COMPARISON OF FLUID INTAKE OF SELF-FEEDING TO ASSISTED-CARE ELDERLY NURSING HOME RESIDENTS

Ву

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ABSTRACT

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The status of hydration of forty elderly, who were residing in Lyngblomsten Care Center in St. Paul, Minnesota, was investigated in this study. The subjects were further separated into two groups using the Minimum Data Set (MDS) screening. The MDS was used to screen and assess the subjects for cognitive patterns, communication/hearing patterns, physical functioning and structural problems, and oral/nutritional status. Using the MDS, the subjects were separated into dependent and independent feeding groups.

The amount of food and beverages consumed by each subject was recorded for three consecutive days by the

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researcher and staff members. Using the the data collected, the total calorie and water intakes were calculated using the Food Processor Plus software. The actual fluid intake was compared with the recommended fluid level from three standards.

The results obtained from this study showed that many of the dependent and independent feeders were not receiving the recommended amount of fluid. According to standard 1, 68% of dependent feeders and 88.9% of independent feeders did not receive the recommended amount of fluid. According to standard 2, 72% of dependent and 77.8% of independent feeders were below the recommended level. According to standard 3, 90% of dependent feeders and 100% of independent feeders did not achieve the water recommendation level.

The results also showed that variables such as age, gender, weight, and number and frequency of medications did not contribute significantly to the total amount of fluid intake. These findings were consistent with other similar studies done in the past.

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INTRODUCTION

Dehydration has long been considered a major health problem in the elderly. In 1991, dehydration was one of the ten most frequent diagnoses reported for Medicare hospitalizations (Health Care Financing Administration [HCFA], unpublished data) (Warren et al. 1994). The major concern with dehydration is that it is commonly underdiagnosed. For instance, approximately one percent of all hospital admissions is associated with hypernatremic dehydration in which serum sodium levels exceed 148 mEq/liter. In other instances, approximately one million elderly individuals per year are admitted to acute care hospitals with isotonic dehydration as a major component of their clinical presentation (Minaker 1995).

According to researchers and practitioners, dehydration is one of the most long-standing and pressing problems of institutionalized persons (Chidester and Spangler 1997). Federal guidelines for long-term-care facilities require that hydration needs are met. The Minimum Data Set (a multi-disciplinary assessment and screening tool for longterm-care residents) provides examples of situations that trigger a need for additional assessment of dehydration problems.

One of the major risk factors for dehydration is an increase of age; the oldest of old (those between the ages of 85 and 99 years) are six times more likely to be hospitalized for dehydration (Chernoff 1994). This is an alarming rate since the current demographics indicate that by the year 2000, persons 65 and older are expected to represent 13 percent of the population. When elderly persons fail to receive optimal hydration, they are susceptible to problems such as urinary tract infections, pneumonia, pressure ulcers, confusion and disorientation (Chidester and Spangler 1997). The results from studies indicate that 17.42 percent of patients admitted with a principal diagnosis of dehydration died within 30 days after admission (Warren et al. 1994). Those admitted under a variety of other diagnostic categories, but with the concomitant diagnosis of dehydration, were also significantly preventable. Recognizing the scope of the problem and identifying the pertinent risk factors are very important in devising effective strategies for prevention.

The objective of this study is to compare the fluid intake of self-feeding elderly nursing home residents to the fluid intake of elderly residents who are assisted by a care giver. The fluid intake from food and beverages will be compared to the recommended hydration level established for the elderly.

REVIEW OF LITERATURE

Elderly

Definition

Although there is no definite consensus as to what constitutes aging, several concepts are generally being accepted (Neuhaus 1982). Neuhaus stated that the aging process begins at the moment of conception and continues until death. Aging is a gradual process that is hardly noticed by anyone. The aging process usually is examined in terms of chronological, biological, physiological and sociological processes. Changes that occur as individuals age are physical, mental, social and emotional.

According to Roe (1983), old and elderly are derogatory terms suggesting that a person can no longer function efficiently, that thought processes are slowed, or that senility is imminent. From a nutritional point of view, an elderly person appears to be one who may have many factors that impair nutritional status. These factors include; problems with ingestion and digestion of food, difficulties in absorption and utilization of nutrients, impaired metabolism, chronic diseases, and difficulties in ambulating (Neuhaus 1982).

In American society, for example, chronological age is utilized as a basis for judgment about a person's stage in life (Smith 1985). In some situations, society defines the elderly in formal chronological terms, such as when determining eligibility for social security benefits, establishing compulsory retirement, and formulating social and health legislation (Glenn 1974). Clausen (1972) has indicated that aging is a course in life that reflects the passage of individuals along a number of dimensions such as stages of work, career, health and family development.

For the purposes of this research, the age of 65 years and older will be used to indicate the elderly, even though there are many different definitions for elderly. Other terms such as senior citizens, older Americans, and golden ages may be used interchangeably throughout this thesis to indicate the elderly.

Dehydration

Definition

Dehydration can be defined as a depletion in total body water (TBW) content due to pathologic fluid losses, diminished water intake, or a combination of both (Gross et al. 1991). Another definition of dehydration is a rapid weight loss of more that 3 percent of body weight (Huffman

1996). Hoffman (1991) defined dehydration as a deficit of relatively pure water (water alone, rather than water and sodium) which leads to hypernatremia.

Water and sodium imbalances are closely interrelated (Sansevero 1997). Changes in osmotic gradients, such as a gain or loss of salt, have an effect on water balance. Similarly, sodium imbalances occur when there are alterations in water volume. Water and solute imbalances can be classified as isotonic, hypertonic, or hypotonic. Dehydration occurs in isotonic and hypertonic alterations, as defined in Table 1 (Heuther 1997).

Table 1	1 '	Water	and	Solute	Imbalances

Tonicity	Mechanism
Isotonic	Gain or loss of extracellular fluid (ECF) resulting in a concentration equivalent to 0.9% sodium chloride solution; no shrinking or swelling of cells takes place.
Hypertonic	Imbalance caused by a water loss or solute gain that produces an ECF concentration greater than 0.9% sodium chloride solution; cells shrink.
Hypotonic	Imbalance caused by a water gain or solute loss that results in an ECF less than 0.9% sodium chloride; cells swell.

Source: Gross CR, Lindquist RD, Woolley AC, et al: Clinical indicators of dehydration severity in elderly patients. <u>J Emerg Med.</u> 1991; (10): 267-74.

Isotonic dehydration occurs when there are equivalent losses of both sodium and water, which results in dehydration without a change in serum osmolality. Hypertonic dehydration is observed in hypernatremia and hyperosmolality (Minaker 1995)

Weinberg and Kenneth (1995) stated that several forms of dehydration occur and must be distinguished, since the forms dictate the management. According to the authors, isotonic dehydration results from a balanced loss of water and sodium, which can occur during complete fasting.

Vomiting and diarrhea will result in isotonic dehydration because of loss of large amounts of water and electrolytes in gastric contents. Hypertonic dehydration occurs if water losses are greater than sodium losses. The characteristics of hypertonic dehydration are hypernatremia (serum sodium levels > 145 mmol/L) and hyperosmolality (serum osmolality >300 mmol/kg). Fever results in loss of water through the lungs and skin, and when combined with limited ability to increase oral fluid intake; it is perhaps the most common cause of hypernatremic dehydration. Hypotonic dehydration occurs when sodium loss exceeds water loss. The serum sodium is decreased (>135 mmol/L) and the serum osmolality is low (<280 mmol/kg). This type of dehydration occurs primarily with excessive usage of diuretics, causing excess loss of sodium.

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Evaluation of Dehydration

To evaluate the causes of dehydration, medications should be reviewed, and medical illnesses, bowel and bladder function, and any mental status changes should be assessed (Weinberg and Minaker 1995). Signs and symptoms of dehydration volume depletion may be vague, deceptive, or even absent in elderly. Therefore, different clinical changes must be evaluated in older patients, specifically targeting function and oral fluid intake. A study on dehydrated states in the elderly emphasizes the need for an age-appropriate assessment. These results show that agerelated tendencies, such as loss of autonomic function and the widespread use of vasoactive medications among the elderly, can cloud the issue (Gross et al. 1991).

The mouth is one of the most important features to assess in an older client with suspected dehydration. According to Gross et al. (1991), a set of sensitive signs and symptoms that accurately correlate with clinical dehydration in elderly populations has been identified (Table 2). Note that in Table 2, no one positive indicator can strongly correlate with a dehydrated state. However, several positive indicators from among the list would be important for assessment and diagnosis. Tongue furrows, dry mucous membranes of the mouth, and absent saliva pool are high correlates for dehydration. Tongue furrows should not

be confused with geographic tongue, which is a benign finding characterized by patchy papillary loss giving rise to a map-like appearance.

Skin turgor can be observed in the older patient by tenting the tissue on the forehead or over the sternum, because alterations in skin elasticity are less marked in these areas. However, in Winberg's report, skin turgor assessment is unreliable, and weights may be impracticable in the nursing home setting.

Table 2. Clinical Indicators of Dehydration Severity in Elderly Patients

Strongly correlative	• Tongue furrows
	• Tongue dryness
	• Dry mucous membranes of the mouth
	and nose
	• Small or absent saliva pool
	• Tongue coating
Moderately correlative	• Upper body muscle weakness
	• Speech difficulty
	• Confusion
	• Sunken eyes
Weakly correlative	• Tachycardia
	• Emaciation
	• Lethargy

Source: Gross CR, Lindquist RD, Woolley AC, et al: Clinical indicators of dehydration severity in elderly patients. J Emerg Med. 1991; (10): 267-74.

Rate and degree of filling of small veins in the foot has also been used to assess hydration status (Robinson and Demuth 1985). A dorsal foot vein can be occluded by finger pressure at a distal point and emptied of its blood by stroking proximally with another finger. In a well-hydrated patient, the vein will fill instantly when the pressure is released. In a volume-depleted patient, the vein will fill slowly, over a period longer than three seconds. Researchers utilizing this method noted that changes in the rapidity and degree of vein filling in the foot provided the best way for evaluating changes in hydration of elderly subjects (Robinson and Demuth 1985).

Although intake and output (I&O) records are often important in handling patients with fluid imbalances, frequent inaccuracies can make these records less than reliable. According to Pflaum (1979), daily weights may be a more accurate measure of a patient's fluid status, but inaccuracies can also occur in measuring body weights. Therefore, both I&O and weight records should be maintained to check fluid status. In general, a gain or loss of 1 kg body weight in a short period is equivalent to a gain or loss of 1 L of fluid.

Blood pressure is another measure to assess hydration status. Wolanin and Phillips (1981) have indicated that a drop of at least 15 mmHg in the systolic pressure, and 10 mmHg in the diastolic pressure, results when volume-depleted patients are quickly shifted from a lying to a standing position.

Body temperature may be used to observe hydration. In younger individuals, a rise of temperature above normal $(37^{\circ}$ C [98.6° F]) may be an indicator of dehydration. However, when assessing aged patients, it is important to realize that their normal body temperatures are often lower than 37° C (98.6° F), possibly close to 36.1° C (97° F).

