medication use was not a problem. Second, given the longitudinal variability in medication adherence, researchers and clinicians should consider working with variable behaviors, in addition to trying to change them. Evidence from randomized controlled trials indicates that as-needed use of inhaled corticosteroids may be equivalent to daily use for prevention of severe exacerbations (8), possibly opening a new door for disease management that might work for people who have difficulty achieving daily use of their asthma controllers.

In summary, the paper by Arcoleo and colleagues provides novel data about

longitudinal patterns of adherence among children with asthma, evidence that medication use is not a stable phenomenon. The results of this and other studies strongly suggest that the current practice of classifying patients with asthma as either adherent or nonadherent should be changed in recognition of nuance in asthma behaviors and their implications for clinical outcomes. The same message applies to the common practice of grouping sociodemographically and culturally distinct groups, including people of Mexican and Puerto Rican heritage. ■

Author disclosures are available with the text of this article at www.atsjournals.org.

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Toward Understanding the Use of Gastrostomy in Critically Ill Adults

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This year will mark the 40th anniversary of the first performance of a percutaneous

endoscopic gastrostomy (PEG) on a 6-month-old infant with inadequate oral intake, which was a radical simplification of the gastrostomies being performed at the time (1). From its first use in pediatrics, improved short-term mortality for adults with serious illnesses, strong consensus on the superiority of enteral over parenteral nutrition during serious illness, and the drive to shift the cost of care from the acute hospital to long-term care settings all contributed to a quick diffusion of this procedure to seriously ill adults (2).

With the increase in the use of gastrostomy tubes in older adults, moral

and ethical questions quickly emerged about its appropriate use in older adults with advanced dementia. Dementia in older adults is a terminal diagnosis whose final stage can be characterized by oral or pharyngeal dysphagia, aspiration, or the inability to feed oneself or a decreased interest in eating (3). Claims-based data suggested an increase in the use of gastrostomy tubes in older adults with advanced dementia (4–6), with wide regional variability in the practice (7). Multiple observational studies in older adults with severe dementia suggested that gastrostomy placement was not associated with an improvement in

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survival and was potentially associated with higher risk for pressure ulcers, aspiration pneumonia, and other burdensome interventions or other adverse effects (8). So it was no surprise that the very first recommendation from the American Geriatrics Society as part of the Choosing Wisely Campaign was against the placement of gastrostomy feeding tubes in older adults with advanced dementia, instead recommending comfort feeding as the more appropriate alternative (9).

In this issue of *AnnalsATS*, Law and colleagues (pp. 724–730) attempt to shed light on the patterns and outcomes of gastrostomy placement in critically ill adults during a decade from 1994 to 2014 (10). The investigators used the National (Nationwide) Inpatient Sample (NIS) from the Healthcare Cost and Utilization Project, which contains claims data from a 20% probability sample of all nonfederal acute care hospitalizations in the United States and so can be representative of the care provided across the country. The investigators used a validated *International Classification of Diseases, Ninth Revision, Clinical Modification*, approach to identify percutaneous gastrostomy, gastrojejunostomy and other types of gastrostomies including open or laparoscopic procedures. Although they do not give us a breakdown of the frequency of each type of gastrostomy within their algorithm, we have to presume from prior literature that the majority of these procedures were PEGs (2). The study confirmed that the use of gastrostomies in critically ill patients during this period has been sharply increasing, going from 11.9 to 28.8 gastrostomies per 100,000 adults, peaking in 2010 at 30.6 per 100,000 adults. This increase is largely attributable to the parallel increase in the incidence of critical illness during the same period. Although the increase in gastrostomy use parallels the increase in tracheotomy placement for prolonged mechanical ventilation (11), by 2014, the majority of gastrostomy tubes were still being placed in patients who were not mechanically ventilated, which means that the “trach and PEG” bundle of care for patients with prolonged mechanical ventilation cannot fully explain the rise in gastrostomy use in critically ill adults. The increase does not appear to be attributable to an increase in optimism about the

procedure’s potential benefit in critically ill adults, as the rate of gastrostomy use in critically ill adults remained relatively stable, going from 2.5% of critically ill adults in 1994 to 3.7% in 2002 before declining back to 2.4% in 2014.

