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Nutrition in Hip Fracture Units: Contemporary Practices in Preoperative Supplementation

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Abstract

Introduction: Patients with hip fractures pose a significant burden on health services. Malnutrition, frailty, and cognitive impairment are common, and key to addressing the needs of this vulnerable patient group is nutrition optimization, including reduction in arbitrary nil by mouth (NBM) perioperative regimens. In order to understand current practices, we characterize preoperative nutrition in a regional hip fracture population. **Methods:** Prospective data were submitted to the National Hip Fracture Database by 6 hospitals in the north east of England over a 6-month period. Patients were stratified by preoperative nutritional intake, frailty, and cognitive function. **Results:** In all, 24.2% (n = 205) patients received no oral intake at all preoperatively; 15.3% of NBM patients were at risk of malnutrition; and 6.9% were malnourished at the time of assessment. Median time to surgery for NBM patients was 16.75 hours, and 6.34% of patients were fasted with no intake for >36 hours. In all, 6.5% (n = 44) of patients with an Abbreviated Mental Test Score (AMTS) of 8 or above were deemed to be at risk of malnutrition at admission, compared to 11.3% (n = 50) of patients with an AMTS of 7 or below. The NBM patients had similar mean Rockwood (4.97) and AMTS (6.51) scores to patients given oral nutrition. **Conclusion:** We have demonstrated contemporary preoperative nutritional practices in the management of over 800 hip fracture patients. Contrary to perception, nutrition practices vary little when stratified for age, cognition frailty, or comorbid burden. We have identified widespread prolonged NBM fasting and undersupplementation in patients sustaining hip fracture across a region. This work suggests a need to focus less on patient factors and more on systematic practices.

Keywords

hip fracture, nutrition, malnutrition, geriatric trauma, fragility fractures, cognitive impairment

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Introduction

The provision of adequate nutrition and hydration is an established tenet of surgical optimization and recovery from injury. In particular for patients with hip fractures, significant (43%) reduction in mortality has been demonstrated in those receiving dietetic input.[1] The addition of 1 extra meal a day to such patients similarly halved mortality across 6 National Health Service (NHS) trusts in northern England and Scotland.[2]

Furthermore, evidence continues to emerge to support greater use of oral nutritional supplementation (ONS) perioperatively with associated reduction in perioperative complications. The ONS is already being implemented in enhanced recovery programs that have shown reductions in hospital stay of up to 4 days.[3,4]

Preoperative fasting is an established practice prior to surgical procedures. Traditionally, this has been justified by concerns related to the risk of gastric contents in the context of a weakened gag reflex. Reflux under general anesthesia is associated with aspiration pneumonitis, commonly thought to be related in severity to the volume and pH of gastric contents. Preoperative fasting by the withdrawal of oral feeding is therefore aimed at reducing the likelihood and potential severity of such a complication.[5,6] The body of evidence challenging this

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long-held association has grown. The literature supporting the relaxation of strict preoperative fasting continues to emerge. Uptake among anesthetists is reportedly as high as 68%, suggesting high awareness of the need to reduce duration of preoperative fasting among clinicians[7,8]

Fasting periods regularly exceed 14 hours, despite recommendation of 6 hours for solid food by the European Society of Anaesthesiology[9], and 6 to 8 hours by the American Society of Anesthesiologists, depending on the type of solid ingested.[10] This is often attributed to the common practice of prescribing nil by mouth (NBM) at midnight on the day of surgery.[8] The clinical challenges posed by the hip fracture demographic only serve to exacerbate the complexity of the debate. The average age at which patients sustain a hip fracture in the United Kingdom is now 83 years.[11] Multiple comorbidities and a high incidence of cognitive impairment are common, necessitating a need to balance anesthetic risk with patient comfort and nutrition. Typically, up to 25% of elderly patients admitted to hospital are malnourished, resulting in depleted glycogen reserve and increased insulin resistance—itself independently related to an increased incidence of postoperative complications.[12,13]

There is currently no description of fasting practices in this population. In order to address this and form the basis of interventions moving forward, we present an overview of everyday practices regarding nutrition in hip fracture patients across 6 NHS hospitals in England, with the view to inform and direct further quality improvement in patient care.