Clearly, dehydration and cognitive impairment are other conditions that affect the progression of disability in older persons. A study was conducted to develop and validate a predictive model that would identify on admission those elders at risk for development of delirium (Inouye et al. 1993). Of 107 elderly medical patients 70 years or older, 27 elders developed delirium during their hospital stay. A predictive model was developed and validated, and results identified four dependent baseline risk factors for delirium:

- 1. Vision impairment
- 2. Severe illness
- 3. Cognitive impairment
- 4. Dehydration (blood urea nitrogen [BUN]/creatinine > 18:1)

Patients with delirium were more acutely ill, and had greater underlying chronic illness, dementia, and functional disability than other patients. In addition, delirium often

triggers a cascade of adverse events that add to the risk of functional decline. Such complications include falls, use of restraints, urinary catheterization, aspiration, malnutrition, and dehydration (O'Keeffe et al. 1997).

Ratios of blood urea nitrogen to creatinine of 25 or more may be found in dehydrated patients. A serum sodium level greater than 148 mmol per L is also an indicative of dehydration, although normal sodium levels may be observed in isotonic and hypotonic dehydration even when the patient is severely dehydrated (i.e., hypernatremia may be a relatively late-finding in these types of dehydration). If a patient is at risk of developing dehydration, Huffman (1996) recommends early laboratory evaluation consisting of serum electrolyte, urea nitrogen, and creatinine measurements.

Thirst in elderly

Water is one of the most important nutrients needed to maintain homeostasis in older adults (Chernoff 1994). It is also the most abundant solvent or medium in the human body. The loss of water may have profound consequences because of its essential role in the regulation of cell volume, nutrient transport, waste removal, intercellularity, and is limited to the fat free compartment. At birth, total body water is approximately 80 percent, but this is slowly

decreased to 60-70 percent in old age. The amount of intracellular water is closely related to cell mass, the metabolically active body compartment. In a series of cross-sectional studies, it has been demonstrated that the changes in total body water with advancing age are mostly due to decreases in intracellular water, and therefore, to changes in total body cell mass (Fulop et al. 1985).

Table 3. Common Laboratory Findings in Dehydration States

Hypertonic dehydration	 Elevated BUN (>18 mg/dl) Packed Cell Volume (PCV) (>40% to 50% for men; >37% to 47% for women). Elevated Hematocreit Elevated serum Na(>148 mEq/L) Elevated urine specific gravity (>1.025)
Isotonic dehydration	 Normal serum osmolality (275-295 Osm/kg)
	 Low hematocrit (<40% to 50% PCV for man; <37% to 47% for women)
Source: Groce CP Lindquist PD	Woolley AC et al: Clinical indicators of

Source: Gross CR, Lindquist RD, Woolley AC, et al: Clinical indicators of dehydration severity in elderly patients. <u>J Emerg Med.</u> 1991; (10): 267-74.

From a physiological point of view, fluid balance is maintained in the body by a continuous dynamic interaction between the intracellular and extracellular fluid (ECF) compartments (Sansevero 1997). Osmosis guides the flow of water across a semipermeable membrane from an area of higher concentration to an area of lower concentration. In the

normal healthy state, this homeostatic mechanism is easily maintained. The primary regulating factors for the fluid balance process are antidiructic hormone (ADH) for water, and aldosterone for sodium. ADH is secreted as a result of an increase in serum osmolality or a decrease in circulating blood volume. Osmolality is a measure used to assess hydration status. It is defined as the number of particles of molecules per weight of water (Heuther 1997). The normal serum osmolality of body fluids is 275 to 295 Osm/kg. When there is a water deficit or an increase in sodium relative to water, an increase of serum osmolality prompts the stimulation of hypothalamic osmoreceptors to induce thirst sensations. The regulation of thirst and ADH secretion is summarized in Figure 1 (Heuther 1997).

Sodium accounts for more than 90 percent of the ECF cations and is hormonally regulated by aldosterone, a mineralocoticoid secreted from the adrenal cortex. The secretion of aldosterone is controlled by circulating blood volumes and plasma concentrations of sodium and potassium. Its primary function is to increase the reabsorption of sodium and secretion of potassium by the distal tubule of the kidney. Other regulating factors for sodium and water include the renin-angiotensin system and the natriuretic



Figure 1. Regulation of thirst and antidiuretic hormone(ADH) secretion.

hormone (Heuther 1997). The renin-angiotensin system increases systemic arterial pressure and regulates renal blood flow through a number of complex physiologic mechanisms. Natriuretic hormone is released when the right arterial pressure increases. It inhibits ADH and dilutes urine, thereby increasing its volume. The overall effect of natriuretic hormone is a reduction in blood volume and pressure (Heuther 1997)

Thirst usually occurs when the need for water has not been realized. Studies have shown that thirst is diminished in older persons, even in normal older people, with high serum sodium and osmolality levels (Chernoff 1994). This may become a serious problem when older individuals become ill, since loss of thirst sensitivity may contribute to severe dehydration, impairment of cognition, and additional loss of water.

Recent studies confirm the long-standing clinical observation that thirst and food intakes are impaired in the elderly (Mineker et al. 1985). In a series of studies, the osmotic threshold for thirst during hypertonic saline infusion was much higher in healthy elderly subjects than in their younger counterparts, with many normal elders not reporting thirst despite elevations of plasma osmolality to levels over 300 mOsm/kg (Murphy et al. 1988). In studies of

water ingestion after intravenously induced hyperosmolality, elderly individuals demonstrate clear reductions, compared with a younger group, in their water intake, and the rate of return of plasma osmolality to baseline. Finally, the same investigators evaluated the influence of free access to water on prevention of osmolality during hypertonic saline infusion. Despite equivalent increases in plasma volume, the older group displayed significantly less water intake, and greater increases in plasma osmolality than did the younger group.

Physiological change in elderly

Structural and functional changes are observed in the elderly as a result of aging. As the human body ages, the quantity of total body water, proportional to body weight, decreases. More specifically, this reduction occurs in the intracellular compartment, making cells more susceptible to dehydration. Typically, the older person's body contains more fat and less lean muscle mass. These anatomical changes reduce the overall water content, since muscle holds 40 percent of total body water (Lavizzo-Mourey 1987). However, changes in body weight do not directly indicate whether there are changes in body fat or muscle. It is known that there is an increase in proportion of body fat to

muscle with age, which results in a decrease in body water. Young et al. (1963) reported increases in body fatness of 23.1 percent in the fifth decade, 46.0 percent in the sixth decade, and 55.3 percent in the seventh decade in comparison with the third decade.

At age 25, lean body mass constitutes approximately 47 percent of body weight, whereas at age 70, lean body mass decreases to about 36 percent (Nelson 1981). Longitudinal and cross-sectional studies of men and women of different ages, measuring lean body mass by radioactive potassium counting, confirm the continuous decline in lean body mass with age (Forbes and Bruining 1976). Progressive changes in body composition affect changes in individual organs and tissues. According to Munro (1981), compared to a young adult, after the age of 70, skeletal muscle lost 40 percent of the young weight, liver 18 percent, kidneys 9 percent, and lungs 11 percent. Since muscle is the largest tissue in the body, it contributes the major part of the ageassociated loss in lean body mass and body water.

Renal function in elderly

The functional decline of the older kidney, is another important age-related change affecting fluid balance. As the kidney ages, there is a gradual loss of glomeruli, which results in a reduced filtering surface. The organ manifests

these changes by losing the ability to concentrate urine effectively (Sansevero 1997). The Baltimore Longitudinal Study on Aging reported a mean decrease in glomerular filtration rate (GFR) of 0.75 mL per minute per year. One third of a sample of 254 normal, elderly subjects reported no decrease in renal function with advancing age, suggesting that a decline in renal function is not immutable. Nevertheless, it has been demonstrated that renal mass does decline, and that renal blood flow declines with age (Chernoff 1994).

Renal concentrating ability reduces with age in humans. In several studies, the maximum urine osmolality, measured following 12 to 24 hours of dehydration, is inversely related to age (Lindeman et al, 1966). In one study, the maximum urine osmolality is 1109 mOsm/kg in 31 subjects with the age of 20 to 39 years. In comparison, the maximum urine osmolality is 1051 mOsm/kg in 48 subjects with the age of 40 to 59 years, and 882 mOsm/kg in 18 subjects with the age of 60 to 79 years (Rowe et al. 1976).

Renal diluting ability is also impaired as a function of age (Crowe et al. 1987). In water-diuresing subjects, minimal urine osmolality is significantly higher (92 mOsm/kg in elderly subjects vs. 52 mOsm/kg in young subjects). Free water clearance is also decreased (5.9 mL/min in elderly subjects vs. 16.2 mL/min in young subjects). The impairment

in free water clearance is largely due to the decrease in GFR. However, when the free water clearance is adjusted for GFR, there is still a significant, but less substantial, decrease in older individuals (Minaker 1995).

Concurrently, ADH has a diminished effect and subtle pH changes are no longer recognized. An important consideration when evaluating laboratory values is that in some cases, older adults may have increased blood urea nitrogen (BUN) levels that may be directly attributable to age-associated changes (Sansevero 1997). On the other hand, insufficient dietary protein can lower BUN levels, and as a result, a nutritionally impaired older adult may show a normal BUN serology, yet have significant impairment in renal functioning (Fischbach 1992).

Overall, the alteration in kidney function means that the older person is less likely to maintain an adequate fluid balance and can, therefore, progress quite rapidly to a potentially lethal state of dehydration and electrolyte imbalance (Aaronson and Seaman 1989).

Among the elderly population, especially those over 75 years of age, the body's ability to maintain homeostasis declines significantly. This phenomena is directly related to a number of important predisposing factors, such as diminished thirst and decreased renal function, that make the elderly more susceptible to fluid and electrolyte

imbalances. From a clinical perspective, the primary care practitioner has to act as a gatekeeper for those most vulnerable to dehydration. In order to successfully manage dehydration in the elderly, it is critical for practitioners to obtain a working knowledge of these predisposing factors. Thus, preventative strategies can be formulated from the beginning, thus avoiding the ensuring complications.

Clinical factors for dehydration

Acute infections, such as pneumonia and urinary tract infections, are common in the elderly, accounting for up to 20 percent of acute hospitalizations in this population. The associated fever results in increased insensible loss of water from sweating, tachypnea, and increased cellular catabolism. Infection of the upper urinary tract may specifically result in reduction of the renal concentrating ability, that may persist for weeks following resolution of the infection. Excessive urinary losses of water and sodium are very common in the sick elderly patient (Minaker 1995).

The likelihood of developing diabetes mellitus (DM), a relative common glucose disorder, increases with age. When uncontrolled, as in diabetic ketoacidosis, the condition can cause intravascular fluid volume depletion by osmotic diuresis through the kidney (Sansevero 1997). In noninsulin-dependent diabetes (NIDDM), glycosuria and

polyuria may occur when the condition is complicated by hyperosmolar nonketotic coma (HHNKC). This metabolic abnormality is characterized by extreme glucose elevations, resulting in a massive diuresis with water losses between 4.8 and 12.6 g/liter occurring daily. Serum osmolality increases and neurologic changes such as stupor, correlate with the degree of hyperosmolality (Sansevero 1997). Diabetes insidious (DI), a disorder causing insufficient ADH secretion, results in an impairment of urine concentration, prompting large losses of water.

