



## Tube Feeding in the Demented Elderly with Severe Disabilities

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**Key words:** tube feeding, severe disabilities, demented elderly patients

### Abstract

**Background:** Despite the ongoing debate on tube feeding of severely demented patients, the current approach in western countries is to avoid feeding by tube.

**Objectives:** To assess the clinical course and outcome of demented elderly patients with severe disabilities, by feeding mode.

**Methods:** The study was conducted in a skilled nursing department of a major psychogeriatric hospital in Israel. Eighty-eight patients aged  $79 \pm 9$  years were followed for 17 months: 62 were fed by nasogastric tube and 26 were orally fed. The groups were compared for background characteristics, underlying medical condition, functional impairment, clinical and nutritional outcomes, and survival.

**Results:** Tube feeding had no beneficial effect on clinical and nutritional outcomes or on healing preexisting pressure ulcers, compared with oral feeding. Very few patients on tube feeding showed signs of discomfort, partly because of low cognitive function. Survival was significantly higher in the tube-fed patients ( $P < 0.001$ ), which could be partly explained by the different case mix (i.e., the underlying diseases)

**Conclusions:** Tube feeding seems to have no nutritional advantage in severely demented elderly patients. Median survival was longer in tube-fed individuals who had no acute co-morbidity. However, since tube feeding does not add to patient pain and discomfort, it should not be contraindicated when it complies with the values and wishes of patients and their families.

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The question of tube feeding for severely demented patients is the subject of an ongoing clinical debate, as evidenced by three recent articles published in this journal [1-3]. Two articles in a leading journal [4,5] have shown that nutritional support via tube fails to improve patients' nutritional status, alleviate pressure sores, prevent aspiration pneumonia, decrease discomfort, improve functional status, or prolong survival in these disabled patients. Nonetheless, it continues to be practised in numerous geriatric facilities worldwide, including Israel [6-8] – for traditional, ethical, clinical and administrative reasons.

The present study aimed to assess the differences in nutritional status and survival between patients who were tube fed

and orally fed patients. Since this question cannot be estimated by a randomized controlled trial due to ethical concerns, we conducted a prospective study of the nutritional and medical changes and clinical outcome in a series of severely demented disabled patients for whom tube feeding was or was not administered during hospitalization in a geriatric center.

### Patients and Methods

All patients admitted to the Skilled Geriatric Nursing Department of Herzog Hospital, Jerusalem between 1 June 2002 and 30 November 2003 were included in this study. Our 36 bed ward is part of a major, 340 bed psychogeriatric healthcare facility with no designated dementia unit. Admission criteria to the skilled geriatric nursing ward include: extensive pressure sores, tracheostomy, terminal cancer requiring palliative care, renal failure requiring nursing and hemodialysis, or tube feeding. Upon admission, patients are evaluated by a multidisciplinary team including a physician, dietitian, speech therapist and occupational therapist. The standard recommended nutritional support consists of 30–50 kcal/kg/day including 1–1.5 kg protein/day, given orally, by nasogastric tube, or via percutaneous endoscopic gastrostomy tube if present.

For every patient, a questionnaire was completed by the attending physician upon admission and at the end of follow-up (date of discharge, death or end of study period on 30 November 2003). Weight, body mass index, serum albumin and hemoglobin levels, presence and number of pressure sores, and scores on several standardized instruments were noted, including the modified Norton Scale to evaluate the risk of pressure ulcers (score range 4–24) [9]; the Glasgow Coma Scale [10], which measures level of consciousness (score range 3–15, with a score below 10 indicating vegetative state); and the Disability Rating Scale [11], which assesses the level of disability [score range 0 (full consciousness and cognitive ability) to 29 (extreme vegetative state), with a score of 22 and over indicating vegetative state]. Because the patients fell below the testable range for mental tests such as the Mini-Mental State Examination, we applied the

cognitive ability items for self-care activities from the DRS (score range 0–13). Score 0 signifies alertness, and 13, severe cognitive disability.

The degree of pain and discomfort were estimated upon admission according to the pain scale [12] and the discomfort scale [13] for verbal and non-verbal patients respectively. Baseline data on gender, age, education, location of residence, clinical characteristics, and associated pathologies were taken from the medical files. Nutritional status was assessed according to weight, body mass index, albumin and hemoglobin levels, and the number of pressure ulcers. Data on admission were complete. Data at the end of follow-up were partial for some of the variables. Where relevant, tables indicate the number of subjects for whom information was present.

