

Factors Contributing to Dehydration in Nursing Homes: Inadequate Staffing and Lack of Professional Supervision

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OBJECTIVE: To investigate the factors that influenced fluid intake among nursing home residents who were not eating well.

DESIGN: A prospective, descriptive, anthropological study.

SETTING: Two proprietary nursing homes with 105 and 138 beds, respectively.

PARTICIPANTS: Forty nursing home residents.

MEASUREMENTS: Participant observation, event analysis, bedside dysphagia screening, mental and functional status evaluation, assessment of level of family/advocate involvement, and chart review were used to collect data. Data were gathered on the amount of liquid served and consumed over a 3-day period. Daily fluid intake was compared with three established standards: Standard 1 (30 mL/kg body weight), Standard 2 (1 mL/kcal/energy consumed), and Standard 3 (100 mL/kg for the first 10 kg, 50 mL/kg for the next 10 kg, 15 mL/kg for the remaining kg).

RESULTS: The residents' mean fluid intake was inadequate; 39 of the 40 residents consumed less than 1500 mL/day. Using three established standards, we found that the fluid intake was inadequate for nearly all of the residents. The amount of fluid consumed with and between meals was low. Some residents took no fluids for extended periods of time, which resulted in their fluid intake being erratic and inadequate even when it was resumed. Clinical (undiagnosed dysphagia, cognitive and functional impairment, lack of pain management), sociocultural (lack of social support, inability to speak English, and lack of attention to individual beverage preferences), and institutional factors (an inadequate number of knowledgeable staff and lack of supervision of certified nursing assistants by professional staff) contributed to low fluid intake. During the data collection, 25 of the 40 residents had illnesses/conditions that may have been related to dehydration.

CONCLUSIONS: When staffing is inadequate and supervision is poor, residents with moderate to severe dysphagia,

severe cognitive and functional impairment, aphasia or inability to speak English, and a lack of family or friends to assist them at mealtime are at great risk for dehydration. Adequate fluid intake can be achieved by simple interventions such as offering residents preferred liquids systematically and by having an adequate number of supervised staff help them to drink while properly positioned. *J Am Geriatr Soc* 47:1187-1194, 1999.

Key words: risk factors; dehydration; nursing homes; staffing

Dehydration is the most common fluid and electrolyte disorder in long-term care settings and among frail older people in the community.¹ Data from the 1996 National Hospital Discharge Survey indicate that 208,000 patients aged 65 years and older were discharged from short-stay hospitals during that year with a primary diagnosis of dehydration.² In 1996, the average length of stay for people older than age 65 was 6.5 days,² and the average cost of care per day was \$1006.³ Thus, the cost of hospitalization for dehydration in 1996 was \$1.36 billion.

Dehydration may be caused either by increased fluid loss or decreased fluid intake. Infection and fever, common problems among nursing home residents, increase the risk of dehydration.⁴ Physiological changes that occur as one ages, such as the decreased ability of the kidney to concentrate urine, decreased thirst, and decreased renin activity and aldosterone secretion, may also contribute to dehydration.^{5,6} When older people do not consume an adequate amount of fluid, they are more susceptible to urinary tract infection, pneumonia, pressure ulcers, hypotension, confusion, and disorientation.⁷⁻⁹ Serious life-threatening electrolyte imbalances such as hypernatremia, hyponatremia, and hyperkalemia can also occur.¹⁰⁻¹³ If dehydration is not treated, mortality rates may exceed 50%.¹⁰

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There has been little research on the prevalence of borderline or overt dehydration.⁶ A few investigators have examined the fluid intake of nursing home residents and have found the amount of liquid consumed by residents to be inadequate.¹⁴⁻¹⁷ To our knowledge, there have been no qualitative studies that uncover, describe, and analyze the multi-

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This work was supported by the National Institutes of Health, National Institute on Aging, Grant AG10131-03.

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ple but preventable factors that contribute to dehydration in nursing homes.

The purpose of the 5-year anthropological study reported here was to investigate the social, cultural, institutional, and clinical factors that influence eating behavior in nursing homes. This paper reports on one part of the data, namely the fluid intake of 40 residents in two proprietary nursing homes, one with 105 beds and the other with 138 beds.