Method

Data submissions to the National Hip Fracture Database (NHFD) were analyzed for 6 centers in the North East of England (James Cook University Hospital, Middlesbrough; North Durham University Hospital, Durham; The Queen Elizabeth Hospital, Gateshead; Northumbria Special Emergency Care Hospital, Cramlington; South Tyneside Hospitals; NHS Trust; and Sunderland Royal Hospital, Sunderland) for 6 months (February to August 2018—a period to coincide with the placement of data collectors at each institution). Institutional approval for a service improvement project was gained at each institution.

Patients were included for analysis based on the completion of nutritional assessment. Nutritional regimens preoperatively were primarily analyzed (Figure 1). Patients were stratified by oral nutrition received prior to surgery: NBM; clear fluids only; clear fluids and a snack or supplement; or clear fluids and a meal and a snack or supplement.

Patient factors were compared between nutritional regimens. Age, gender, Rockwood Frailty Score, Abbreviated Mental Test Sore (AMTS), and Nottingham Hip Fracture Score were compared between strata.

In addition to this, data were compared between centers to assess for any heterogeneity of practice throughout the region. Only oral nutrition regimens were considered: Data on whether patients were receiving tube-fed enteral nutrition or total parenteral nutrition were not recorded. We also did not investigate the rates of perioperative intravenous fluid usage.

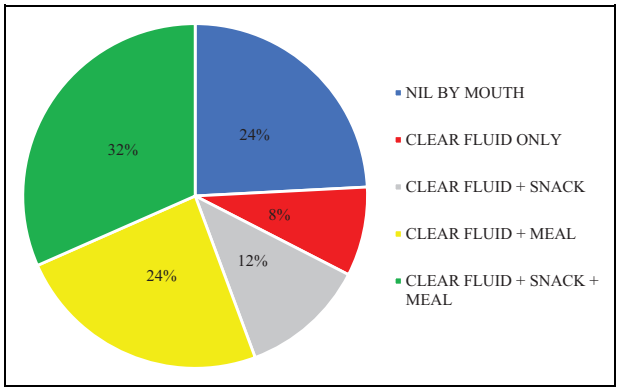

Figure 1. Nutritional regime across all centers.

Finally, we substratified patients by their AMTS score into 2 groups: 7 and below and 8 and above. We then analyzed nutrition regimes to ascertain whether there was any difference in nutritional practice, and malnutrition risk, in the presence of cognitive impairment (Figure 3). Variance between groups and statistical significance were tested using analysis of variance.

Results

In all, 1113 patients were identified from the NHFD as having received a nutritional assessment. This amounted to 98.41% of patients in the NHFD from the hospitals selected over the given time period. Twelve patients in the NHFD data set were not assessed, and 6 cases had no data recorded. In all, 276 patients identified had no recorded regimens preoperatively (24.4% of patients identified), and 848 patients had recorded regimens and were included in further analysis.

Mean patient age was 81.7 years and exhibited a female predominance at 71%. Most patients assessed (72.3%) had a normal nutritional status (as assessed by Malnutrition Universal Screening Tool [MUST]), meaning that they were at a low risk of malnutrition. In all, 17.6% patients assessed were at moderate risk of malnourishment, while 8.5% were at high risk of malnourishment at the time of assessment, indicating dietetic treatment.

Regarding supplementation, 56.9% of patients with recorded nutritional regimens received clear fluids preoperatively, alone or as part of an oral feeding regimen consisting of meals and/or snacks or supplements. Only 6.3% of patients received clear fluids exclusively; 41.7% received a supplement or snack, while 32.5% received a meal (Figure 1).

