated at home. Increased educational opportunities for health care providers to identify clients at risk and which focus on preventing the ***frequent hospital readmission of the CHF client*** are needed. Examples of this would be seminars or conferences educating providers regarding how poor dietary habits, or cognitive/functional impairments can impact the client and put them at an added risk for hospital readmission.

One example in which health care providers along with the APN can affect ***inadequate education of client by provider*** is by educating families and caregivers in the care of elderly clients. The primary management and control of the client's care rests not with the provider but with the client and family who carry out the ***prescribing regimen***. The health care provider including the APN needs to collaborate with the client and family in order to achieve client and family care management and independence. Client and family education become paramount.

The APN as educator may have an opportunity to work with directors of nursing programs and promote the incorporation of information about the complexity of CHF and how it relates to the elderly into the programs. This could impact the way the elderly CHF client could be perceived in the future. There would be a better understanding that CHF is a chronic, complex and progressive syndrome. Upon completion of the educational programs, the providers should have a better understanding of this syndrome and recognize the surveillance of the client's treatment regimen is imperative for both provider and client. The regimen would require close monitoring of blood pressure and weight and the need to be as simple as possible to prevent ***noncompliance***.

Implications for research

The EM can serve as a framework for future research. Health care providers can influence frequent hospital readmissions with research that is aimed at specific factors in the model and which address the secondary and tertiary levels of prevention.

Research is needed about cost containment programs that limit or reduce expenditures to publicly funded programs or that cause a disproportionate share of the

reductions to fall on the population served by public programs. Specifically an issue which needs to be examined is whether cost-containment interventions reduce access and the quality of care for the elderly.

Future research by health care providers, including the APN, on readmission rates may be more productive if it focuses on quality of care differences of the elderly CHF clients. Peer review of medical records could establish whether premature discharge, inappropriate admission, or other quality-related problems were associated with the identified cases at significantly higher rates than with other cases. This represents an important area for future research related to the secondary level of prevention.

Research at the tertiary level of prevention is needed in the area of health care costs. Health care providers including the APN can affect change by working with legislators on ways to develop a managed care system for the elderly who lack access to care, and who are in need of better health care and prescriptive coverage. Instituting pilot programs to determine the best and least costly way of providing health care for this segment of the population is suggested. The primary issue for nursing is: Will there be APNs who are willing to accept the challenge? How do APNs start the process of making this change? Research will be ongoing regarding this challenging problem.

CONCLUSION

Chronic CHF is a complex issue and represents a significant burden to elderly clients (through morbidity and mortality), their caregivers (through provision of daily care), their health care providers (through the challenge of effective management), and the health care system (through frequent hospital readmissions). This syndrome poses an enormous socio-economic public health problem that needs to be taken seriously.

The EM provides an initial epidemiological visualization of the current individual, provider and system factors contributing to the frequent hospital readmission of elderly CHF clients and thus enables the identification of points of intervention. It is evident that health care providers and specifically the APN need to address multiple issues related to practice, education, and research in order to impact this problem.

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