



Oral Nutritional Supplements After Discharge: Adherence, Cost and Who Actually Keeps Taking Them

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Abstract

Systematic review of 46 studies in 4,328 patients reports mean compliance with oral nutritional supplements of 78 per cent, higher in community settings at 81 per cent than in hospital at 67, with mean intake of 433 kcal daily. Longitudinal data from after discharge look different. In patients with advanced chronic liver disease, adherence was 46 per cent at thirty days, 26.1 per cent at ninety and 16.9 per cent at one hundred and eighty. The distinction matters because the economic case assumes continued use: a randomised trial reported post-hospitalisation mortality of 4.8 against 9.7 per cent, and a claims analysis found total costs at three hundred and sixty days higher in the group prescribed supplements at discharge but lower among the subgroup who continued taking them. The benefit is conditional on a behaviour most patients do not sustain.

Keywords: Oral nutritional supplements; Adherence; Discharge; Cost-effectiveness; Malnutrition

Introduction

Malnutrition affects a substantial minority of hospital inpatients and persists after they leave, with reported prevalence of 20 to 50 per cent among inpatients and continuing through the transition to home [1,2,3]. Oral nutritional supplements are the commonest response, being cheaper than parenteral or enteral routes and requiring no procedure [4,5].

Their efficacy in trial conditions is reasonably established. What is less clear is what happens after discharge, when supervision ends, the prescription passes to primary care and the patient decides each day whether to open the bottle [6,7].

This review examines what proportion of prescribed supplement is actually taken, how that proportion changes with time after discharge, what the clinical and economic modelling assumes about it, and why patients stop.

Objective

This review sets out to establish four things from the published literature. First, the pooled compliance figure and the range behind it. Second, how adherence behaves over the months following discharge, as distinct from compliance measured at a single point. Third, what the clinical and cost evidence shows and what it assumes about continued use. And fourth, the reasons patients give for stopping, since these determine whether the pattern is modifiable.

Literature Review

The pooled compliance figure: A systematic review of 46 studies including 4,328 patients reported overall mean compliance with oral nutritional supplements of 78 per cent. Compliance was 67 per cent in hospital and 81 per cent in the community, and did not differ substantially between randomised and non-randomised studies at 79 and 77 per cent (Figure 1). The range across individual studies was 37 to 100 per cent, and mean supplement intake was 433 kcal daily [8].

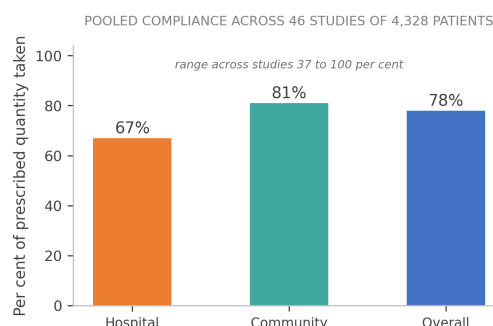


Figure 1: Pooled compliance across 46 studies of 4,328 patients [8]

What happens over time: A cohort of patients with advanced chronic liver disease followed after discharge reported adherence of 46 per cent at thirty days, 26.1 per cent at ninety days and 16.9 per cent at one hundred and eighty days (Figure 2) [9]. A cross-sectional compliance figure and a longitudinal adherence curve are different quantities, and the community figure of 81 per cent describes patients still taking supplements at the moment of measurement rather than the proportion of those prescribed who continue [8,9].