Urinary tract obstruction is a common affliction in the elderly male with prostatic hypertrophy, often exacerbated by anticholinergic medication. Postobstructive diuresis associated with relief of urinary tract obstruction, is physiologically similar to nephrogenic diabetes insidious with its inadequate renal responsiveness to vasopressin.

Gastrointestinal losses of fluid occur with vomiting, nasogastric drainage, diarrhea, and bleeding. In addition to the commonly recognized etiology of diarrhea, laxative abuse is often present but unreported in the elderly. As many as 40 to 60 percent of elderly persons use laxatives regularly, in which the elderly patient may experience unrecognized continuation of regularly ordered laxatives and stool softeners in the setting of diarrhea. The elderly are

especially prone to heat-related fluid loss from excessive sweating with inadequate volume replacement (Minaker 1995).

Often underappreciated in elderly individuals are conditions resulting in inadequate fluid intake. Iatrogenic oral fluid deprivation is commonly ordered before diagnostic or surgical procedures or, inappropriately, for edema, renal insufficiency, or hyponatremia. Also, gastrointestinal problems, such as swallowing disorders, bowel obstruction, and the unrecognized side effects of medication (nausea, vomiting, early satiety), often preclude adequate oral fluid intake. A common, yet infrequently diagnosed, cause of bowel obstruction in the elderly is ischemic bowel disease.

Numerous prescription and over-the-counter drugs can predispose the elderly to dehydration. The most common class of agents at fault is diuretics such as hydrochlorothiazide, furosemide (lasix, SK-Furosemide), or bumetanide (BUMEX). Other serious offenders include excessive use of sedatives, antiphychotics, or major tranquilizers such as diazepam (Valium, Valrelease), lorazepam or haloperidol (Haldol). Although such agents may be effective in managing anxiety, pain, or paranoia, they invariably affect the desire to drink fluids. In addition, alcohol abuse is often overlooked as a possible contributing factor for dehydration in the elderly (Sansevero 1997).

Constipation, which is a common complaint in the elderly, is often treated with laxatives. Overuse of these seemingly innocuous, over-the-counter remedies can induce severe diarrhea and acute dehydration, which can also result in serious electrolyte abnormalities. Nonsteroidal antiinflammatory drugs (NSAIDS) are frequently used by elders to treat arthritic pain. By inhibiting prostaglandin synthesis, NSAIDS can disrupt fluid and electrolyte homeostasis and cause renal vasoconstriction. Moreover, they are cleared renally, so even a mild impairment in hydration status can potentiate serious damage to vulnerable renal tissue (Sansevero 1997).

From a nutritional point of view, artificial feeding supplements can also predispose the client to dehydration because of their high osmolality. Those receiving total parental nutrition or high-protein tube feedings, or taking nutritional supplements are prone to fluid and electrolyte alterations and need close attention.

Other factors (Hoffman, 1991) that may also have an effect on the fluid intake of the elderly individual include: decreased water access due to immobility, functional dependence, poor visual acuity, or diminished taste and smell which may lead to decreased food and fluid intake, and fear of oral intake due to dysphagia and aspiration. Nutrition intervention, such as high-protein

diets and high-solute tube feedings, may also cause dehydration if extra fluids are not given.

Drug effects on dehydration

For most nursing-care facilities, drug therapy is a key component of resident care. In the United States, persons of age 65 or older, account for 23 to 30 percent of all prescription drug use each year. Surveys reveal that at least 28 percent of residents in long-term care facilities are on some type of medication. Among the elderly, analgesics, cardiovascular agents, laxatives, antacids, vitamins, and sedatives are the most frequently used drugs (Behrens and Blocker 1994).

For drugs to be effective, they must be absorbed into the body, distributed through the blood stream, converted into their active forms, and excreted by the kidneys. Factors that can affect how this process works include: body weight and composition, age, gender, physical condition, food, and/or drug interactions (Behrens and Blocker 1994).

Elderly patients, particularly those with incontinence of urine or those on diuretics, attempt to take their medications with as little fluid as possible. Capsules, more often than tablets, can remain in the esophagus for 5 to 15 minutes. This may cause irritation, ulceration, stricture, or even more serious damages. However, quite

often this delay causes no abnormal esophageal characteristics. Patients particularly at risk are those with hiatus hernia, stricture, and an enlarged left atrium caused by mitral valve disease (Watson 1994).

Correct or incorrect intake of fluids may play an important part in the chain of drug absorption and disposition. Drugs with poor water-soluble characteristics will be absorbed to varying degrees, depending on the amount of fluid used to swallow them. Fluids may still play a more important role. It has been speculated that ice water, which is frequently used in nursing homes, can delay the dissolution of capsules. This could become an important factor in the case of hypnotics where rapid onset to overcome sleep latency is desirable (Watson 1994).

The elderly often show some phase of dehydration in response to a diminished thirst mechanism, decreased fluid intake, or increased fluid excretion. Dehydration leads to a diminished plasma volume. Plasma albumin concentrations may, therefore, appear to be elevated. Conversely, when patients suffer from congestive heart failure or renal impairment, they may see an expanded plasma volume and decreased albumin concentrations (Munro and Young 1978, Mitchell and Lipschitz 1982). Furthermore, lean body masses, the metabolically active tissue, decreases with age. Muscular tissue decreases by 40 percent, the kidney by 9

percent, the liver by 18 percent, and the lung by 11 percent. This decrease is accompanied by an increase in body fat and a decrease in total body water (Munro 1981).

Alterations in urinary excretion often result from changes in urinary pH. Tubular excretion/reabsorption of some drugs follow pH-dependent kinetics. If the urine has an acidic pH, weak basic drugs such as amitriptyline and chloroquine would be excreted because they will form watersoluble salts in the urine. Conversely, if the urine is alkaline, these drugs would remain largely water-insoluble and would be reabsorbed. Thus, a continued dosing at a predetermined level would ultimately lead to toxic plasma levels of the drug.

Balanced protein diets will produce an acid urinary pH (pH 5.9), while low-protein diets usually result in an alkaline urinary pH (pH 7.5). It is interesting to note that citrus fruit juices, contrary to 'expectations', produce alkaline urine. Many elderly switch to low-protein diets with advancing age, and it is reasonable to assume that drug elimination may well change simply due to that factor.

Minimum Data Set (MDS)

Providing care to residents of long-term care facilities is complex and challenging work, which requires

clinical competence, observational skills, and assessment expertise from all disciplines to develop individualized care plans. The Resident Assessment Instrument (RAI) helps staff to gather definitive information on each resident's strengths and needs that must be addressed in the plan. The RAI also assists staff to tract changes in the resident's status.

The RAI helps facility staff to look at residents as individuals for whom quality of life and quality of care are mutually significant and necessary. Interdisciplinary use of the RAI meets this emphasis on the quality of care and life. Facilities have found that incorporating disciplines such as dietary, social work, physical and occupational therapy, speech language pathology, pharmacy, and activities in the RAI process has improved resident care and strengthened team communication.

The RAI consists of the Minimum Data Set (MDS), Resident Assessment Protocols (RAPS), and Utilization Guidelines. The MDS is a core set of screening that forms the foundation of the comprehensive assessment for all residents of long-term care facilities. The set includes clinical and functional status elements including common definitions and coding categories (Allen 1997). The completion of the assessment instrument has been a manual system within each facility. The long-term care facilities

are required to encode and electronically transmit all required MDS records to the State Survey Agency effective June 22, 1998.
METHODOLOGY

Subjects

The subjects for this study consisted of 40 elderly residing in Lyngblomsten Care Center in St. Paul, Minnesota during February of 1999. The subjects included 13 men and 27 women who were all Caucasians and over the age of 60. These subjects were free from acute illness and infections, and did not receive enteral feedings. Due to the personal nature of the study, an agreement between Lyngblomsten Care Center and the University of Wisconsin-Stout was established (Appendix A). The consent form was signed by the directors of Medical Service and Food Service at Lyngblomsten Care center. The main agreement drawn in the consent form was that any risks to the subjects were small, and the potential benefits to Lyngblomsten Care Center could be significant upon the successful completion of this study. The study was to be carried out in a confidential manner and Lyngblomsten Care Center had the right to withdraw permission for participation of all or some of the subjects.

The subjects were divided into two groups, an independent feeding group and a dependent feeding group. In order to divide the subjects into these two groups, the Minimum Data Set (MDS) was used (Allen 1997). The MDS is a

set of screening and assessment elements that form the foundation of the comprehensive assessment for all residents of long term care facilities. Highly skilled nursing units at Lyngblomsten Care Center reviewed the subjects for their cognitive patterns (Section B of MDS), communication/hearing patterns (Section C), physical functioning and structural problems (Section G), and oral/nutritional status (Section K) (Appendix B).

After concluding the MDS review, the subjects who received high marks were placed in the independent feeding group, and the subjects with low marks were placed in dependent feeding group. As a result, the subjects in independent feeding group were able to feed by themselves, and those in dependent feeding group needed full or partial assistance in feeding themselves. In this study, a total of 18 participants were randomly assigned to the independent feeding group and 22 participants were randomly assigned to the dependent feeding group.

Data Collection

In order to facilitate the data collection, the researcher prepared a data sheet (see Appendix C) which contained categories for gender, age, body weight, medication number and frequency, calorie intake, and water

intake. The data were collected for each subject for 3 consecutive days (Tuesday, Wednesday, and Thursday) by direct observation by the nursing staff and researcher. The same data sheet was used for all subjects in the independent and dependent feeding groups.

The total calorie and water intakes were calculated using the Calorie Count Record Sheet (see Appendix D) created by the researcher. The sheet contained the amount of food and beverages consumed by each subject during breakfast, lunch, dinner, and snack times. The same menus were given to all subjects in both groups. Each data sheet represented one full day of meals, and a total of 120 data sheets were collected during this study.

The water intake with medication was recorded by nursing staff on the record sheet. Nursing staff was much more diligent recording snacks, than medications and associated fluid on this sheet. Information regarding the frequency of medication dispensation and the number of medications was recorded for each subject. This information was provided by a food service manager, since the researcher did not have an access to the subjects medical records. The nursing staff recorded the water intake with medication.

The researcher, with the help from resident staff members, was responsible for recording and collecting data. However, the resident staff members were responsible for

recording and collecting data during bed times (10 PM to 6 AM).

<u>Data Analysis</u>

The FPRO (Food Processor Plus) software was used to analyze the total energy (kcal) consumed, and the total fluid (g) taken by each subject per day. To compare the actual fluid intake with the recommended fluid intake, data sheets were used to record the actual body weight of each subject and the total energy consumed by each. The following three standard formulas were used in this study:

- Standard 1: 30 mL fluid per kg actual body weight (Chernoff, 1994).
- Standard 2: 1 mL fluid per kcal energy consumed (Food and Nutrition Board 1989).
- Standard 3: 100 mL fluid per kg for the first 10 kg actual body weight, 50 mL fluid per kg for the next 10 kg actual body weight, and 15 mL fluid per kg for the remaining kg actual body weight (Skipper 1993).