### Statistical analysis

We compared the characteristics of our study population by feeding mode upon admission. Results are expressed as proportions or mean  $\pm$  SD. The distribution of categorical variables was compared using the chi-square test, and when appropriate, by the Fisher's exact test. Student's *t*-test was used to compare continuous variables with a normal distribution between tube-fed and orally fed patients. Non-parametric Mann-Whitney test was used when the assumption of equality of variance was rejected. Survival of patients from admission, by feeding modality, was studied by the Kaplan-Meier method using the log rank test to compare survival between study groups. Cox proportional hazard models were used to study the association between mode of feeding and survival after controlling for study variables. Dementia, cerebrovascular events, and acute or chronic persistent vegetative state were entered into the models separately, and grouped together as having either one of the conditions or none. All statistical tests were two-sided; *P* values below 0.05 were considered significant. All data were analyzed with SPSS software (version 11.0; Chicago, IL, USA).

### Results

The study group comprised 88 patients: 26 fed orally, 62 by nasogastric tube, and 7 by PEG. Because of the small sample, the PEG group was excluded from the analysis. Indications for tube feeding included difficulty in swallowing, mainly due to neurologic deficiency (72%); refusal to eat because of dementia (13%); and decreased level of consciousness, mainly vegetative state (8%); or other causes (7%).

The characteristics of study participants by feeding modality are presented in Table 1. Tube-fed patients were significantly older than the orally fed patients (mean age 81  $\pm$  10 vs. 75  $\pm$  12 years, *P* = 0.009) and had a significantly higher proportion of females (58% vs. 31%, *P* = 0.019). Tube-fed patients had a higher proportion of married individuals and a lower level of education, but these differences did not reach statistical significance. Two-thirds of the whole cohort were transferred from general hospitals

**Table 1.** Characteristics of study population by feeding mode

	Tube feeding (n=62)	Oral feeding (n=26)	<i>P</i> value
Gender (female)	36 (58)	8 (30.8)	0.019
Age (yr) (mean $\pm$ SD)	81 $\pm$ 10	74 $\pm$ 12	0.009
Family status (married)	26 (42)	15 (58)	
Education			
< 8 years	23 (37)	8 (31)	
> 9 years	28 (45)	16 (61)	0.06
Transferred from general hospital	44 (71)	16 (65)	NS
Caregiver – family	13 (21)	3 (18)	NS
Permanent residence			
Nursing home	28 (45)	6 (24)	0.06
Private home	32 (52)	19 (73)	

Numbers in parentheses are percentages unless otherwise indicated.  
NS = not significant.

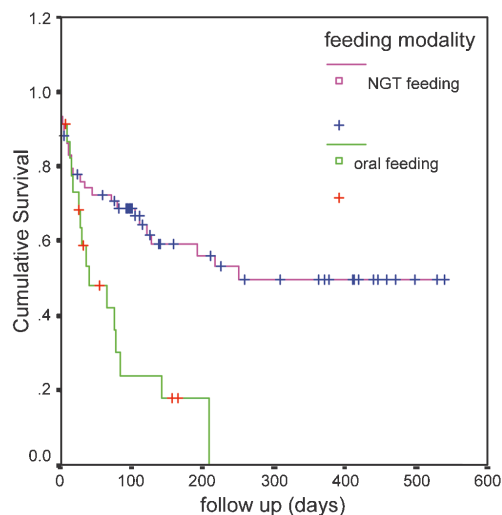
**Table 2.** Functional impairment of study population by feeding mode

	Tube feeding (n=62)	Oral feeding (n=26)	<i>P</i> value
Disability Rating Scale (DRS)*			
Total score (mean $\pm$ SD)	18.7 $\pm$ 5.75	9.7 $\pm$ 4.2	0.027
Score > 22	25 (41)	0	
Cognition parameters	9.5 $\pm$ 3.4	3.8 $\pm$ 2.2	0.002
Glasgow Coma Scale (GCS)**			
Total score (mean $\pm$ SD)	10.9 $\pm$ 3.2	14.6 $\pm$ 1.7	0.001
Score < 9	20 (33)	0	
Modified Norton Scale***			
Total score (mean $\pm$ SD)	10 $\pm$ 2.1	14 $\pm$ 3.6	0.002

\* DRS score range: 0 (no disability) – 29 (extreme vegetative state); a score over 22 indicates vegetative state. DRS cognition domain, score range 0–13.

\*\* GCS score range 3–15; a score under 9 indicates comatose state.

\*\*\* Modified Norton Scale score range 4–24.