METHODS

Anthropological field methods were used to obtain data. When conducting anthropological research, the investigator spends much time in the research setting(s) observing daily activities, asking appropriate questions, identifying and interviewing key informants, and taking precise field notes. This method generates rich data, which are not obtainable through the use of quantitative research methods.

Event analysis, a detailed description and analysis of a specific event (in this study an eating problem), was an anthropological research strategy used to obtain data on 100 residents who were not eating well. The residents were observed 7 days a week at all three meals. The period of observation ranged from 1 to 9 months (SD 2.68; mean = 5.56), and 71% of the residents were followed for 6 to 9 months.

During event analysis, we observed, for example, when and where residents ate their meals (i.e., in the dining room or bedroom while in a chair or bed), the type and amount of food and fluid served, the number of staff or family members available to assist residents at mealtime, the amount of time spent feeding residents, and how staff assisted residents with their meals.

Purposive sampling, typically used in qualitative studies, was used to select the 100 residents to be followed. To achieve diversity and representativeness, we included men and women of various ethnic and religious orientations, ages, levels of cognitive and functional ability, and diagnoses (e.g., Alzheimer's disease and stroke), and both residents who had family visitors and those who did not.

Data were collected from October 1, 1993, to October 1, 1995. The research protocol was approved by the University of California, San Francisco Committee on Human Research. A full description of the methodology has been reported elsewhere.¹⁸⁻²¹

Collection of Fluid Intake Data

Purposive sampling was again used to select 40 residents (20 in each facility who were representative of the larger sample (N = 100)). Detailed food and fluid intake data were obtained on these 40 residents at mealtime for three consecutive days, beginning with breakfast on Sunday and ending with dinner on Tuesday (nine meals for each resident), yielding data on a total of 360 meals. Data were also obtained on liquids taken between breakfast and lunch (AM nourishment), lunch and dinner (PM nourishment), and at bedtime (HS nourishment), providing data about 360 nourishments.

Four research assistants (RAs), masters-prepared gerontological nurses, were trained by a registered dietitian to estimate the amount of food and fluid consumed from a series of trays prepared for estimation. The methods used to determine dietary intake, the training of the RAs, and the reliability

and validity of estimating the amount of food and fluid consumed are presented elsewhere.^{20, 21}

An RA was present at every meal and recorded exactly what each resident ate and drank. The RAs observed only two residents at any one meal, enabling us to describe precisely liquids that were served and taken and the factors that influenced fluid intake. After being instructed by the RA about how to measure and record the amount of fluid taken, liquids consumed at AM, PM, and HS nourishments were recorded by the certified nursing assistant (CNA) caring for the resident. The definition of fluids was based on the method of intake. Anything that could be or usually is drunk (e.g., water, milk, coffee, tea, and juices) was defined as fluids.²²

Data Analysis

The adequacy of daily fluid intake was determined using three established standards: Standard 1: 30 mL/kg of actual body weight; Standard 2: 1 mL/kcal energy consumed; and Standard 3: 100 mL/kg for the first 10 kg actual body weight, 50 mL/kg for the next 10 kg actual body weight, and 15 mL/kg for the remaining kg of actual body weight.^{7,23,24} Although it is impossible to set a specific fluid requirement (insensible losses, for example, can vary markedly), these standards have been established by experts in the field taking into account metabolic needs, insensible losses, and the minimal volume of water required for urine formation.²⁵

Qualitative data were analyzed using the methods described by Bernard,²⁶ Spradley,²⁷ Strauss and Corbin,²⁸ and Morse.²⁹ A major goal was to identify the factors that influenced fluid intake by identifying patterns or recurrent themes that explain behavior.