Descriptive data analysis included determination of means, standard deviations, and ranges of actual fluid

intake and recommended fluid intake as determined by using the three standard formulas. A two-tailed t test was used to compare whether there was any significant difference between the groups of actual water or calories consumed. The t-test also compared the values obtained from subtracting each of the three calculated recommended water intake values from actual water intake of the two groups. This statistic indicates whether either of the two groups were significantly more replete or deficient in recommended water than the other.

RESULTS

General Information

The subjects for this study consisted of elderly residing in Lyngblomsten Care Center in St. Paul, Minnesota during February of 1999. The Minimum Data Set was used to separate the subjects into two groups: an independent feeding group and a dependent feeding group. A data sheet (Appendix C), prepared by the researcher, was used to collect the data on gender, age, body weight, medication number and frequency, calorie intake, and water intake for each subject for three consecutive days. The total calories and water intakes were calculated using the Calorie Count Record Sheet (Appendix D).

The FPRO (Food Processor Plus) software was used to analyze the total energy (kcal) consumed by, and the total fluid (g) taken by each subject per day. The three standard formulas were used to compare the actual fluid intake with the recommended fluid intake. Descriptive data analysis including means, standard deviations, ranges, and a twotailed t test were conducted on the actual and recommended fluid intakes.

Gender and Age

There were 40 participants in the study, 13 males and 27 females (Table 4). The age of participants ranged from 73 to 99, with the mean age of 87 and the median age of 87.5 (Table 5).

Table 4 Gender of Participants

Gender	Number	Percent
Male	13	32.5
Female	27	67.5

Table 5 Age of Participants

Age	Frequency
73ª	1
76	2
77	3
78	1
82	4
83	2
85	4
86	2
87	1
88	1
89	2
90	б
92	2
93	2
94	1
96	2
97	2
98	1
99	1

^aMeans there is only one person with age 73.

Dependent and Independent Groups

Of the 40 participants, 18 were independent feeders and 22 were dependent feeders. There were 6 males and 16 females in the dependent feeding group and 7 males and 11 females in the independent feeding group (Table 6).

Table 6 Classification by Independent or Dependent Feeders

Groups	Total Number	Males	Females
Dependent	22	б	16
Independen	18	7	11

Dependent feeders were defined as those who needed full or partial assistance in feeding themselves. The age range of dependent feeders was 73 to 99, with the mean age of 86.2 years. Independent feeders had a tendency to be older with the age range of 76 to 97, with the mean age of 87.9 years (Table 7).

Body Weight

The participants ranged from 33.6 kg to 98.2 kg in weight. The mean weight was 63.1 kg and the median weight was 59.85 kg. The body weight ranged from 33.6 kg to 96.4 Table 7 Range of Age in Dependent and Independent Feeding Groups

Dependent	Frequency	Independent	Frequency
73	1	76	1
76	1	78	1
77	3	82	2
82	2	83	1
83	1	85	3
85	1	89	1
86	2	90	3
87	1	92	1
88	1	93	1
89	1	94	1
90	3	96	2
92	1	97	1
93	1		
97	1		
98	1		
99	1		

kg for the dependent feeding group, with the mean of 60.17 kg. The mean body weight of independent feeders was 66.7 kg, which was slightly higher than dependent feeders. The body weight of independent feeders ranged from 41.8 kg to 98.2 kg (Table 8).

<u>Medications</u>

Participants were prescribed from 1 to 10 medications per day, and the mean number of medications was 5.225. The mean number of medications taken by dependent feeders was 4.59, compared to 6 medications taken by independent feeders

(Table 9). The medications were taken once per day to five times per day, with the mean number of 3.15 times

Dependent	Frequency	Independent	Frequency
33.6	1	41.8	1
43.9	1	48.2	1
44.5	3	49.5	1
45.0	1	50.5	2
50.0	1	57.3	2
51.4	1	61.8	1
53.4	1	62.3	1
55.5	1	63.2	1
55.9	2	64.3	1
57.9	1	75.5	2
63.6	1	79.5	1
67.3	1	80.0	1
69.3	1	90.2	1
70.0	1	95.0	1
73.6	1	98.2	1
74.5	1		
85.5	1		
87.7	1		
96.4	1		

Table 8 Body Weight (kg) of Dependent and Independent Feeders

per day. Both dependent and independent feeders took the medications from 1 to 5 times per day. The mean number of times dependent feeders took medications was 3.22 versus 3.05 times for the independent feeders (Table 10).

Medication	Dependent	Independent	Total
1	3	2	5
2	2	0	2
3	2	0	2
4	5	2	7
5	1	3	4
6	4	3	7
7	3	3	б
8	1	2	3
9	0	2	2
10	1	1	2

Table 9 Number of Medications taken by Dependent and Independent Feeders

Table 10 Frequency of Medications Taken Per Day by Dependent and Independent Feeders

Times/Day	Dependent	Independent	Total
1	1	2	3
3	14	12	26
4	7	3	10
5	0	1	1

Water and Caloric Intakes

The average water intake over the three-day period was 1417 grams, and the individual water intake ranged from 602 to 2374 grams. The average water intake for dependent feeders ranged from 602 to 2374 grams, with the mean water of 1392 grams. This was only slightly, but not significantly, lower than the mean intake of 1447 grams of independent feeders, with the range from 1005 to 2083 grams (Table 11). The caloric intake over the three days ranged from 546 to 2649 kcal, with the mean caloric intake of 1639 kcal. The calorie intake of dependent feeders for the 3 days ranged from 546 to 2649 kcal, with the mean of 1549 kcal, whereas the calorie intake of independent feeders ranged from 1002 to 2492 kcal, with the mean of 1750 kcal (Table 12).

Dependent	Frequency	Independent	Frequency
602	1	1005	1
669	1	1024	1
678	1	1128	1
738	1	1161	1
886	1	1165	1
1124	1	1170	1
1201	1	1328	1
1221	1	1363	1
1313	1	1426	1
1337	1	1430	1
1461	1	1460	1
1474	1	1480	1
1506	1	1507	1
1567	1	1558	1
1638	1	1776	1
1647	1	1920	1
1676	1	2071	1
1706	1	2083	1
1745	1		
1831	1		
2231	1		
2374	1		

Table 11 Total Water Intake (g) for Dependent and Independent Feeders

Dependent	Frequency	Independent	Frequency
546	1	1002	1
586	1	1172	1
640	1	1288	1
1169	1	1345	1
1180	1	1399	1
1190	1	1415	1
1320	1	1519	1
1474	1	1526	1
1475	1	1696	1
1505	1	1713	1
1544	1	1795	1
1677	1	1909	1
1734	1	2075	1
1738	1	2172	1
1863	1	2232	1
1924	1	2316	1
1937	1	2444	1
2009	1	2492	1
2081	1		
2302	1		
2649	1		

Table 12 Total Energy (kcal) for Dependent and Independent Feeders

Comparison of Actual and Calculated Water Intakes

The first method by which recommended water intake was determined, used body weight utilizing the formula, 30 mL water per kg body weight. Only nine of the forty participants consumed equal or greater than the recommended amount of water (Table 13). Of the nine, seven were dependent feeders and only two were independent feeders. Results ranged from -1776 to 214 mL with the mean value of -553.5 mL for independent feeders and -1441 to 772 mL with the mean value of -413.2 mL for dependent feeders. A (-) negative sign preceding the number indicates mL of water deficiency when compared to calculated value.

When water intake was calculated by the second formula, 1 mL water/kcal consumed, only 10 of the 40 participants consumed equal or greater amounts than the recommended (Table 14). Of the ten, 4 were independent feeders and 6 were dependent feeders. The range for independent feeders was from -1007.0 to 159.0 mL, with the mean value of -303.05 mL. The range for dependent feeders was from -614.0 to 281.0 mL, with the mean value of -157.36 mL.

The third formula was 100 mL fluid per kg for the first 10 kg actual body weight, 50 mL fluid per kg for the next 10 kg actual body weight, and 15 mL fluid per kg for the remaining kg actual body weight. When water recommendation was determined using this formula, only 2 of the 40 participants obtained enough water (Table 15). The two participants who obtained enough water were dependent feeders, and none of the independent feeders obtained enough water. The range for dependent feeders was from -1416.0 to 373.0 mL, with the mean value of -710.6 mL. The range for independent feeders was from -1503.0 to -51.5 mL, with the mean value of -753.0.

Dependent	Frequency	Independent	Frequency
-1441.0	1	-1776.0	1
-1381.0	1	-1241.0	1
-1170.0	1	-1226.0	1
-1147.0	1	-1137.0	1
-1068.0	1	-1074.0	1
-858.0	1	-827.0	1
-822.0	1	-764.0	1
-729.0	1	-558.0	1
-561.0	1	-470.0	1
-533.0	1	-347.0	1
-449.0	1	-329.0	1
-406.0	1	-249.0	1
-203.0	1	-157.0	1
-188.0	1	-152.0	1
-134.0	1	-55.0	1
2.00ª	1	-16.0	1
41.0	1	201.0	1
96.0	1	214.0	1
144.0	1		
326.0	1		
554.0	1		
772.0	1		

Table 13 Difference Between Water Consumed and Calculated by First Method for Dependent and Independent Feeders

[®]Numbers in bold represent the nine participants who obtained adequate water intake when actual water intake was compared to the formula (30 mL water per kg body weight).

<u>Two-Tailed t test on Dependent and Independent Variables</u>

Results from the t test showed t values ranging from 0.3 for water difference consumed using formula 3, to -1.8 for the number of medication types taken. The two-tailed probability estimates ranged from 0.08 for number of medication types taken, to 0.76 for water difference consumed using formula 3. However, there were no significant differences in any variable (age, medication types and frequency, average Kcal, average water or water differences) as calculated by all three formulas between these two groups (Table 16).

Dependent	Frequency	Independent	Frequency
-614.0	1	-1007.0	1
-500.0	1	-725.0	1
-443.0	1	-689.0	1
-418.0	1	-668.0	1
-333.0	1	-667.0	1
-323.0	1	-429.0	1
-304.0	1	-421.0	1
-290.0	1	-396.0	1
-275.0	1	-283.0	1
-273.0	1	-163.0	1
-168.0	1	-138.0	1
-162.0	1	-71.0	1
-118.0	1	-59.0	1
-71.0	1	-2.0	1
-70.0	1	8.0	1
-28.0	1	15.0	1
56.0°	1	81.0	1
92.0	1	159.0	1
98.0	1		
154.0	1		
247.0	1		
281.0	1		

Table 14 Difference Between Water Consumed and Calculated by Second Method for Dependent and Independent Feeders

^aNumbers in bold represent the nine participants who obtained adequate water intake when actual water intake was compared to the formula (1 mL water per kcal consumed).