In all, 24.2% (n = 205) received no oral intake at all preoperatively (NBM). Of these 205 NBM patients, 77.8% had normal nutritional status, 15.3% were at risk of malnutrition, and 6.9% were malnourished at time of assessment (Figure 2).

Median time to surgery for NBM patients was 16.75 hours, and 6.34% were fasted for over 36 hours (see Supplemental Table S2). The majority of NMB patients—37.6%—were

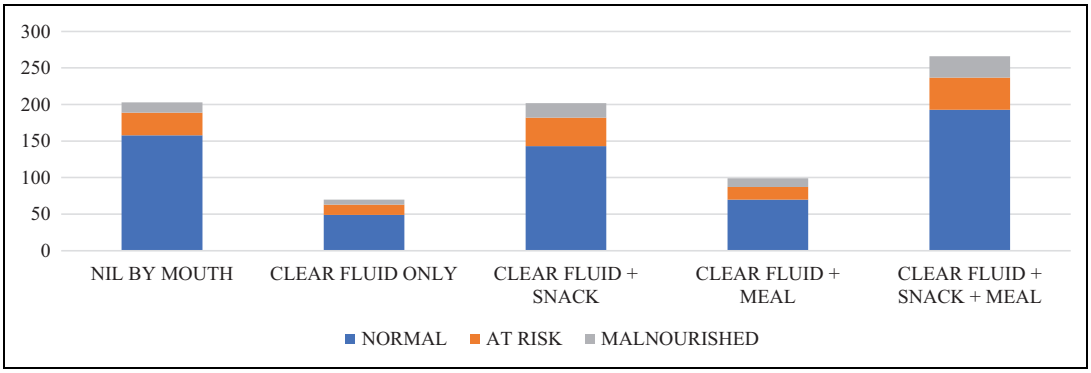

Figure 2. Risk of malnourishment and supplementation.

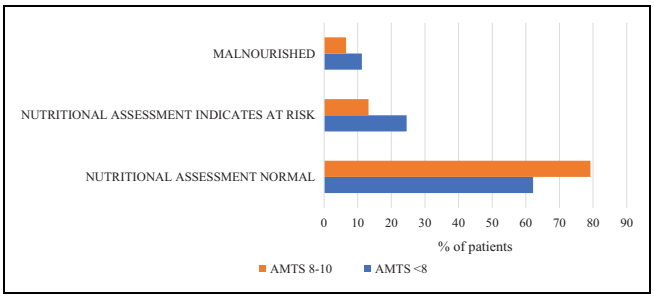

Figure 3. Nutritional status by abbreviated mental test score.

fasted for between 12 and 18 hours (see Supplemental Table S1). Of the NBM patients, 17.6% (n = 36) were fasted for over 24 hours. Patients given clear fluids and a meal but no supplements were fasted for a median of 26.9 hours and had the highest percentage of duration over 36 hours (28%).

The NBM patients had similar mean Rockwood (4.97), Nottingham (5.0), and AMTS (6.51) scores to patients given oral nutrition. The NBM patients had higher mean Nottingham scores compared to patients on oral nutritional regimens although not statistically significant (5.08 vs 4.83, $P = .0631$). The NBM patients had a mean age of 82.6 years, and patients on oral nutritional regimens had a mean age of 81.6 years (see Supplemental Table S3). There was no significant difference in age between NBM and orally fed patients ($P = .530$).

Of the patients, 6.5% (n = 44) with an AMTS of 8 or above were deemed to be at risk of malnutrition at admission compared to 11.26% (n = 50) of patients with an AMTS of 7 or below (Figure 3). There was a similar proportion of patients kept at NBM when patients were substratified by AMTS: 17.06% for 8 or above versus 19.82% for 7 or below. There was no statistically significant difference between AMTS scores of NBM patients and those on oral nutrition ($P = .141$). Figures for other nutritional regimes also varied little between the 2 AMTS groups.