**Figure 1.** Kaplan-Meier cumulative survival of patients according to feeding modality.

DRS = Disability Rating Scale

PEG = percutaneous endoscopic gastrostomy

**Table 3.** Nutritional indicators of the study population, by feeding mode

	Tube feeding	Oral feeding	P value
<b>Admission</b>			
Weight (kg) N	52	23	
Median	57	64	0.09
Range	36–150	41–77	
BMI (kg/m <sup>2</sup> ) N	46	15	
Median	23	24	NS
Range	16–38	19–29	
Albumin (g) N	57	25	
Median	32	31	NS
Range	15–43	14–40	
Hemoglobin (g/dl) N	57	25	
Median	11.3	11.0	NS
Range	7.9–14.9	7.6–16.2	
No. of patients with pressure ulcers (%)	29 (49%)	16 (64%)	NS
<b>End of follow-up</b>			
Weight (kg) N	16	14	
Median	47	68	NS
Range	37–80	50–84	
BMI (kg/m <sup>2</sup> ) N	13	10	
Median	21.0	23.5	NS
Range	16–33	18–29	
Albumin (g) N	27	20	
Median	29	31	NS
Range	17–43	14–37	
Hemoglobin (g/dl) N	27	20	
Median	10.9	10.9	NS
Range	8–15	8–15	
No. of patients with pressure ulcers (%)	13 (21%)	11 (42%)	0.065

after acute episodes of illness, with no difference between the study groups. A significantly higher proportion of patients with tube feeding lived in nursing homes prior to admission (45% vs. 24%,  $P = 0.06$ ).

Tube-fed patients had higher rates of dementia and stroke compared with orally fed patients (dementia 68% vs. 36% respectively,  $P = 0.002$ ; stroke 34 vs. 12%, respectively,  $P = 0.062$ ). Tube-fed patients had lower rates of Parkinson's disease, diabetes mellitus, peripheral vascular disease and hypothyroidism than orally fed patients (Parkinson disease 13 vs. 32% respectively,  $P = 0.063$ ; diabetes mellitus 39 vs. 60% respectively,  $P = 0.096$ ; PVD 5 vs. 22% respectively,  $P = 0.024$ ; hypothyroidism 10 vs. 36% respectively,  $P = 0.009$ ).

The findings for functional impairment are shown in Table 2. The mean DRS score was significantly higher among the tube-fed patients compared with orally fed patients (18.7 vs. 9.7, respectively,  $P = 0.027$ ). This group also had a higher rate of DRS scores over 22 (41% vs. 0). Separate analysis of the cognitive impairment parameters of the DRS yielded worse cognitive impairment in the tube-fed patients (median scores 11 vs. 4, tube vs. oral feeding respectively,  $P < 0.001$ , Mann-Whitney

test). Accordingly, the mean GCS score was lower in the tube-fed patients (median scores 10 vs. 15 respectively,  $P < 0.001$ , Mann-Whitney), and a score below 10 was found in 33% of this group compared to none in the orally fed group. The Norton score for risk of pressure ulcers was significantly lower in the tube-fed group ( $10 \pm 2.1$  vs.  $14 \pm 3.6$ ,  $P = 0.002$ ).

Patients of both feeding modalities had similar nutritional characteristics (albumin, hemoglobin, BMI and weight) upon admission [Table 3]. At the end of the follow-up, no significant changes were seen, and no differences by feeding modality were noticed between the two groups.

Sixteen (64%) of the orally-fed patients versus 29 (49%) of the tube-fed patients had pressure sores on admission. By the end of follow-up, 11 (42%) of the orally fed and 13 (21%) of the tube-fed patients had pressure ulcers [Table 3]. The mean number of ulcers per patient was significantly different between the tube and orally fed groups at both the beginning (1.05 vs. 2.28, ulcer per patient respectively,  $P = 0.05$ ) and end of the study (0.97 vs. 1.92 ulcers per patient respectively,  $P = 0.03$ ). The reduction in the number of pressure ulcers per patient was similar with both feeding modalities. More of the orally fed patients complained of pain and discomfort compared with those fed by tube (52% vs. 29%, respectively,  $P = 0.043$ ).

During follow-up, 42 (47.7%) of all the patients died, 17 (65.4%) of the oral feeding group and 25 (40.3%) of the tube-feeding group. The median survival time of patients receiving oral feeding and nasogastric tube feeding was 40 and 250 days, respectively ( $P = 0.001$ , log rank test) [Figure 1], from the time of admission.

The crude hazard ratio for mortality comparing patients who received oral versus tube feeding was 2.86 (95% confidence interval 1.50–5.45). Age, gender, marital status, or permanent residence did not change the association between feeding mode and survival. After controlling for dementia, stroke, persistent vegetative state and PVD, the association between mode of feeding and survival was no longer significant (HR 1.55, 95% CI 0.69–3.46). The conditions that were associated with mortality were having dementia, stroke or persistent vegetative state (HR 0.26, 95% CI 0.12–0.56) and PVD (HR 3.42, 95% CI: 1.39–8.45).

## Discussion

Our study demonstrated a median survival of 250 days for severely demented patients who were fed by tube. Patients who were tube-fed did not experience an improvement in their nutritional status or healing of preexisting pressure ulcers during follow-up. According to our observation, tube feeding was associated with a low level of discomfort and pain, probably due to the low cognitive status.