Dependent	Frequency	Independent	Frequency
-1416.0	1	-1503.0	1
-1399.5	1	-1308.5	1
-1358.5	1	-1204.5	1
-1272.0		-1073.0	
-1202.5	1	-999.5	1
-1102.0	1	-898.5	1
-1018.5	1	-849.0	1
-981.5	1	-834.5	1
-901.0	1	-822.0	1
-811.5	1	-722.0	1
-683.0	1	-620.0	1
-666.5	1	-614.5	1
-657.0	1	-594.5	1
-564.5	1	-497.5	1
-530.5	1	-493.0	1
-397.5	1	-329.0	1
-378.5	1	-139.5	1
-333.0	1	-51.5	1
-326.5	1		
-199.0	1		
192.5	1		
373.0	1		

Table 15 Difference Between Water Consumed and Calculated by Third Method for Dependent and Independent Feeders

*Numbers in bold represent the nine participants who obtained adequate water intake when actual water intake was compared to the formula (100 mL fluid per kg for the first 10 kg actual body weight, 50 mL fluid per kg for the next 10 kg actual body weight, and 15 mL fluid per kg for the remaining kg actual body weight).

Variables	Groups	Mean	St. Err.	t value	2-tailed
Age	Dependen Independ	86.2 87.9	1.56 1.47	-0.78	0.437
Weight (kg)	Dependen Independ	60.1 66.7	3.47 3.98	-1.24	0.223
Medication	Dependen Independ	4.59 6.00	0.52 0.58	-1.8	0.08
Medication Frequency	Dependen Independ	3.22 3.05	0.14 0.22	0.67	0.51
Ave. Energy (kcal)	Dependen Independ	1549.4 1750.5	113.8 107.0	-1.27	0.21
Ave Water (g)	Dependen Independ	1392.0 1447.5	102.0 78.3	-0.42	0.68
Water diff (formula 1)	Dependen Independ	-413.2 -553.5	130.9 132.3	0.75	0.46
Water diff (formula 2)	Dependen Independ	-157.3 -303.0	52.2 79.5	1.58	0.12
Water diff (formula 3)	Dependen Independ	-710.6 -753.0	105.3 90.8	0.30	0.76

Table 16 Comparison of Dependent versus Independent Variables Using Two-Tailed t test

DISCUSSION

Subjects and Caregivers

A study of 40 residents of Lyngblomsten Care Center in St. Paul, Minnesota, was conducted to investigate the adequacy of fluid intakes from meals and nonmeal feedings. Furthermore, these subjects were divided into dependent and independent feeding groups based on Minimum Data Set screening test.

Unfortunately, the major obstacle encountered in this study was that these subjects did not eat 100 percent of their meals. The subjects consuming significantly less than 100 percent of their meals could be at risk, since meals themselves do provide various amounts of fluid. For these subjects, the awareness of caregivers and their actions could remedy these situations. For instance, if the meal consumption was routinely low for a particular subject, such that he or she was not consuming enough fluid, then the caregiver could increase fluid intake in nonmeal feedings. The findings suggested that caregivers should concentrate their efforts on all elderly residents, as very few of the population studied met the recommended water levels.

Effects of Age and Weight on Water Intake

The number of women who participated in this study was more than twice the number of men (Table 4). Dependent feeders outnumbered independent feeders 22 to 18 (Table 6), and independent feeders were slightly older than dependent feeders (Tables 7). However, this difference was not significant, and should not have affected calculated values. The slightly, but not significant, higher average body weight of independent feeders (66.7kg), compared to 60.1 kg of dependent feeders (Table 8), should have impacted the calculation of water needs. The range of water intake (Table 11) for dependent feeders (602 g to 2374 g) was greater than the range for independent feeders (1005 g to 2083g), but the difference between them was not significant. Neither dependent nor independent feeders achieved recommendation levels.

Effects of Medication on Water Intake

The average number of medications was 1.41 higher for the independent feeders than the dependent feeders (table 9), but the dependent feeders took medications 0.17 times more frequently than did the independent feeders (Table 10). These differences were not significant and probably added

some, but not significantly, to the total water consumed. The reason for this insignificance might have been that the staff nurses did not record the water taken with medication at night clearly.

Energy and Water Intake

The average calorie of dependent feeders was 1549 kcal, compared to the average intake of independent feeders of 1750 kcal (Table 12). This difference in caloric intake probably added some, but not much, to the total water consumed. However, energy intake correlated significantly with fluid intake. Independent feeders consumed more calories than dependent feeders and had higher water intake than dependent feeders. However, this 200 kcal difference was not significant between the two groups.

Comparison of Actual and Calculated Water Intake

Sixty-eight percent of the dependent feeders compared to 88.9 percent of independent feeders did not obtain the recommended amount of water as calculated by first formulation, 30 mL water per kg body weight (Table 13). However, this was not a significant difference since the majority of participants did not achieve the recommended

level. To put Table 13 into perspective, an additional onecup of water (250 mL) would put 8 additional people, 3 dependent and 5 independent feeders, into the category of meeting the recommended amount.

There was not a significant difference between the 72 percent of dependent and 77.8 percent of independent feeders who did not meet water recommendation as calculated based on second formulation of kcal intake (Table 14). Those who met the recommended water amount included 6 dependent and 4 independent feeders. One cup of water (250 mL) would have placed 11 participants, 6 dependent and 5 independent feeders, in the adequate category.

Ninety percent of the dependent feeders and 100 percent of the independent feeders did not achieve the water recommendation based on third formulation (Table 15). This meant that only 2 of 40 participants obtained enough water, and both were dependent feeders. In this case, adding 250 mL of water would only bring 3 participants, 1 dependent and 2 independent feeders, to the adequate level. However, there was not a significant difference between the two groups.

Two-Tailed t test

As there were not significant differences in any variable between two groups, age, weight, medication type, and medication frequency probably had little effect on water recommendation of the two groups (Table 16). Also, there were no significant differences between the two groups in meeting the recommendation using any of the three formulations. It is of concern that the number of both groups who did not meet the recommendations calculated by the three methods is quite high. It was found from this study that by drinking one or two cups of water would have brought many more people closer to the recommendation level.

Comparison with Other Studies

Study by Chidester and Spangler

Chidester and Spangler performed a similar study in 1997. In their study, fluid intake was collected for 40 nursing home residents for 3 consecutive days from meal and nonmeal feedings. The collected data were compared with the three standards, which were the standards also used in this study. A two-tailed t test was used to compare actual and recommended fluid intakes. In their study, the subjects

were separated into two age groups: 65 through 85 years, and 86 through 100 years.

The results from their study showed similar trends found in this study. When the actual and recommended fluid intakes were compared using three standards, the subjects received adequate fluid according to standards 1 and 2. However, inadequate fluid amount was consumed according to standard 3. They found that age was not a factor in adequacy of fluid intake, although older subjects tended to be more dependent on fluid from meals to achieve adequate fluid intake. They also found a positive correlation between fluid obtained from nonmeal feedings, and number and frequency of medications.

The findings in this study differed from their study, but showed similar trends. Similar to the Chidester and Spangler (1997) study, the results from this study showed that age did not have a significant impact on fluid intake. Since the subjects were separated into dependent and independent feeding groups, dependent feeders showed a tendency to intake less fluid than independent feeders. This suggested that dependent feeders, who tended to have a higher mean age, may need assistance from caregivers to achieve adequate fluid intake.

Another similarity was that the subjects had difficulties in meeting the water intake recommendation

level calculated by standard 3. In the study by Chidester and Spangler, their subjects received adequate fluid according to standards 1 and 2, but not 3. In this study, although the entire population did not meet any of the three standards' recommendation level, many did meet recommendation levels computed by standards 1 and 2, but over 90 percent did not meet standard 3 level.

There were differences between this study and the one performed by Chidester and Spangler. This study took matters further by studying subjects based on dependent and independent feeding. The results from this study show that caregivers play an important role in providing or offering adequate fluid intake, especially to those who depend on others to feed them. The difference between the two studies was that subjects in Chidester and Spangler study received enough fluid whereas, in this study, there were many who failed to receive the recommended level.

There were some variables that could have contributed to subjects not receiving the recommended amount of water in this study, compared to the Chidester and Spangler study. First, since data were collected by both the researcher and caregivers, some data might have been recorded more accurately than other data. Second, the sample of subjects was different. In the study by Chidester and Spangler, all subjects were able to feed by themselves. However, in this

study, dependent feeders required caregivers' attention. Third, the contribution from nonmeal feedings added to the total fluid intake in their study. In this study, fluid from nonmeal feedings was not significant. A difficulty in data collection could be reliance on the p.m. shift to record fluid intake during the nonmeal feedings. Finally, since the subjects in these studies were from different nursing homes, the role of caregivers could have significantly impacted the results. Education of the health care providers about dangers of dehydration and potential techniques to achieve optimum fluid levels may have also differed in the two studies.

Study by Lavizzo-Mourey, Johnson, and Stolley

Lavizzo-Mourey, Johnson, and Stolley (1988) performed a similar study on identifying the risk factors for dehydration in acutely ill elderly nursing home residents. Their hypothesis was that those nursing home residents who develop dehydration associated with an acute illness, differed from those without dehydration with regard to six categories of clinical variables; underlying diagnoses, type of acute illness, type of medications, level of functional status, and time of year during which the dehydration develops.

In their study, 339 subjects with acute illness requiring hospitalization in 1984 were taken from two nursing homes. A standard laboratory definition of dehydration was used: serum sodium concentration greater than 150 mg/dL, or a blood urea nitrogen to creatine ratio (BUN: Cre) greater than 25. One hundred and seventy-three subjects had a serum sodium of less than 150 mg/dL and a BUN:Cre less than 20. These subjects were designated controls for the purpose of this study. Ninety-one were thought to have significant dehydration and twelve were severely dehydrated. The variables in the study included age, sex, level of care requirement, date of admission to the hospital, underlying diagnoses, acute diagnoses, electrolytes, BUN and creatine on admission to the hospital, medications used within one month of discharge to the hospital, and functional status measures. The functional status measures were based on the subject's ability to eat, toilet, dress, communicate, and walk or transfer from bed to chair without assistance. Three levels of feeding and mobility status were defined: those who did not require any assistance, those who required assistance with feeding, and those who required tube feeding.

The results of their study showed that more female subjects were significant or severely dehydrated than male subjects. The more severe cases have more chronic diagnoses

than the less severe or the controls. There is some trend towards increased medications among the severely dehydrated subjects. All variables except the number of acute diagnoses represented significant risk factors for dehydration. Age, sex, number of chronic diseases, and number of medications were the most important risk factors for dehydration. Of the functional status measures, requiring a skilled level of care and being bedridden, were risk factors for the less severe cases. Among those with severe dehydration, requirements for assistance with transfers or ambulation, as well as being bedridden and requiring a skilled level of care, were associated with a markedly increased risk for dehydration.

There are differences between the study performed by Lavizzo-Mourey, Johnson, and Stolley and this researcher. First, the age and gender did not have significant impact on dehydration in this researcher's study. However, this impact was much greater in the study done by Lavizzo-Mourey, Johnson, and Stolley. They concluded that women over the age of 85 years were at greatest risk for dehydration. Second, the effects of number and type of medications on dehydration were more significant in the study done by Lavizzo-Mourey, Johnson, and Stolley than in this researcher's study. However, this effect might have been significant in our study if the records were more clearly

kept during the data-collecting process. However, one similar conclusion from the two studies is that the subjects who needed the most assistance were in danger of dehydration.

