

sertion, and the Table lists evidence of the adequacy of the match, but there is a chance that some important unobserved confounder was omitted. On the other hand, it would be difficult to randomize patients with advanced cognitive impairment to receive a PEG feeding tube. Thus, our propensity-matched cohort study provides important information to guide decision making.

In conclusion, previous syntheses of the literature have concluded that feeding tubes do not benefit patients with advanced dementia.^{3,4,24} Our findings regarding the risk of developing new stage 2 or higher pressure ulcers suggest that PEG feeding tubes are not beneficial, but in fact they may potentially harm patients.

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INVITED COMMENTARY

Tube Feeding and Pressure Ulcers

Evidence of Harm From the Intervention

“**M**alnutrition” is frequently cited when patients with pressure sores do poorly, and “adequate” nutrient intake (or input) is part of most guidelines on pressure sore management. This

may be misleading, however. Although not conclusive, available evidence consistently suggests that nutrition support—parenterally, with oral supplements, or via enteral tube feeding—does not improve pressure sore outcomes.

The Cochrane review of enteral tube feeding in older people with dementia concluded that data were limited and that “there was no evidence of benefit in terms of nutritional status or the prevalence of pressure ulcers.”¹

What would good evidence look like? A randomized clinical trial of enteral tube feeding compared with a program of careful hand feeding among frail institutionalized elderly patients might resolve this problem, but such a trial seems forbiddingly complex for several reasons. How to enroll incapacitated patients in research studies and protect these highly vulnerable individuals from unfair burden is a vexing question. Defining a group to randomize would be daunting. Ideally, substitute decision makers who had been persuaded to accept tube feeding for the patient would be asked, perhaps in the endoscopy suite, to randomize the patient with a chance that tube feeding would be withheld. Feeding (and the appearance of being well fed) plays a special social and symbolic role in the expression and perception of caring. Furthermore, providing increased nutrition to debilitated elderly patients who are eating little and losing weight has powerful face validity. For these reasons, enrollment in such a trial might be difficult, and those who agree to randomization might not be representative of the general population.

In this issue of *Archives*, Teno and colleagues² describe an elegant approach to evaluating the effect of tube feeding on pressure sore outcomes in nursing home patients with advanced cognitive impairment. Using a large administrative database, these researchers compared a group of nursing home residents with newly inserted feeding tubes and a group without feeding tubes who were propensity matched to be about as likely to develop pressure sores or to have them heal if already present. Tube-fed residents without pressure ulcers at entry were more than twice as likely to develop them during the study, and those with pressure ulcers at the time of tube placement were significantly less likely to have them improve compared with the propensity-matched group without feeding tubes. These findings extend and confirm most earlier studies in this area and are now the most rigorous data we have on this subject. While earlier studies suggested that feeding tubes did not offer a benefit for pressure sore outcomes, Teno and colleagues² demonstrate harm with this approach. This best evidence suggests that feeding tubes should not be used to prevent or treat pressure ulcers in patients with dementia. The evidence argues generally against the use of feeding tubes in patients with severe dementia because their use increases the likelihood of this bad outcome in these patients.

Propensity matching may, of course, fail to account for unmeasured confounders, perhaps including intuitive aspects of a physician’s judgment to withhold or place a feeding tube, but stronger data are difficult to imagine short of a randomized controlled trial. Our confidence in these findings is strengthened by their consistency in sensitivity analyses stratifying by stage of pressure ulcer and by whether subjects had a high likelihood of feeding tube placement.

How could feeding tubes worsen pressure sore outcomes? The authors note that tube-fed patients are

more likely to be restrained than those without and more likely to have diarrhea. Those receiving “adequate” nutrition and hydration will also make more urine and stool than those taking lesser amounts by hand-feeding. Immobility, moisture, and stool are certain risk factors for bad pressure-sore outcomes. Puncturing skin, abdominal wall, parietal and visceral peritoneum, and gastric wall, then embedding a foreign body in a frail, institutionalized, permanently recumbent elderly patient may have significant effects as yet uncharacterized, and these may overcome any possible advantage of tube feeding. Formulae delivered via feeding tube may be nutritionally inferior to nursing home food. The therapeutic benefit of convivial mealtimes might be substantial in some patients, and this is likely to be lost when tube feeding begins.

Data about tube feeding are consistent with, but more consistently negative than, evidence about oral nutritional supplementation. A 2006 review of non-percutaneous endoscopic gastrostomy–tube nutritional interventions identified 6 relevant studies.³ In 1 unblinded 15-day trial, acutely hospitalized patients received the standard hospital diet with or without oral multinutrient supplements.⁴ Pressure ulcer incidence was reduced. This finding was inconsistent with the other 5 studies. One small subsequent study showed that a micronutrient-enriched supplement given daily to 28 nursing home patients for 12 weeks was effective in facilitating pressure-ulcer healing.⁵ Taken together, most studies of oral supplements fail to show improved outcomes, but the body of evidence remains inconclusive. Oral supplements have been shown not to be a cost-effective approach.⁶ Sadly, no prospective study compares either supplements or tube feeding with enhanced bedside care.

Failure to find benefit from either intervention may result from a more fundamental misconception. We hypothesize that in many chronic illnesses, anorexia, poor intake, and weight loss are epiphenomena, and that nutritional support cannot be helpful. Illness can cause anorexia as part of *sickness behavior*—all of us generally eat less when we are sick—and worse illness may lead to more severe anorexia. This has been shown in all animal species that have been studied.⁷ For several illnesses, “adequate” nutrient intake for anorectic, underweight patients has not been shown to help; advanced cancer⁸ is an archetypal example. We believe that anorexia and poor intake are frequently unimportant in the causal chain leading to poor outcome.

In our opinion, physiology and morality each support an approach in all settings where all patients with severe dementia should be offered a conscientious, careful program of hand feeding. We should ask for evidence of benefit before we force feeding beyond what the patient desires. This will require a nonformulaic rethinking of the term *adequate nutrient intake*.

Teno and colleagues² provide sophisticated additional evidence that pressure sore outcomes are not improved, in fact are worsened, among patients with dementia who receive additional nutrition via feeding tubes. Why this is so is fascinating to contemplate. The clinical bottom line, however, is that use of tube

feeding in patients with advanced dementia is ever more difficult to justify.

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