RESULTS

Residents

The residents were primarily very old, widowed, dependent, white women (Table 1). Only four residents were able

Table 1. Demographic Characteristics of Residents (N = 40)

| Characteristic | n | % | Mean (SD) | Range |
|------------------------|----|------|-------------|--------|
| Age | | | 86.9 (7.95) | 66-102 |
| Sex | | | | |
| Female | 34 | 85.0 | | |
| Male | 6 | 15.0 | | |
| Ethnicity | | | | |
| White | 27 | 67.5 | | |
| Black | 7 | 17.5 | | |
| Asian | 5 | 12.5 | | |
| Russian-American | 1 | 2.5 | | |
| MSQ ^{30,†} | | | | |
| Severely impaired | 27 | 71.1 | | |
| Moderately impaired | 5 | 13.1 | | |
| Mildly to not impaired | 6 | 15.8 | | |
| ADL ³¹ | | | | |
| Severely impaired | 30 | 75.0 | | |
| Moderately impaired | 8 | 20.0 | | |
| Mild to not impaired | 2 | 5.0 | | |

*n for mental status is 38 because of missing data.
 †52.5% of the sample had a primary diagnosis of primary organic mental disorders (including dementia).

to eat and drink without supervision or physical assistance (Table 2). None of the residents were terminally ill. Four levels of family/advocate assistance with mealtime care were identified. Most residents (26 of 40) were classified as Level 1 (Table 3).

Quantitative Data — Fluid Intake

Adequacy of Recommended Daily Fluid Intake: Standards 1, 2, and 3

The residents' fluid intake was compared with the recommended intake as defined by standards 1, 2, and 3. Using Standard 1, the fluid intake was inadequate for 38 of the 40 residents. When applying Standard 2, fluid intake was inadequate for 37 of the 40 residents, and when Standard 3 was used, the fluid intake was inadequate for all 40 residents (Table 4). The mean difference between what the residents drank and the amount of fluid required as determined by Standard 1 was 512 mL (range = 126–1440 mL, SD 379) and by Standard 2, it was 665 mL (range = 160–1735 mL, SD 451). Using Standard 3, the mean difference was 1008 mL (range = 399–1781 mL, SD 310 mL). The overall daily mean fluid intake for the residents was 897 mL (range = 278–1560, SD 284). Five of the 40 residents drank less than 500 mL/day (range = 278–458 mL); only one resident drank more than 1500 mL/day (Table 5).

Fluids Served and Mean Fluid Intake With and Between Meals

The average total amount of liquid served daily at the three meals was 1200 mL. The mean fluid intake at the three

Table 2. Scoring of Eating Function³² (N = 40)

| Score | Characteristic | n | % |
|-------|---|----|------|
| 1 | Feeds self without supervision or physical assistance. May use adaptive equipment. | 4 | 10.0 |
| 2 | Requires intermittent supervision (i.e., verbal encouragement/guidance and or minimal physical assistance) with minor parts of eating, such as cutting food, buttering bread, or opening milk carton. | 5 | 12.5 |
| 3 | Requires continual help (encouragement/teaching/physical assistance) with eating or meal will not be completed. | 13 | 32.5 |
| 4 | Totally fed by hand; patient does not manually participate. (Includes syringe feeding).* | 18 | 45.0 |
| 5 | Tube or parenteral feeding for primary intake of food. (Not just for supplemental nourishments). | 0 | 0.0 |

*No residents were fed by syringe.

Table 3. Level of Family/Advocate Assistance at Mealtime (N = 40)

| Score | Characteristic | n | % |
|-------|--|----|------|
| 1 | Family/advocates rarely or never visit, do not assist with care, and are ineffective in communicating with staff | 26 | 65.0 |
| 2 | Family/advocates visit about once weekly, minimally assist with care, and are minimally effective in communicating with staff | 4 | 10.0 |
| 3 | Family/advocates visit 2–3 times per week, moderately assist with care, and are moderately effective in communicating with staff | 6 | 15.0 |
| 4 | Family/advocates visit almost daily or daily, always assist with care, and are highly effective at communicating with staff | 4 | 10.0 |

meals, however, was 610 mL (251 mL at breakfast (SD 121; range = 20–560); 175 mL at lunch (SD 100; range = 0–360); and 184 mL at dinner (SD 102; range = 0–440)). The mean fluid intake between meals was 287 mL, (121 mL at AM nourishment (SD 98; range = 0–460); 92 mL at PM (SD 68; range = 0–240); and 74 mL at HS (SD 74; range = 0–240)). At 65 of 360 meals (18.1%), no fluids were taken; 28 of 40 residents at one or more meals had no fluids. Residents did not consistently consume liquids between meals. No liquids were taken at 49 of 120 AM nourishments (40.8%), 56 of 120 PM nourishments (46.7%), and 64 of 120 HS nourishments (53.3%). At nearly half of the nourishments (169 of 360), no liquids were taken between meals; 34 of 40 residents did not drink any liquids at one or more of the AM, PM, or HS nourishments.