CONCLUSIONS AND FUTURE RESEARCH

<u>Conclusions</u>

In this study, several conclusions could be made with regards to dehydration in elderly. One, it is difficult to make generalizations regarding the elderly since they represent a diverse group with different needs and care. With this in mind, the researcher concludes the following from this study:

- Age did not have a significant impact on dehydration in elderly. In general, older subjects achieved less fluid and energy intake, but this difference was insignificant. Older subjects tended to eat less, and therefore, consumed less fluid intake.
- 2. Independent feeding subjects weighed slightly more than dependent feeding subjects. Therefore, independent feeders ate more and achieved slightly higher fluid levels than dependent feeders. This small difference was somewhat surprising, but since the weight difference between the two groups were very slight, this was expected.

- 3. The number and frequency of medications added very little to the total amount of fluid for both dependent and independent feeders. The number and frequency of medications did not contribute much to the total fluid intake in this study. The main contributor to the total amount in this study came from meal feedings.
- 4. The actual fluid intake for both groups was, in general, less than the recommended level according to the three standards. Independent feeders achieved a better success than dependent feeders, as was expected. Both groups were more successful in achieving, or coming closer to, the recommended levels calculated by standards 1 and 2, but failed badly for standard 3. In all three cases, if the subjects were to drink one or two cups of fluid, they would have had a much better result.
- 5. This study compared well with a similar study done by Chidester and Spangler. Both studies concluded similar results and trends. The results from both studies showed that subjects alone cannot control the fluid level; they need professional help in achieving a more desirable fluid level to prevent dehydration.

6. Finally, caregivers in health care facilities need to be educated and trained to understand and properly take care of the needs of elderly. They need to understand the dangers of dehydration, especially in elderly, and know how to treat dehydration. This responsibility should fall on dietetic practitioners.

Future Research

The recommendations for further study as observed by the researcher are as follows:

- Study the effect of drug interaction in dehydration. It is known that different drugs act differently under similar circumstances, especially for elderly. This may help caregivers to better treat elderly patients in long-term care facilities.
- Study how the side effects of certain drugs affect the dehydration level in elderly.
- Conduct a similar study including subjects from different long-term care facilities to be more inclusive. This wide range of subjects could help generalize the dehydration pattern among elderly.

- 4. Compare elderly subjects from different cities, counties, and/or countries. The advantage of this type of study is to observe the quality of long-term care facilities around the country, and to target specific areas of the country that needs assistance.
- Identify and include other dependency factors that may contribute to dehydration in elderly. Identification of these factors in future research could be very important.

APPENDIX A

Lyngblomsten Care Center and University of Wisconsin-Stout

Consent Form

UW-Stout Institutional Review Board Consent Form for the Study: Comparison of Fluid Intake of Self Feeding to Assisted Care Elderly Nursing Home Residents

The primary purpose of this study is to compare the fluid intake of self-feeding elderly nursing home residents to the fluid intake of elderly residents who are assisted in feeding by a caregiver. Subjects will be 40 residents who are free from acute and chroinc infection and not receiving enteral feedings. Consecutive 3-day foods and fluid intake will be recorded and analyzed by computer for water content. Type, number, and frequency of medications and Minimum Data Set (MDS) information about cognitive skills, physical locomotion, and ability to understand will be obtained. The secondary purpose is to compare fluid intake from beverages and foods to fluid recommendations established for the elderly. The three established standards are 30 mL/kg body weight, 1 mL/Kcal energy consumed, and 100 mL/kg for first 10 kg, 50 ml/kg for next 10 kg, and 15 mL for remaining kg body weight.

We, the undersigned, understand that by returning this consent form we are giving our informed consent and professional authorization as responsible employees of the Lyngblomsten Care Center for the execution of this study. We understand the nature of the study and agree that any risks to the subjects are exceedingly small. We also agree that the potential benefits that might be realized from the successful completion of this research would be significant. We are aware and agree that the information being sought will be provided in a specific, confidential manner so that only minimal identifiers are necessary and overall confidentiality will be guaranteed. We realize that we can withdraw permission for participation for all or some of the subjects. We agree that all concerned will function within standard medical protocols and ethics.

Note: Questions or concerns about this study or the role of Lyngblomsten Care Center or the University of Wisconsin-Stout should be addressed first to the researcher, Samantha Choi, Phone (612) 332-4136, or research advisor, Carol Scaborn, Ph.D., RD, Department of Food and Nutrition, Phone (715) 232-2216 and second to Dr. Ted Knous, Chair, UW-Stout Institutional Review Board for the Protection of Human Subjects in Research, 410 BH, UW-Stout, Menomonie, W1 54751, Phone (715) 232-1126

On Behalf of Lyngblomsten Care Center:

Date

Martha McCusker, M.D. Director of Medical Service

annon Heinz, RD Wate 2/15/99 Shannon Heinz, R:D.

Director of Food Service

UW-Stout Student Researcher:

Samanother ChiqDate 2/15/99

Samantha Choi Student Researcher

APPENDIX B

Minimum Data Set (MDS) - Version 2.0
FOR NURSING MONE RESIDENT ASSESSMENT AND DAPS SCREENING.

BASIC ASSESSMENT TRACKING FORM



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	were presence, screamor at, curved 5. PrfYS CALY ABUSINE BEHAVICRA	at) LISTMPTONS (cherk	+	i i	DILET ÜSE	How resident uses the told we massive accordinger, clearses, remains off, so relevant	ora (or texnorote, bedjezn, urhal): changes osd, manages ostomy or	
	 Method (advice) formation activity of - Method (advice) for a state of the - Metho	ALMER REPORT			EFSONAL	hav no den; maintxina paras	vsi hydiene, indiatáro combina haix	
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!	be organys; e. PESISTS CARE (resisted taking medi	cestons/-rijections, AD.						
	assusance, or earing;		<u>_ (_</u>				VCS20	101854

Resderi					Nucenc Ideni	fer			
2. 8ATHING	, How resident between hit early b	astratewer, sponge beit, and	· .	2	APPUANCES	Ally schooled is of g pan		Dis not use folkil ranmi	. L — J
	Transfers Ivous of LESSnower	(EXCLUCE washing of back and nair.)			AND	L'ander retrais no program	<u> </u>	commedic/serial	<u>!</u>
	(A) SATHING SELF PERFC	RMANCE codes appen herm	(A) (B)		PHOUHAUMS	Contract root and building	<u>p.</u>	Parashina ta yawi	<u> </u>
i I	D Independent -No ne'p pr	T-VDec	•			Econal resident, catholog	L_	EnenseatnigeSor	<u>. </u>
	1. Supervision-Oversity#7	naj: onv				Inc-eling catheler	ia 🛛	Ostorry aresen:	<u>ــــــــــــــــــــــــــــــــــــ</u>
	2. Physical help is modified in the	e stre (rk)	•			lute der i catterer		NONE OF AEOVE	3
	3. Physical help in period be	raigedaby		4	CHANGEIN	Hesklerits unrary continence	has chi	upped as compared to status e'	$2\pi/2$
!	4. Total dependence	- · ·	1.0		LEINARY	90 days ego (or sace lass act	essme:	n ir leas blan 90 days)	20
ļ	2. Activity teal did not come	como entre 7 deve			NENCE	3 No character 1, m	DEVE	2 Detenorates	
	(Bathre superreades and is	desiring in Karn 1, code B spares							
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(see training	 Fictus preside support dur 	ng bet		6.62	tvo decocevs)		~ ~ ~		
(nanuar)	Or Electric (etc) (but cores no) 7. March Later (cores no)	tiskow carentiprovice tear		1.	DISEASES	(if none apply CHECK the h	IONE O	FASOVE bain	
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(Tanks)	a NSOK	ļ	<u> </u>	1		(AS-CI	a.	Teamate sets, injury	
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	a lies rouging to or orea		\rightarrow	:		Deep vein thrombosis	2	Depression	
	 roup—rouging ande ortee former fusionisment former 	97 I	-+-			Hyperlension	<u>h</u>	Marie depression (bipoler	
-	 Constraint (Constraint) 	inst7 (e.e.)				Hyperension	Ŀ	Salasaj	н
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h .i	Otherperson wheeled		· •	!		Antirus	I	Emphysecte/COFE	n
8. MODES OF	(Check AY that apply (i, ring)	ee (7 dega)				Holzano	n.	BENSORY	
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	Bac Gis Levil for bad out-fity	Tans'erad (e.a. side board	Ť	1		Collectories.	<u>~</u>	Dispetic Ménapathy	<u>w</u>
1	ormanaler	 trapeze, case, waker, brace; 	<u></u>			Particlogical bore freek.re	P	Classoome	<u> </u>
	Litted manually	a NONE DE ASOVE	л.			NEUROLOGICAL		Macular degeneration	m.
J. TASK	Some or all of AQL activities y	were broken into excessive during lase 7				Altre mars scesse	a		
SEGMENTA-	days so that resident courd pe	form trem	i :			артака Основна војск	r.	Atamas	Inn.
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* FUNCTIONAL	investoem beieves horsnalls as likast some ADLs	pape or increased independence in a:	. ·			Cereorovescular accoerti		Caresr	PP
REHABILITA-	Element es constant inclinate racidat	ci is reachie of paragraphic interestions				1	<u>، </u>	Hend: Salard	-
POTENTAL	in et least some ADLs		°P			Alzhemer's disease	L.	NUME OF ADDVL	:n.
	Fosidem able to perform tasks	stativity but is very slow	E .	2	B FECTIONS	(Knone apply CHECK the N	ione a	F ABOVE bat)	
!	Defensione in ADL Set Packon	serve or ACL Support, comparing				Antania resistant urberson		Sectoria	10
	mominga to eveninga		- ب ا	-	•	(a.g., Vetrisi'r resster)	<u>م</u>	Security paramined diseases	h.
	NONE OF ABOVE		B .			staphi		Tuberticais	i.
9. CHANGE IN	Resdent's ADL set-performation	nce status has changed as compared				Clostratum diffals (c. alt)	ь.	Univery treat integrion in last 3	
	ino stanus di 90-daya ago (or si Idmai	nce last assessment if less than SU				Carjenes/Hz	-	deys.	¥
Function	0. No onange 1. Ha	provec 2 Detendested	i			MV effection	d.	Viral nepatida	<u>i</u>
						Pre-mona	E.	Wound Intection	<u></u>
SECTION H. C	ONTINENCE IN LAST :	14 DAYS				Peopletion //	ι	NONE OF ABOVE	<u></u>
1. CONTINENCE	SELF-CONTROL DATE OUT	ER ALL RUNFTE	1	a.;	OTHER	<u>م</u>			
1000000000000	OF A PARACONSTRUCTION	n all shere,			i CAMOAC	<u> </u>		111	
IO. CONTINEN	7—Complete control (includes)	use of individing unitary address or as	DATA	1	DETAILED			· · · · ·	·: —i
;	noes not reak inche by aloof,			1	ANDICOLE	·	·		<u> </u>
i ji pechatya	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	r finer i eçisedes örça a weck or less;		1	CODES	د		<u> </u>	∎I`
	ss main weekly			£					i ا
2.0004500	илди міронтімент—Вілар	CE9, 2 or prone limes is week suit for d	aly;	RE		ENTH CONDITIONS			
: SOMEL or	ice a week			픧	S NON J. N			k ala - a malaga a star Kar a d	
1 FREGUEN	TLY MOONTINENT- BLADCE	ER, tended to be incontinent daily, but to	оте	11.	PROBLEM:	no necit all problems presen protestori	1.11.1441) paya bisas contrarie name	-
 COLOR 2428 	eni (e.g., on day shit); BCWEL	2-3 times a week				INDICATORS OF FLUXD		Dizziness/Vertige	
4. NOCATIN	ENT-Had (nadaguana control)	ELADOEA, mutipe czły góstałew				STATUS		Edena	ia l
EOWEL 8	(or elimon all) of the time					Weight gein ar less at 3 er		Favar	jn.
A BOWEL	Control of sowell mevement, w	with appliance or bower confinence		1		more points within a 7 day		Hallucinations	Ē
EN25	hindrasian'i subrohoo		· ·			peroc		niewe: Needing	<u> </u>
ADCER	Control of urthany diadoenhury	ຕາວກ ຫຼື d abbles, we have interfaced to				rodášty ky lie liet duc 10. Stanislava – stálovaní		Requirent long explosion for a	<u> </u>
CONTL	scak through underpaints), wi	th appliances (e.g., lowy) or continence				SAVE BOUND OF DESIGN	D.	last \$9 days	E
NENGÉ	Diversity in employed		+			Derived alleC; 0-⊈vil €orsects . Travé		Sixornese of boasts	L
2. BOWEL EUMINATION	Bowe Amnason patan Inggia – at cast one		E			-t.u.	1	Syncope (Sinting)	in.
PATTERN	movement every time cays	Facz Impaction	<u>ه</u>			Insufficient faid of NOT consume a lateratia the set		Unsteady gait	n
1 !	Constantion	NOVE OF ABOVE	L		!	provided curring last 3 days	! <u>a</u>	Vaniting	۵
	1 · · · · · · · · · · · · · · · · · · ·	1 · · · · · · · · · · · · · · · · · · ·		1				NUMBER AND A	- I-
				1		:01464		MOME OF ADOME	