Patients who received tube feeding had a high prevalence of dementia or stroke (two-thirds of the patients), diseases

GCS = Glasgow Coma Scale

BMI = body mass index

HR = hazard ratio

CI = confidence interval

PVD = peripheral vascular disease

that result in severe disabilities but do not necessarily hasten mortality. We suggest that demented patients who have no other co-morbidities except for stroke or dementia have long survival with tube feeding. Diabetes and PVD were more prevalent among patients who were orally fed. These systemic diseases are associated with increased mortality. We attribute the short survival among those orally fed to the high prevalence of life-shortening systemic co-morbidities, such as diabetes and PVD. Our study supports the clinical impression described by Van Dijk and Sonnenblik [2].

A new law, the Law of Terminal Patients, was recently enacted in Israel. According to this law, terminally ill patients with a prognosis of 6 months survival have the right to receive or decline treatment by artificial means, unless they have requested otherwise in written advanced directives, or if they are suffering (according to a physician's opinion) [14]. Since the median life expectancy of the tube-fed patient admitted to the Skilled Nursing Department exceeds 6 months (250 days), it may be argued that these patients do not fall into the category of "terminal," with all its implications.

The decision on tube feeding is influenced by cultural, ethical, religious, and administrative determinants. In the recent study by Clarfield et al. [15], 53% of demented patients in long-term care departments in Israel were fed by tube, compared with 11% in Canada. A level of use in demented patients of only 4.7% was seen in non-Jewish Canadian institutions, whereas Jewish-affiliated hospitals in Canada exhibited an intermediate rate of 19.6%. In the United States [6], a nationwide survey of 385,741 nursing home residents suffering from severe dementia revealed that 18% were fed through a tube. By state, rates varied from 3.8% in Nebraska to 44.8% in the District of Columbia. A smaller survey (n=63,101) of a similar population yielded a 34% rate of tube feeding [7]. Analysis by nursing home features showed that tube feeding was more frequent in urban facilities run by non-profit organizations, institutions with more than 100 beds without a dementia unit, institutions with a smaller proportion of residents with "Do not resuscitate" orders, and institutions that lacked nurse practitioners or physicians on staff. The tube-fed patients in the latter study were characterized by younger age, male gender, divorced status, lack of advance directives, recent decline in functional status, and absence of diagnosis of Alzheimer's disease. In contrast, we found that the patients for whom tube feeding was indicated were generally older than those who were orally fed, were more often female, married, of low educational status, and lived in a nursing home prior to admission.

Our study has some limitations. Conducting an observational study rather than a controlled trial means that there is a possibility of selection bias to study groups. This bias may have been reflected in the survival data. Therefore, we cannot attribute the higher survival rate in the tube-fed group solely to the feeding modality. Nasogastric tube feeding is one of the administrative requirements of Israel for the admission into a skilled nursing department. These administrative requirements introduced a bias in our study, since general hospitals have an incentive to insert

nasogastric tubes into patients who have a feeding problem in order to discharge patients faster to skilled complex nursing institutions. In addition, families prefer the skilled nursing facilities over home care because the former provide more comprehensive care. To reduce this bias, we redefined the indications for tube feeding (nasogastric) in our admission examination.

In the recently published debate on tube feeding in severely demented patients, in IMAJ, Shapiro and Friedman [3] underscored the ethical and Jewish concepts of value of life at any age and any cognitive status, whereas Berner [1] presented inconclusive evidence on the physical benefits of tube feeding and emphasized it being a futile treatment in terms of cure or improvement of cognitive status. Van Dijk and Sonnenblik [2] reported the clinical impression of long survival among demented patients with no acute illness and stressed the patients' autonomy in the event of advance directives. Our findings contribute to this debate, e.g., long survival, the lack of improvement in nutrition or pressure ulcers, and the lack of pain and discomfort. Therefore, from the medical standpoint, tube feeding does not seem to improve nutritional status or pressure ulcers among severely demented patients. Survival is determined by acute co-morbidities and not by dementia *per se*. In the stable demented patient, tube feeding probably increases survival. From the ethical and emotional points of view, it would be best if we had advance directives from the patient or a custodian who acts according to the patient's values or preferences. Otherwise, the decision is subject to administrative regulations.

We found that a tube-feeding policy, as applied in Israel, does not improve patient nutritional status and does not alleviate pressure sores, but may have a positive effect on survival if there are no acute co-morbidities, without adding significantly pain and discomfort. It is therefore not contraindicated if it complies with the beliefs and values of the patients and their families. Ethical and legal requirements can thereby be met without increasing or prolonging patient suffering.

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