Length of Time Without Liquids and Possible Complications of Dehydration

When fluids were not taken at or between meals, residents were without liquids for a long time. Eight of the 40

Table 4. Number and Percent of Residents with Inadequate Fluid Intake: Standards 1, 2, 3 (N = 40)

| Standard | Description | n | % |
|------------|---|----|-------|
| Standard 1 | 30 mL of fluid/kg actual body weight | 38 | 95.0 |
| Standard 2 | 1 mL fluid/kcal energy consumed | 37 | 92.5 |
| Standard 3 | 100 mL fluid/kg for first 10 kg body weight 50 mL fluid/kg for next 10 kg body weight 15 mL fluid/kg for remaining kg body weight | 40 | 100.0 |

Table 5. Residents' Mean Fluid Intake (N = 40)

| Mean Fluid Intake | Range (mL) | n | % |
|---------------------|------------|----|------|
| ≤499 mL/day | 278-458 | 5 | 12.5 |
| 500 to 999 mL/day | 595-980 | 20 | 50.0 |
| 1000 to 1499 mL/day | 1000-1476 | 14 | 35.0 |
| ≥1500 mL/day | 1560 | 1 | 2.5 |

residents were without liquids for 10 to 12 hours, 20 for 13 to 16 hours, seven for 17 to 20 hours, and five for 21 to 34 hours. During data collection, three residents were diagnosed with pneumonia, seven had urinary tract infections, 11 had upper respiratory infections, and 15 had pressure ulcers. Twenty-five of the 40 residents had conditions that may have been related to dehydration.

Qualitative Data

Factors That Influenced Fluid Intake

Clinical, sociocultural, and institutional factors individually and cumulatively influenced fluid intake. For example, a resident with a swallowing disorder (clinical), who could not speak English (cultural), and who was fed hurriedly because of inadequate staffing (institutional) was likely to receive an inadequate amount of fluid.

Clinical Factors

Undiagnosed Dysphagia Twenty-five of 39 residents had swallowing disorders ranging from mild to severe; only five residents, however, had been referred for a dysphagia evaluation. The CNAs, unaware that residents had swallowing disorders, often fed them while they were lying on their sides, with the head of the bed elevated to a 30 to 40 degree angle. Residents often coughed and choked, and when coughing became severe, they refused to take additional liquids. For example, when a CNA was hurriedly feeding a resident, the resident began to cough, and said, "Take it easy on this old woman. Don't choke me! Don't choke me!" The CNA initially slowed the pace, but then resumed feeding her rapidly. The resident cried out, "That's enough!" and refused to eat or drink. Her mean fluid intake was 680 mL. Twelve of the 17 residents who had a moderate to severe dysphagia drank less than 1000 mL/day (range = 278-975 mL).

Functional and Cognitive Impairment Twenty-three of the 40 residents were severely impaired functionally and cognitively. The functionally impaired residents were unable to take liquids independently, and those who were cognitively impaired were unable to request beverages. Fluids were often inaccessible and glasses and straws were not always provided; residents spilled milk as they tried to drink from cartons. When milk and supplements were served unopened, residents struggled, unsuccessfully, to open the containers. A blind and deaf resident, who could normally drink unaided all of the beverages served could not manage to open a closed container. At one dinner, for example, the CNA guided her hand to a glass of milk, which she drank completely. The resident then explored her tray and found a carton of unopened supplement. For 10 to 15 minutes she tried but could not open it.