This investigation is a sophisticated and rigorous use of administrative claims data to capture the patterns of a specific treatment in adult survivors of critical illness. Because the NIS does not identify admission to intensive care units, the investigators defined critical illness by a list of diagnoses such as severe sepsis, shock, acute respiratory failure, and cardiac arrest, rather than by location of care delivery. This is likely a strength of these analyses, as admission to an intensive care unit can be heavily influenced by local allocation practices, and the list of diagnoses they used appears to have strong face validity, having been used in prior publications to describe critical illness. The investigators were careful to exclude patients’ hospitalizations with diagnosis-related groups in which the gastrostomy tubes placed were more likely attributable to anatomic reasons or reasons unrelated to critical illness (these diagnosis-related groups include nervous system neoplasm without major complications or comorbidities, ischemic stroke or intracranial hemorrhage without complications, and many more). In sensitivity analyses, they investigated the rates of gastrostomy placement among mechanically ventilated patients, a disease state admittedly less amenable to up-coding for increased physician reimbursement (or what they call “coding sensitivity”), and found a similar increase in the rates of gastrostomy tube placement. They also did sensitivity analyses to evaluate the effect of the competing risk for hospital death, and to ensure that the results were not being driven by dementia diagnoses.

Also striking about these results are the outcomes associated with critically ill recipients of gastrostomy tubes. During the decade, the investigators found a decrease in hospital mortality, a decrease in hospital length of stay, and a sharp increase in the number of discharges to long-term facilities, including skilled nursing facilities and long-term acute care hospitals, and fewer discharges to home. And yet, as with all research using

previously existing data, it is important to underline what cannot be described from the data. The NIS database could not provide the investigators with any outcomes beyond the index hospitalization, and so, with the shift in care from the acute to long-term facilities that they observe, we are left with questions about the long-term morbidity and mortality in adult survivors of critical illness who receive gastrostomy.

And yet, before we decry the overuse of gastrostomy in critically ill adults, it is important to underline that such descriptive studies, rigorous though they may be, cannot answer the question of whether clinicians should “PEG or not PEG” our survivors who struggle with dysphagia or difficulty swallowing. Unlike the trajectory of illness in older adults with dementia, these survivors with protracted or chronic critical illness come into critical illness with a heterogeneous mix of preillness trajectories that makes prognostication and risk-stratifying difficult and uncertain (12). Unlike in older adults with advanced dementia, for whom there is a clear alternative treatment approach of comfort feeding only, which is congruent with most patients’ preferences for care focused on comfort at that stage of the illness (13), in these survivors of critical illness who require long-term enteral feeding, humane alternatives have not been presented, and we have little data on patient’s values around long-term feeding while facing protracted serious illness.

The results of these analyses invite future research into both the long-term morbidity and mortality outcomes and the attitudes and expectations of physicians, patients, caregivers, and other stakeholders involved in caring for our adult survivors with gastrostomy tubes. Admittedly, integrating long-term prognosis information into the shared decision-making process is fraught with affective and heuristic challenges (14). We can only hope that, through such avenues of investigation, novel default approaches (15) emerge that can further improve the care we provide these broken critical care survivors who need long-term enteral feeding. ■

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The Importance of Showing Our Work: Process Transparency in Dispute Resolution

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An Ovid search for use of the term "medical futility" since 1980 returns 7,467 results. Although this subject has received much academic attention, there remain significant gaps in our knowledge about how best to resolve conflicts with surrogates requesting treatments that clinicians believe should not be provided. Most of the existing literature can be assigned to one of three clinician-centric categories: 1) descriptions of common surrogate requests and theoretical resolution strategies, 2) communication interventions to prevent disputes, and 3) explorations of how requests for a potentially inappropriate treatment make clinicians feel. There have been comparatively few investigations into how surrogates experience these disputes outside of the contentious situations where conflicts

rise to the level of public discourse, as in the cases of Charlie Gard and Jahi McMath (1, 2).

In 2015, a policy statement approved by multiple critical care societies, including the American Thoracic Society, proposed using the broader term "potentially inappropriate" to encompass all situations in which clinicians believe competing ethical considerations justify withholding treatments (3). This statement outlined a multistep process for responding to surrogates' requests for such interventions in intensive care units (ICUs). In this issue of *AnnalsATS*, Bailoor and colleagues (pp. 738-743) explore the reactions of uninvolved lay citizens to clinical vignettes concerning resolution of requests for potentially inappropriate treatment via this process (4). A nationwide sample of 1,191 adults reviewed two vignettes in which clinicians withheld one of two treatments

against the wishes of the patient's daughter: chemotherapy in the setting of metastatic cancer and hemodialysis after a devastating intracerebral hemorrhage. Half of the respondents were randomized to receive "process information." These respondents were told that the team obtained a second opinion from an independent physician, had the case reviewed by the hospital ethics committee, and explored whether the

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