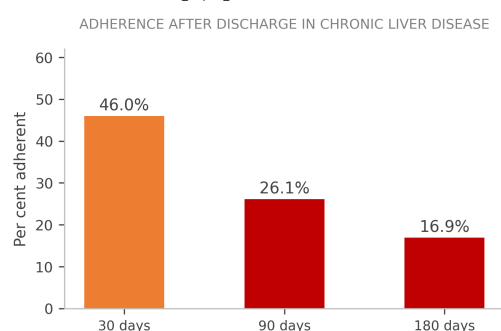


Figure 2: Adherence after discharge in advanced chronic liver disease [9]

Table 1: Compliance and adherence as reported by the original investigators

Measure	Setting	Value
Pooled mean compliance	46 studies, 4,328 patients	78% [8]
Compliance, hospital	Pooled	67% [8]
Compliance, community	Pooled	81% [8]
Adherence at 30 days	After discharge	46% [9]
Adherence at 180 days	After discharge	16.9% [9]

Compliance in older inpatients: Compliance on geriatric wards has been reported as low as 37 per cent (Figure 5). A study

measuring wastage over twenty-four hours in 22 older hospitalised patients found supplement to the value of 50.12 pounds discarded, which the authors extrapolated to a net loss of 18,294 pounds annually, and the greatest wastage occurred among the 72 per cent of patients who disliked the taste [10,11].

Table 2: Clinical and economic findings, and the population each describes

Table 3: What is and is not established about supplements after discharge

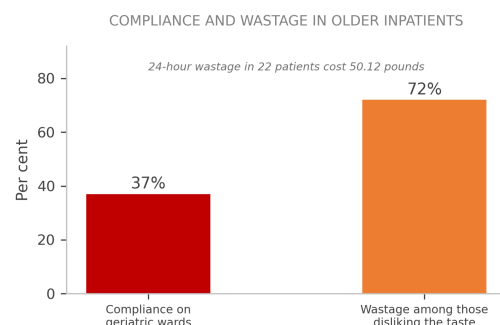


Figure 5: Compliance and wastage in older inpatients [10,11]

Why patients stop: Reasons recorded in the liver disease cohort included abdominal fullness, palatability, diarrhoea and difficulty controlling blood glucose (Figure 6) [9]. A community study of 76 patients, of whom 64 per cent were free-living, found that 49 per cent reported not following the instructions they had been given [12]. Separate work reports that supplement use is frequently not followed up after discharge, producing both unnecessary long-term use and confusion about how and when to take them [7,13].



Figure 6: Reported reasons for stopping after discharge [7,9,12]

What the clinical evidence shows: A randomised trial of a nutrient-dense oral supplement in malnourished older adults hospitalised with heart failure, myocardial infarction, pneumonia or chronic obstructive pulmonary disease reported post-hospitalisation mortality of 4.8 per cent against 9.7 per cent in the control group ($p = 0.018$) (Figure 3) [14]. That difference is the basis on which the economic case rests.

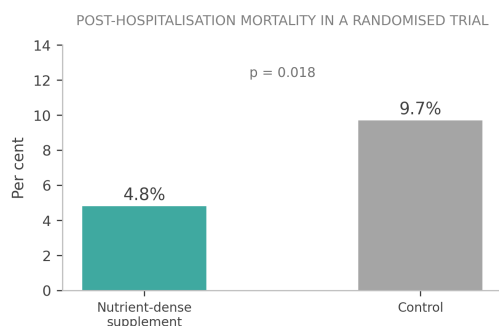


Figure 3: Post-hospitalisation mortality in a randomised trial [14]

What the cost modelling assumes: A model applied to 1,693,034 at-risk hospitalised older adults estimated that supplementation after discharge would prevent 67,747 deaths and 116,570 readmissions annually, at a cost of approximately 175 US dollars per patient per month for two servings daily, giving roughly 4,380 dollars per death avoided and 2,546 dollars per readmission avoided [15]. Those figures assume the supplement is taken.

What a claims analysis found instead: An analysis of Japanese claims data examined total costs at three hundred and sixty days. Costs were higher overall in the group prescribed supplements at discharge than in those not prescribed them, but lower among the subgroup who continued taking them (Figure 4) [16]. The direction of the effect therefore depends on which population is examined, and continuation is the variable that separates them.