Unmanaged Pain Poorly managed pain also contributed to poor fluid intake. A man was admitted to the nursing home

with a diagnosis of pneumonia and mild, chronic obstructive pulmonary disease. He complained of severe pain when he urinated and pain in his rectum, which was further intensified by his sitting in a wheelchair for many hours. We suggested that sitting in a recliner might relieve his rectal pain. The staff replied that there were not enough recliners, and one was never obtained. Thirty milligrams of acetaminophen with codeine orally was ordered every 4 hours, as needed, for pain. During the 44 days of observation (from induction into the study until transfer to the acute hospital), he received no pain medication on 13 days (including the last 6 days before transfer), he received one to two tablets on 18 days, and on 13 days he received three to four tablets. He complained of pain constantly. His mean fluid intake was 384 mL. He died shortly after transfer to the hospital.

Sociocultural Factors

Social Support Residents who had relatives who visited daily and assisted them at mealtime (Level 4, Table 3) consumed more fluids than residents without families. An aphasic resident with advanced Alzheimer's disease was totally dependent. Each day her husband gave her an 8-ounce can of fruit juice at 10 a.m. He fed her lunch, then left for the day, having arranged for a CNA to feed his wife dinner. The resident drank 240 mL of juice for the AM nourishment, but in her husband's absence she did not drink any liquids for the PM or HS nourishments. Her mean fluid intake at meals ranged from 240 to 360 mL, and because she regularly drank juice in the morning, her mean fluid intake for the 3 days was 1280 mL.

Inability to Speak English and Cultural Preferences Non-English-speaking residents with dementia and no family support, such as Mrs. K, a 90-year-old Chinese woman, had poor liquid intake. Although the staff remarked that Chinese residents did not like to drink cold liquids, during the dietary analysis Mrs. K was served a hot drink only twice. She was never served tea. Unable to speak English, she could not request preferred beverages. Her fluid intake at meals ranged from 0 to 240 mL; her overall mean fluid intake was 458 mL. Hot liquids were served at less than one-third of the meals (116 of 360), and water was served at only 8 of 360 meals (2.2%); 35 of 40 residents never received water with meals.

Attitudes and Beliefs of Staff The attitudes, beliefs, and behavior of the staff also influenced fluid intake. Four men repeatedly asked for more coffee. A volunteer started to refill their cups. A CNA intervened saying, "No, they can't have any more coffee." The activity director explained that although the residents like coffee, the staff limit how much they can have. "If they drink a lot of coffee," she said, "then they're wet, and that's too hard on the CNAs." When the staff thought residents were eating too slowly, they stirred the pureed food into a glass of milk or supplement. Residents resisted taking this unpalatable mixture. One woman pulled her head back and said she did not like it. "Don't say that you don't like it," the CNA replied. "You should like it!" While some residents were forced to drink these concoctions, others spat them out thus reducing their fluid and food intake.

Institutional Factors An insufficient number of adequately trained staff and lack of supervision of the CNAs by the professional staff was the major factor that influenced fluid intake.

Residents Were Poorly Positioned and Fed Hurriedly or Not at All As a result of inadequate staffing, CNAs had to

feed or assist 7 to 15 residents.^{18,19} Many residents ate their meals in bed, lying on their sides. A resident (mean fluid intake = 400 mL) was trying to drink while holding herself up by resting on her elbow. She said she was thirsty but could not drink because, "The juice spills down my chin." Although some CNAs took 25 to 45 minutes to feed residents, others fed them in 5 to 10 minutes. The staff complained that it was especially difficult to care for residents on the special care units (SCUs). "We talked to the administration about it, but they never listen. We really could use more help," a licensed vocational nurse (LVN) remarked. "It's very hard. If you're committed to giving good care, you can do it, but some of the aides who don't care so much don't really do the job they should."

Two residents, Mrs. S and Mrs. G, were in the same room; both had swallowing disorders. The CNA attempted to feed them while they were lying on their left sides. Standing on the right side of Mrs. S, she reached across the bed and offered her a bite of food. The resident spat the food out. She offered Mrs. S a second bite, which she also spat out. When milk was offered, Mrs. S refused to open her mouth. The CNA then approached Mrs. G and spent less than 5 minutes feeding her. Thus, at dinner on Day 1 of the dietary analysis, Mrs. S drank nothing, and Mrs. G took 30 mL of supplement. The CNA recorded that Mrs. S ate 60% of her meal and that Mrs. G ate 30%. In fact, Mrs. S (mean fluid intake = 680 mL) had nothing to eat or drink from lunch on Day 1 until breakfast on Day 2. During that same period of time, Mrs. G had only 30 mL of supplement and nothing to eat.