VES 20 10/18/944

Resident_				Nartado Ideni	fier
1.2. DAR	of Carde the Information and an	ain creases' at 554 4047 7 Americ		ECTION ML SI	
SYMPTOM	B FREQUENCY wo which	b. NTENAITY of pain		1. ULSERS	(1) word the contribut of values at such table stage—report Dess of values if none present and stage, record (3) (seen). Code of the apply (2) days a fast 7 days, Code 34, 5 or group (7) (Requires full body seen). (3)
! ļ	Shows evidence of usin	1. Mile pain 2. Moseralo pain		(eares) (eares)	E Sago I. A persiser land is skin redress (without a break in the
	1. Pair eastar daty	 Times when pain is homote shear usiding 			b. Sizge 2. A partial tratasea loas of vide. Ayaa that presenta
	(X pain present, check at als	es mer excly in last 7 days)	-		o nosity as an abrason, stady, in Abrily weight a Sage 3 - A full tractess of skinis kor, watching the systemineous
	Reck pain Blone pain	lainoson≥i pain sioin; psin (ofter tran hip;	<u>. </u>		lisses provents vále Geop Crater with 6° without undermining edjacent tissue.
	Chest spin while doing usual acceptes	Schitssue painie g., idean, g. musde)			 Stage 4. A full misoness of side and substrateous faster is less expering muscle or bone.
:	Heedscrie Hoedscrie	d. Stattach pain		2. TYPE OF ULCER	(Hor each type of sector body for the ingreat stage in the last 7 days - complexity both MI—A.C. O-none, stages 1, 2, 3, 4)
4. ACCIDENT	S (Check at that apply) Sel in mar 20 days	. Molecce related 160 date			 Pressure user—any tester, tested by pressure resulting in de vege et underlying user.e
	.Fell in paar: 91-180 days	 Covertiscence in last 160 days Up to point 100 days 	· 📥		b Stabs User—coord lesion calls and by providing white the laws externities
5. STABILITI	Conditional Seasons make no	size its organitye. ADL mood pribehavo	<u>.</u>	3. HISTORY OF RESOUVED	Responsible and the static second on our of the LAST, BO DAYS
L CONOTION	patiens inspare-(contain)	g, procaracie, or neveral range		A CITTUES EVAN	n. NG 1, 105 "Check el Stat annih de nor Jeat 7 devel
	Hosdeni esperiencing en ecu abtorict-uroberto	ra opisions is a fare-up of a recurrent or	<u>b.</u>	PROBLEMS	Alvasiena, bryżese
	End-stage (Second Gardner)	months to bye	:	OR LESIONS	(Zums (second or frid degree)
	NOWE OF ASTUR		·	PRESENT	Open leaders of e: then ulters, rashes, puts (and, cancer leasons)
· · · · · ·	provide of resolute				Paster eg, intering, norme, drug ear, heat get, herpes zoner in
					Skin desensitized to psill or pressure (a.
SECTION K	CHALMUTHITIONAL ST	A105	<u> </u>		Skin tears or cuts (other then surgery)
1. ORAL	S Dur/Leinner		<u> </u>		Surgioslawa mas 👘 🧕
	 Owenderig patient 		÷	ļ	ACAEGEABOVE
	NONE DE ADOUE	-	÷ [5. SKIN	(Check all that apply during last 7 days)
а насит	Home or Asore	ana ita') waliota in mawata. Sana wenzh		MENTE	Pressure referring dence(s) for crazin
AND	most recent measure in fast i	O days; measure neight consistently in	0.000	:	Pressure retexing device(s) for bod
WEIGHT	 with standard balky process shows of and in combinities 	-cg, wan sherveding been med	#101	•	Tuminghepestioning program
	2.000 00, 000 00.97203.05	ALT 90 N 207 00		:	NUTLOF OF WORDON INSIVERSON IS IT A 12/2018 SKIR problems
	a. Waliofini kana5 % an anta-	a leat 30 days, or 10 % or more in least		:	Loos care ja
CHANGE	19C days			:	Sugar would date
	C. No1. Ye	<u> </u>	ال	•	egologication of sites a rigs (with silvathout lopes) medications) other than (a, see
	b. Weight gain—5 % or more	i in taat 20 daya: ar 10 % ar mars in taat		•	Amplication of a numerical menurations latter than to leaf.
	100 ¢ányá				Cher prever taive or projective skip rare lother tran la ker/
41	Complains arout he rarte of	 Leaves 25% correspondence 	<u>+</u> −1		NONE OF ABOVE
T.ONAL	many tools	 unezen el most mesis 	<u>∟</u> †	9.; FOOT	(Check of that apply chang last 7 days)
PROBLEM	^E Regular or repetitiva	NONE OF ABOVE		PECELESIS	Resident has one or more fact problems—e.g., come, leskouses,
	rearrapeains of hunger	b	4	AND CAHE	turnikku, hänniter toks, okeregiping loes, pää, asuotusi problems 👘 🁔
5. NUTHA	Check all that apply in lea	t 7 store,			kritodien sintra loos - e.g., del afits, puntiern drainage <u>o.</u>
	PesanterašTV I-	 Disary supplement between 			Epen lesions on the fool
E9	(Feeding 2.4ee	L Difference	ſ.		Nais/talusas nimmed during lost 90 days
	Machanicsly attend die:	 Par quart, szadzer but-up stersá, sz. 	<u> </u>		Received preventative or protective lexit care (e.g., used apercal shows) most is peak (be separators)
	Synnge (oral leading) Thereas for dist	 On s plannet weight doorge i rmman 			Application of desetangs (with or without topical number loss)
	. Kapese dei	NONE OF ARMS	F		aune de antone
	1 JElda to Eaction L # netther	Sa nov So is shacked	1 .		
OR ENTER	Lin. Cone the property of the	i calorina the resident received thre of		SECTION N. A	CUMIT FURSUIT PATTERNS
TITAKE	parentenal or lube leadings	ir falast 7 days		1. TIME	(Check appropriate time periods over blit 7 days) Restert availe all or most of time (i.e., race no more then user 'axe'
	0.16745 1.1% 12.25% 2.25% in 57%	4, 28%, to 100%		ANNO 2	pertone pencol in the Evering
	h. Eade the generate fluit late	ste per tau by Micrische in last 7 daes			Afternoon b. NONE OF ABOVE a
	0. None	3, 100° to 1500 colday		it resident is ea	ematose, skip to Section O)
	1.1 to 500 ec/cay 2.50° to 1000 ec/cay	4, 150° to 2007) (shikey 8, 2007) or mone 40046y		2. AVERACE	(When awake and not receiving treatments or ADL care)
				NVCLVED N ACTIVITIES	3 Vest-more ben 23 of time 2 Office less than \Softime 1 Borne-How 1.5 is 23 of time 3 None
SECTION	UNALIDENTAL STATUS		[D. PREFERRED	Check pl partinge in which activities preferred.
t. ORAL	Dobris jach, easily movable s minimized o'hort al nicht	substances) present in modif. (Monte		5E TINGS	Uwn 2007 a Cuside lealby d
DISEASE	is gauge a sea an age. Is as deminate or monochie o	nte.	<u> </u>		
PREVENTION	N Samalal say of residue of	n agas Nacio notificara produce con una destrucció	F~~~ -	4. GENERAL	Coose all PREFERENCES whether or and activity is currently
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1.	Broken, kassa, er canous ted	th	2	PHEFER- ENCES	Valkingwheeling outdoors
	(All-Arried gurns (Gauliea) Sec	Kat or blacking gutts; oral Abcesses	□ ·	(edepled to	E-mattering TV
	ukcera or rashes	••••	⊢	ALTERT	La solution a sector
	Daily cleaning of teeth territor	es or daily mouth care +-by resident or -	<i>t</i>	p52illan)	Bezánovertoc
	SET		- H ·		Reinters Helping stress
	NONE OF ABOVE		المتخل		Source Prove Contraction Contr