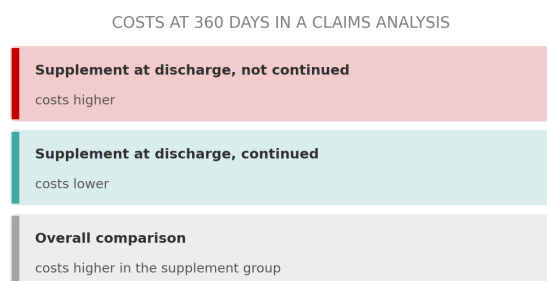


Figure 4: Costs at three hundred and sixty days in a claims analysis [16]

Source	Finding
Randomised trial	Mortality 4.8% against 9.7% [14]
Cost model	About 4,380 dollars per death avoided [15]
Claims analysis, overall	Costs higher in the supplement group [16]
Claims analysis, continuers	Costs lower [16]

Where prescription responsibility sits: Work in one health system reported that adherence after discharge was low unless the supplement was prescribed directly by the patient's general practitioner rather than continued on hospital instruction [17]. Reviews of practice in England and Ireland describe supplement use going unreviewed after discharge, with prescriptions continuing beyond the period of need in some patients while others stop within weeks [7,13,18].

Question	What the evidence supports
Is compliance high?	78% pooled, but 37% to 100% across studies [8]
Does it persist after discharge?	Falls to 16.9% by 180 days in one cohort [9]
Does the supplement work?	Mortality reduced in a randomised trial [14]
Is it cost saving?	Only among those who continue [16]
Is follow-up arranged?	Frequently not [7,13]

What the wider evidence base shows: Systematic review and meta-analysis report reduced hospital readmissions with supplementation [19,20], and high protein preparations have been examined separately with benefit across several outcomes [22]. Cochrane review compared dietary advice with and without supplements for disease-related malnutrition [23], and an updated meta-analysis of nutritional support in medical inpatients at risk found association with improved clinical outcomes [25]. A randomised trial of individualised nutritional support in medical inpatients at nutritional risk reported benefit against standard care [26]. Disease-related malnutrition carries a clear prognostic penalty independent of these interventions [21].

Evidence specific to the period after discharge: Systematic review and meta-analysis of oral nutritional support in older medical and surgical patients after discharge exists [27], as does review of individualised dietary counselling for nutritionally at-risk older patients moving from acute hospital to home [28]. Guidance for geriatric practice addresses the transition directly [24], and managed care pathways implemented in the community have been evaluated for their effect on supplement use [13]. Cost and cost-effectiveness have been reviewed for community and care home settings separately from the hospital setting [6,29].

Product characteristics and intake: Taste and texture influence compliance in older adults [32], and a high energy density, low volume preparation was reported to improve compliance and increase energy and protein intake [33]. Reviews of treatment options note that factors influencing intake in this population extend well beyond the nutritional composition of the product itself [31]. In care home residents, supplements were more effective than dietary advice at improving quality of life in a randomised comparison [30], and broader review has examined the effect of improving nutritional care on outcomes and cost [34].

Method

Search strategy: PubMed and the archives of the major clinical nutrition, geriatric medicine and health economics journals were searched for studies of oral nutritional supplement use following hospital discharge. Search terms combined oral nutritional supplements with compliance, adherence, discharge, cost-effectiveness and community prescribing. Reference lists of the systematic review [8] and the cost model [15] were screened by hand for primary sources.

Eligibility: Studies were included if they reported compliance or adherence in a defined population, tested supplementation against a comparator, or modelled cost. Whether a study measured compliance at a single point or adherence over time is recorded, since the two are reported interchangeably in this literature and are not equivalent.