Liquids Were Inaccessible On the SCUs the staff was concerned that residents would drink from one another's glasses; thus water was not left at the bedside. The residents depended on the staff to offer them water between meals. The daughter of a resident said: "They don't get enough activity, and they don't get enough fluids. They only get them with their meals, and they can't get them by themselves. They need to offer it to them. They don't have enough help." Liquids were also inaccessible on other units. An RA wrote: "On no occasion, during the 12 times I visited Mr. P, were fluids within reach. When I placed his liquids closer, he took some, one time drinking 2 1/2 glasses of water. He complained that he could never reach the beverages, and he remarked that when he was at the hospital he could have juice every day, all day." But here I don't get it," he said, "and the water is where I can't reach it."

Residents Experience Thirst To capture the "natural situation" when doing the dietary analysis, we did not offer the residents liquids. On other days, if residents complained of thirst, we offered them something to drink. Mr. B, admitted to the nursing home after a stroke, was restrained in a chair, with the water out of reach. His mouth was dry. "Would you like a glass of cold water?" I (JKJ) asked. He drank a full glass. "Was your mouth dry before we gave you the water?" "Indeed it was," he replied. "You might suggest that they furnish us with glasses of cold water. I'll drink water anytime." His water pitcher was empty; I left the room to refill it and, upon returning, offered him another glass of water. He drank another 8 ounces. "How does that taste?" I asked. He replied, "How do you suppose heaven's going to feel? I really like cold ice water."

Numerous observations disclosed that people were not receiving an adequate amount of fluid. A resident called out for water. No one responded. "Dammit, I want some water!"

she shouted. Another resident said, "I'm so thirsty. I'm not hungry." On the previous day, she had drunk only 360 mL of liquids; her mean fluid intake was 400 mL. A severely impaired resident who seldom spoke walked up to us and said: "I am just dying of thirst!"

Profile of Residents Most at Risk for Dehydration

In sum, residents with a moderate to severe dysphagia who are severely impaired cognitively and functionally, without family, aphasic and/or unable to speak English are most at risk for dehydration. The eight residents who fit this profile had a mean fluid intake of 678 mL/day (range = 278 mL-890 mL). Mrs. C, for example, had had a stroke, leaving her with cognitive and functional impairment and a moderate oropharyngeal dysphagia. Her daughter never visited. Mrs. C enjoyed food but seldom received assistance. She usually ate her meals in bed in a semireclining position. Often, she spilled the liquids, and sometimes, instead of drinking them, she dipped her fingers into her juice and licked them. Her fluid intake was especially poor at breakfast (mean fluid intake = 20 mL), and she consumed no liquid nourishment at AM or HS. Her mean fluid intake for the 3 days was 620 mL.

DISCUSSION

The four major findings in this study are: (1) According to the three standards discussed above, fluid intake was inadequate for most of the residents; 39 of 40 residents consumed <1500 mL/day. (2) Although an adequate amount of liquid was served at meals, the amount of fluid drunk with and between meals was low; sometimes no fluids were taken. (3) Clinical (undiagnosed dysphagia, cognitive and functional impairment, and inadequate pain management), sociocultural (lack of social support, inability to speak English, and inattention to individual beverage preferences), and institutional factors (an inadequate number of staff and lack of supervision of CNAs by professional staff) contributed to an inadequate fluid intake. (4) Twenty-five of the 40 residents had illnesses/conditions that may have been related to dehydration.