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	SECTION D. MEL	DICATIONS			I		:	b. — Other types of add	e rada used (n.g. ha	shire", one side;	
Total Construction A REW Finded crowned watery declared to bar were their initial of the construction of the second sec	1. INLOUBER OF 1/1	liptensi dhe seember al Giller wat whe the St Factories	wit met	Socious used in the last 7				c. Truck restand			<u> </u>
2. MEM [Insider_enantly_making mediators to up we reflectionly the line of the sector of the mediate menits and the double fill of the line of the mediate menits and the double fill of the line of the mediate menits and the double fill of the line of the mediate mediat	TIONS							di umo restranti			
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	TIONS 0.	Ag1,1 <u>84</u>			<u> </u>	5.,	STAYIS	(Negora numper di mus- (Nejora gli, Aley 10 Mac 90	recched neva echi di daya (crisince last	assessment if less the	n 90
Bits Description Description Description Description PERDIPTION Description	3. INJECTIONS	Record the regriser of DAVS R Mat 7 decements 117 8 000	i kaominin' dia mandri Ny INSEE dia mampi	kis al any fyce reselves during		_	THE PLAN	ilionii <u>(Everenne tas</u> Bootenne taitean	pial agrissions] no docudekod EE	ulta ta cuenta alca	
PRESIDE LAST ACCOUNT A CONTRACT OF TAXABLE AND PROCEEDURES INFORMATION & ANSWERS INFORMATION OF AND PROCEEDURES INFORMATION A CONSTRUCT AND PROCEEDURES INFORMATION INFORMATI	6 Days (B	locard the number of DAYS	ີ ລຳເກັກອ	last 7 days, wher "S" it con			ROON JERI	In lease of days in since	asi assessment 31	less than 90 days).	чЦ
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	FOLLOWING	Antipeyenetic		d. Hypricto		- 74	FRYSCIAN VISTIS	Easts/ new many days "	na ing piya dan (o	n arthonizatio asta-sile 1174 A arthonizatio asta-sile 1174	∝ LL
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ECTION P. SPECIAL TREATMENTS AND PROCEDURES SECTION P. SPECIAL TREATMENTS PROGRAMS Section and the section an				· · ·		2.	PHYSICIAN DROEBS	In the LAST 14 DAYS (d brack) now many days (ranco edmasion (las na chyskian (6	i less than 14 days in r pilmorizae seastant (or 🗌
	SECTION P. SPEC	CIAL TREATMENTS /	ND P	ROCEDURES	.			pactionen crenged ne	 nesdents orders? (Enter 2 Anona) 	Do not inclusie order	
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Image: International Internatinternature International International International	104	unyyes.	D	Accoholicing best rest program		\$E(TON D. D	ISCHARGE POTEN	TTAL AND OV	ERALL STATUS	`
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In the set of the		resentation .	<u>d</u>	care and	<u> </u>		POIEATIAL	0.50	1 Yes		
Coopy care Coopy		curroning source mecanality	b .	Hospice care	;≞			b. Resderc ras a surpo	rt person who is po	oine Ionana dadary	"
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APPENDIX C

Subject Information Data

ID		Gende	Age	Body Wt.	Med. #	Med.	Total Energy	Total Water
		r	_	(kg/lb.)		Freq.	(Kcal)	Intake(g)
1	D1	М	76	74.5/164	3	3	1924	1506
2	D2	М	82	96.4/212	6	3	1863	1745
3	D3	F	90	45.0/99	2	3	2009	1676
4	D4*	F	77	53.4/117	2	3	2649	2374
5	D5*	F	97	55.5/122	6	4	1734	1706
6	D6*	F	90	51.4/113	1	3	2081	1638
7	D7	F	86	55.9/123	6	3	1544	1474
8	D8	F	86	55.9/123	4	3	2302	2231
9	D9	М	87	67.3/126	5	4	1677	1831
10	D10	F	89	70.0/154	6	3	1320	1567
11	D11	М	73	87.7/193	4	3	1475	1313
12	D12	F	88	57.9/127	7	4	1169	669
13	D13*	F	83	33.6/74	7	4	546	602
14	D14*	F	90	63.6/140	8	4	640	738
15	D15	F	77	69.3/152	4	4	1544	1221
16	D16	М	82	85.5/188	4	3	1738	1124
17	D17	F	99	50.0/110	1	1	586	678
18	D18	F	92	43.9/96	10	3	1180	1461
19	D19	М	85	44.5/98	3	3	1474	1201
20	D20*	F	93	44.5/98	4	3	1505	1337
21	D21	F	77	73.6/162	1	3	1937	1647
22	D22	F	98	44.5/98	7	4	1190	886

Dependent Feeders

total dependent feeders(22) M: 6 F: 16

ID		Gende	Age	Body Wt.	Med. #	Med.	Total Energy	Total Water
		r	_	(kg/lb.)		Freq.	(Kcal)	Intake(g)
1	I1	F	82	62.3/137	5	3	2075	2083
2	I2	F	93	63.2/139	6	4	1345	1426
3	I3	М	97	50.5/111	4	3	1526	1363
4	I4	F	85	41.8/92	7	3	1288	1005
5	I5	F	90	61.8/136	5	3	2232	1507
6	I6	F	94	57.3/126	8	4	1002	1161
7	I7	М	83	80.0/176	6	3	2492	2071
8	I8	М	90	90.2/198	5	3	1909	1480
9	I9	F	90	75.5/166	1	1	1795	1128
10	I10	F	76	57.3/126	1	1	2316	1920
11	I11	М	85	75.5/166	10	5	1713	1024
12	I12	М	78	98.2/205	6	3	1172	1170
13	I13	М	85	95.0/209	8	3	2444	1776
14	I14	F	92	64.3/141	4	3	2172	1165
15	I15	М	89	48.2/106	7	3	1415	1430
16	I16	F	96	49.5/109	9	3	1399	1328
17	I17	F	96	79.5/175	9	4	1696	1558
18	I18	F	82	50.5/111	7	3	1519	1460

Independent Feeders

Total independent feeders (18)

M: 7 F: 11

APPENDIX D

Calorie Count Record Sheet

CALORIE COUNT RECORD SHEET

___DAY 1

NAME:	ROOM #	DIET:	General/3-5 GRAM	

... Please check Yes or No on each meal or snack time if the resident needed assistance. Assistance includes any of the following; feeding self, drinking fluids, reaching food on tray, holding earning utensits, cotting meat, or opening packages.

OBSERVATION OF FOOD INTAKE

BREAKFAST Did resident need assistance ? Yes	No
--	----

Food Items	Τ	0.5	25%	50%	! 75%	- 100YX	Food Items	. 11%.	25%	1.50%	75%	100%
ORANGE JUICE	Т					i	JELLY	-			1	
RALSTON	Т					<u> </u>	COFFEE/ TEA					
SOFT COOKED EGG						<u> </u>	8 52, 29 MILK					
SAUSAGE LINK	Т					Γ-						
WHEAT TOAST						Γ	-	· · · ·				
Comments												

LENCH

Did resident need assistance? Yes____ No _____

Food Items	17%	[25%]	50%	755	100%	Food Items	0%	25%	50%	75%	100%
APPLE JUICE			·			MARGARINE				F ·	
BELF STEW						COFFEE/ TEA					· -
BISCUTT				-		4 oz. 2 % MILK					··· · ·
TRUIT SALAD										<u> </u>	···- ·
HONEY											
Comments											

OINNER Did resident need assistance? ---

Yes No___

T 3 Te	0.01	T	1	1								
Pood Items	Ura:	25%	10%	7556	100%	Food Items		10 %	25%	50%	75%	100%
FRESH BANANA			L.			MARGARINE		1				-
GR CHZ ON WHITE			L.			COFFEE/101A		l				
TOMATO SOUP			L.			4 07. 2 % MILK	<u></u>	:				
DUTCH APPLE PIE								;				·
CRACKERS								1				-
Comments				· _		· · · ·						

SNACKS

Did resident need assistance ? — Yes $_{\rm o}$ No_

Rood Dems	1)%	25%	50%	75%	100%	Food Items	- 11%	25%	50%	75%	100%
DONUT HOLES							:				
FRESH FRIJIT		!								:	
Comments					-		·				

BEVERAGE/ FREE WATER/ WATER WITH MED.

<u>Items</u>	 2 02.	4 0 <u>7.</u>	6 0z.	8404	Items	 2 oz.	2 0Z.	6 oz.	8 oz.
· <u> </u>							ļ		
Comments							-		

CALORIC COUNT RECORD SHEET

NAME:	GRAM SODIUM	DAY 2
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_ Please check Yes or No on each meal or snack time if the resident needed assistance. Assistance includes any of the following: feeding self, drinking fluids, reaching food on tray, holding eating utensils, cutting meat, or opening packages.

OBSERVATION OF FOOD INTAKE

BREAKFAST Did resident need assistance ? Yes ... No

Food Items	0%	25%	50%	75%	100%	Food licms	0%	25%	50%	75%	100%
ORANGE JUICE			[·			JIGU.Y					
CORNMEAL						MARGARINE			!		
SOFT COOKED EGG					[COPPERSTEA					
WHITE TO AST		<u> </u>				8 ov. 79. MILK	i		•		
MINI DANISH	1								:		
Comments											
								.			
LENCH	Did r	rsident	need a	ssistanc	e? Ye	s No	_				

 Food Items
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 50%
 75%
 100%
 Food Items
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 25%
 50%
 75%
 100%

 LC PARSLEY SPRIG
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DUNNER Did resident need assistance? Yes_____ No_____

Food Items	0%	25%	50%	75%	100%	Final Items	UYS.	25%	ા કાઈ 🖗 🗍 🖓 કે છે.	100%
TARTAR SAUCE	ļ				i .	POPPYSEED CARE				
FISH CHZ BURGER ON						COPHNIZTIPA			i	
<u>R1,IN</u>								:		
TATER GEMS	L .					4 oz. 2 % MILK				
COLESLAW		L								
Comments						•				

SNACKS

Did resident need assistance ? Yes____ No____

-											
Food Items	0%	25%	50%	75%	100%	Road Items	0%	25%	50%	75%	100%
YOGURT Ir.								· ·			
								t—	r 1		
Comments											

BEVERAGE/ FREE WATER/ WATER WITH MED.

Ttems	2 dz.	4 0z.	60z.	8 Oz.	Items	 2 oz.	4 02	6 oz.	802
						 •			
						 · · · · _ ·			
					-				
Comments									

CALORIE COUNT RECORD SHEET

NAME:	GRAM SODIUM	DAY 2
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_ Please check Yes or No on each meal or snack time if the resident needed assistance. Assistance includes any of the following: feeding self, drinking fluids, reaching food on tray, holding eating utensils, cutting meat, or opening packages.

OBSERVATION OF FOOD INTAKE

BREAKFAST Did resident need assistance ? Yes ... No

Food Items	0%.	25%	50%	75%	100%	Food liens	0%	25%	50%	75%	100%
ORANGE JUICE			[·			JIGU.Y					
CORNMEAL						MARGARINE					
SOFT COOKED EGG					[COPPERSTEA					
WHITE TO AST		<u> </u>				8 ov. 793. MILK	i		•		
MINI DANISH	1								:		
Comments											
								.			
LENCH	Did r	rsident	need a	ssistanc	e? Ye	s No	_				

 Food Items
 0%
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 Food Items
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 LC PARSLEY SPRIG
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DUNNER Did resident need assistance? Yes_____ No_____

Food Items	0%	25%	50%	75%	100%	Final Items	UYS.	25%	່ຽນໝໍ່	75%	100%
TARTAR SAUCE	ļ				i .	POPPYSPED CARE					
FISH CHZ RURGER ON						COPPER/TEA			i		
TATER CLARK	+ · ·				<u> </u>	4					
COLESIAW	<u>⊢</u> ·			-	· ··-	4 02. 2 % MRLK					
Comments	·	L				L					

SNACKS

Did resident need assistance ? Yes____ No____

-											
Food Items	0%	25%	50%	75%	100%	Food Items	 0%	25%	50%	75%	100%
YOGURT Ir.											
							 		Г I		
							:				
Comments											

BEVERAGE/ FREE WATER/ WATER WITH MED.

Ttems	2 dz.	4 0z.	6 0z.	8 Oz.	Items		2 oz.	4 02	6 oz.	802	
							•				
							· · · · - · -	T			
Camments											

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