Data extraction and handling: Setting, population, follow-up duration, the definition of compliance applied and the reported estimate were extracted as published. Duration of follow-up is stated alongside every adherence figure, because figures measured at thirty and one hundred and eighty days differ by a factor of nearly three in the same cohort and the interval is frequently omitted when such figures are quoted. This review reports published findings and does not constitute guidance on the prescription, selection or discontinuation of nutritional supplements for any individual, which are matters for the treating clinician. No pooling or re-analysis was performed. Figures 1 to 6 and Tables 1 to 3 reproduce published values only. This is a narrative synthesis of published literature and was not registered as a systematic review.

Concluding Remarks

The headline compliance figure and the discharge experience describe different things, and conflating them flatters the intervention. Pooled compliance of 78 per cent across 46 studies is a genuine finding [8]. Adherence of 16.9 per cent at one hundred and eighty days after discharge is also a genuine finding [9]. The first is measured among patients currently taking supplements, much of it during supervised trial conditions; the second follows a discharged cohort forward and counts those who stopped.

The claims analysis is the result that should govern how the economics are read. Total costs at three hundred and sixty days were higher in the group prescribed supplements at discharge, and lower among those who continued [16]. Both statements are true of the same dataset. A service that prescribes at discharge and arranges nothing further is buying the first outcome; the modelling that projects savings assumes the second [15,16].

That places the useful intervention somewhere other than the prescription. The trial evidence for benefit is real, with mortality of 4.8 against 9.7 per cent in a randomised comparison [14]. But a trial supplies the product, monitors intake and contacts

participants, and those activities are part of what is being tested even when only the supplement is described. Reproducing the result in practice means reproducing the follow-up, not only the prescription.

The reasons patients stop are mostly practical and several are addressable. Abdominal fullness, palatability and diarrhoea are product and tolerance issues that a review appointment could identify and a change of preparation might resolve [9]. Taste alone accounted for the greatest wastage in the older inpatient study, where 72 per cent of the wastage came from patients who disliked what they were given [11]. Forty-nine per cent of one community sample were not following their instructions, which is a communication problem rather than a pharmacological one [12].

There is a symmetrical failure worth naming. The same literature reporting that many patients stop too early also reports supplements continuing unreviewed beyond the period of need [7,13]. Absence of follow-up produces both, and a system that never revisits the decision will simultaneously under-treat the patients who stopped and over-supply those who did not. Neither is visible without a review appointment.

Three limitations belong with these conclusions. The systematic review pooled studies with heterogeneous definitions of compliance and excluded a large number for inadequate reporting, so the 78 per cent figure describes the studies that measured it well rather than practice generally [8]. The longitudinal adherence data come from a cohort with advanced chronic liver disease, in whom abdominal fullness and glycaemic difficulty are more prominent than in a general discharged population, so the decay curve may be steeper than elsewhere [9]. And the wastage extrapolation rests on twenty-four hours of observation in 22 patients, which is a small base for an annual figure [11].

A note on what the pooled figure is measuring. The systematic review excluded a large number of studies for inadequate reporting of compliance [8]. Studies that measure and report intake carefully are likely to be those that supervised it, so the surviving 46 describe practice under conditions closer to a trial than to a discharge letter. That selection works in one direction only, and it inflates the figure rather than deflating it [8,19].

The community and hospital comparison invites a similar caution. Community compliance of 81 per cent against 67 in hospital reads as though supplements are taken better once patients are home [8]. But hospital figures count every prescribed patient on the ward, whereas community figures count those still enrolled and still taking them. Patients who stopped have left the denominator, and the adherence curve shows how many that is [9].

The practical implication is narrow and cheap. Nothing in this literature suggests the product fails when taken; the trial

evidence and the meta-analyses of readmission point the other way [14,19,22]. What is missing is the review appointment at which tolerance, taste and continuing need are checked, and its absence produces both the patient who stopped at three weeks and the patient still receiving monthly deliveries two years on [7,13,18].

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Conflict of Interest

The authors declare no competing interests.

Ethics Statement

This article reviews previously published studies only. No new patient data were collected and no participants were recruited, so ethical approval was not required.

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