Inadequate Fluid Intake

Adequacy of Mean Fluid Intake as Determined by Standards 1, 2, and 3

The two residents who had an adequate fluid intake according to Standard 1 had relatively low body weights (34.5 and 45 kg, respectively) and relatively adequate to fair fluid intake (1476 and 1108, respectively). According to Standard 1, a resident who weighed 34.5 kg needed only 1036 mL/day. Thus, her mean fluid intake of 1108 mL was 72 mL in excess of the need as determined by Standard 1. However, if Standard 3 were used to calculate her fluid need, she would have been 610 mL short of her fluid requirement of 1718 mL/day. Standard 2 could set an unrealistically low requirement for fluid intake for residents with a low energy consumption. Chernoff³³ states that 1500 mL/day, regardless of weight, is the minimum daily fluid requirement for older adults. Like Chidester and Spangler,⁷ we believe that Standard 3, which adjusts for extremes in body weight, should be used to determine fluid needs. Although there may be disagreement about the required daily fluid intake for older people, many investigators recommend that the minimum goal should be 1500 to 2000 mL per day.^{6,7,15-17,34-37} It is

remarkable, therefore, that only one resident had a mean fluid intake >1500 mL (Table 5).

A Low and Erratic Pattern of Fluid Intake at and Between Meals

The low mean fluid intake at meals (203 mL per meal) and between meals (96 mL) is of concern. Studies of healthy adults have shown that liquids taken with food dominate spontaneous drinking behavior, accounting for about 70% of daily fluid intake.³⁸⁻⁴⁰ Thus, if the amount of fluid consumed at meals is low, residents are likely to have an inadequate fluid intake. A low fluid intake may influence the amount of food eaten. A study of 20 young males found that when beverages were reduced to 40% of the subjects ad libitum intake (from 620 to 250 mL/meal) the subjects voluntarily ate only 62% of what their food intake had been when beverage intake was ad libitum.⁴⁰ Furthermore, food causes dryness in the mouth; having an adequate amount of liquid facilitates the chewing and swallowing of food.³⁹ Residents may be eating inadequately because not enough fluids are being given.

Fluid intake was erratic. At 65 of 360 meals, no fluids were taken, and nearly 50% of the time (169 of 360 AM, PM, and HS nourishments) no fluids were taken at designated nourishment hours. This haphazard pattern of fluid intake illustrates the lack of a systematic plan to ensure that residents will be adequately hydrated. When fluid intake was erratic, residents were deprived of liquids for long periods of time, ranging from 10 to 34 hours. When liquids are taken so infrequently, residents will become dehydrated.

Outcome

The inadequate fluid intake of the residents in this study was attributable to clinical, sociocultural, and institutional factors. Whereas undiagnosed dysphagia, cognitive and functional impairment, lack of social support, and inattention to cultural/individual beverage preferences were factors contributing to dehydration, inadequate staffing and lack of supervision of the CNAs by professional staff was the predominant factor that influenced fluid intake.

Nearly half of the time (169 of 360 nourishments) residents did not receive liquid nourishment between meals, residents were fed while improperly positioned, 28 of 40 residents drank no liquids at one or more meals per day, and 39 of 40 residents drank less than 1500 mL/day. This indicates that supervision was poor and staffing inadequate. In fact, it indicates neglect. Although investigators report that the sensation of thirst diminishes in old age,⁴¹ some residents said they were thirsty. These data raise an important question: How dehydrated (mildly, moderately, or severely) must older people be to experience thirst? Although we do not have laboratory data to evaluate the degree of dehydration, the residents' low mean fluid intake and their saying they were thirsty suggest that they were dehydrated.

Recommendations

To be adequately hydrated, older people must consume at least 1500 to 2000 mL/day of liquids.^{6,7,15-17,34-37} Recently, in a modified food guide pyramid for people older than age 70, it was recommended that they drink at least eight glasses of fluid (1920 mL) daily.⁴² Ideally, fluid intake should be determined by using Standard 3, which adjusts for extremes in body weight. To ensure adequate hydration, we

recommend that staffing be increased in nursing homes and that CNAs receive more supervision by registered nurses (RNs). The regulation that states: "The facility must use the services of a RN for at least 8 consecutive hours a day,"⁴³ is completely inadequate and outdated given the level of acuity and severe-impairment of residents in many nursing homes today. Elsewhere we have recommended that CNAs have only two to three residents to feed at mealtime.¹⁹ Moreover, to prevent dehydration, physicians and RNs, working with LVNs, CNAs, dietitians, and speech pathologists, must be responsible for ensuring adequate fluid intake. Residents *must* be provided with beverages of their choice, liquids *must* be accessible to them, and staff *must* assist residents who cannot drink independently. We also recommend that the educational programs of physicians, nurses, and dietitians include content on the clinical evaluation and management of dysphagia. This information should be a part of in-service education in all nursing homes.

The nursing homes in this study were not in compliance with the federal regulation that states: "The facility must provide each resident with sufficient fluid intake to maintain proper hydration and health."⁴³ Although federal regulations require that nursing home residents be adequately hydrated, and the Minimum Data Set (MDS) provides examples of situations that trigger a need for assessment of dehydration problems, these guidelines are vague. Despite the residents inadequate fluid intake, the nursing homes in this study did not receive any citations during the 2 years that we collected data. The regulations must require that nursing homes have a systematic plan to ensure adequate fluid intake. If, for example, residents drank 300 to 450 mL at each meal and 240 mL between meals, they would consume 1620 to 2070 mL/day. The regulations must also require that fluid intake be recorded accurately. If the residents' clinical condition indicates that they are dehydrated, but their records show an adequate fluid intake, the possibility that staff are recording fluid intake incorrectly should be considered. Finally, our data raise the concern that staff may be restricting fluids in order to reduce the urinary output of incontinent residents. Other investigators have said that patients may take or receive less fluid to control the frequency of urinary incontinence.^{16,44} Adequate fluid intake, may, however, reduce incontinence by decreasing bladder irritation from concentrated urine, which results in frequent, small voidings.^{34,45} Further research is needed in this area.

Limitations

This was a purposive, not a random, sample of residents who were not eating well. The data were collected in only two nursing homes; however, the residents in this study are typical of nursing home residents nationally, the majority of whom suffer from cognitive and/or functional impairment. We hypothesize that under similar conditions (i.e., undiagnosed dysphagia, lack of family support and severe cognitive and functional impairment, inadequate staffing, and lack of supervision of CNAs by professional staff) dehydration will occur.

The RAs were present at mealtime and recorded liquid intake accurately. We cannot be certain, however, that the fluid intake recorded between meals was accurate. While the CNAs were instructed on how to record the amount of liquid consumed, they may have forgotten to record some liquids, or they may have exaggerated the amount taken. We have

reported elsewhere that percentage figures of the amount of food eaten as recorded by the staff are often incorrect.²⁰ Also, our presence may have influenced the amount of fluid taken. To ensure accuracy of dietary intake, we had to be on-site during meals. Residents sometimes took liquids from one another's trays, and sometimes staff took liquids from one resident and gave them to another. Furthermore, the staff knew we were recording the amount of fluid consumed, and, thus, may have been more diligent when assisting residents. The residents' fluid intake may actually have been higher than usual during the 3-day dietary analysis than on other days.

We do not have data on liquids that may have been taken with medications and at other times (e.g., between 10 p.m. and 7 a.m.). We observed, however, that medications were often crushed and given with applesauce, especially when residents were moderately to severely cognitively impaired, as were 32 of the 40 residents in this study. In a study that investigated fluid intake among 30 independent institutionalized and noninstitutionalized older adults, it was found that most fluid intake occurred at mealtime. Almost no liquids were consumed at night.¹⁷

CONCLUSION

Inadequate fluid intake in older people may lead to rapid dehydration and precipitate hypotension, fever, constipation, vomiting, mucosal tissue dryness, and confusion.³³ When these complications of dehydration occur, residents may be hospitalized. As mentioned above, although the monetary cost of hospitalization for dehydration for people older than 65 is considerable (\$1.36 billion in 1996), the human cost of adding yet another burden to frail, older people can be devastating. The mortality of patients hospitalized with dehydration is seven times that of age-matched patients without dehydration, ranging from 40 to 70%.⁴⁶

We are also concerned that because signs and symptoms of dehydration and its complications may be overlooked,⁴ dehydration may be undetected. Residents may be dying from dehydration or from infections secondary to dehydration. Adequate fluid intake can be achieved by simple interventions such as offering residents preferred liquids systematically and by having an adequate number of supervised staff assist them to drink while properly positioned. Providing people with an adequate amount of fluid is a basic, universal physiological need. It is not sophisticated, highly technological, costly care. If we do not provide an adequate amount of fluid to nursing home residents, we have seriously failed our older citizens.

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