Discussion

The majority (72%) of patients were deemed to be at low risk of malnutrition, suggesting a normal nutritional status on admission, as assessed by the MUST. Of the patients, 8.5% necessitated dietitian referral and dietetic treatment for malnutrition as indicated by the MUST tool. This would appear to suggest the common misconception that hip fracture patients are malnourished on admission is incorrect.

Almost one-quarter of patients admitted following a fractured hip receive no oral nutrition or fluids whatsoever preoperatively. In all, 8% of patients receive only clear fluids and 12% clear fluids and a snack *or* supplement. In light of the evidence supporting additional meals and dietetic nutritional optimization, we have shown that actual practice does not meet this standard, with up to 44% of patients receiving "suboptimal" nutrition (no solid meal preoperatively).[1,2]

The median time to surgery for NBM patients was over double the recommended fasting time to solids. The median fasting time for patients on a clear fluid-only regimen was over 8 times the recommended fasting time to clear fluids. The implications of this are 2-fold; guidelines on fasting duration are rarely upheld in practice, and patient comfort (and likely outcome) is compromised for a large population of vulnerable patients. Less than half (368 of 848 patients) received a supplement or snack preoperatively alongside clear fluids and meal despite the established benefits of ONS well established and applicable to the hip fracture demographic. Some ONS are clear fluids that may be consumed up to 2 hours before surgery which renders this finding even more concerning in the lack of its uptake.

Patient factors affect all elements of care, and these were specifically addressed in this study. Gender and age had little impact on nutritional performance. Similarly, there was little difference between the frailty, comorbidity, and cognitive impairment measures. Alongside the lack of difference in age and gender, this may suggest that patient factors have little effect on in-hospital nutritional management. This contrasts directly with the association of cognitive impairment with other areas of perioperative management, namely, pain control, whereby patients with cognitive impairment are known to receive poorer pain management.[14] We found that there was no meaningful difference in nutritional practice in the presence of cognitive impairment, suggesting that cognitively impaired hip fracture patients receive comparable nutritional management to cognitively intact patients.

The discrepancy between nutrition and pain control, in terms of providing the best possible care and ensuring patient comfort, may lie in the assessment of each respectively. Nutritional assessment rates were high (98.41%), and the MUST tool is standardized, validated in cognitively impaired patients, and its use is incentivized through the hip fracture Best Practice Tariff (BPT) and National Institute for Clinical and Healthcare Excellence (NICE) guidance.

However, a higher proportion of patients were found to be at risk of malnutrition within the low AMTS group, suggesting that cognitive impairment may be associated with an increased risk of malnutrition prior to admission to hospital for hip fracture but not affecting clinical practices.

Limitations

As an observational study, some data fields were not fully completed by all institutions, partly due to differences in pre-existing data collection arrangements. The numbers of patients are large, however, and this allows for further assessment of any data omissions, including significance. The impact of observation must be appreciated in this study. Health-care professionals collecting data and providing nutrition are likely to follow guidelines more accurately and improve correct nutritional practice when being watched. In hospitals where the data were not being recorded, and practice was not being observed, there is the potential for nutritional practice to be of lower standard.

Generalizability

Additionally, the data are only collected from trauma centers within the North East of the United Kingdom. This may potentially reduce the generalizability to the rest of the country although mean age, NBM percentage, and nutrition prescribing may actually differ little. Although a regional study, we present a cross-section of a major trauma network system applicable to others within the United Kingdom. Among the 6 centers included, James Cook University Hospital is a major trauma center, and the others are trauma units. The 6 centers included serve diverse demographics with both rural and urban centers represented. There is no way that any inference of unit performance, benefit of supplementation, or equally harm from any regime can be drawn from this work. This work simply aims to generate baseline data to generate hypotheses and inform those involved in the care of hip fracture patients regarding areas where focus for controlled intervention and measurement may be of benefit.

Conclusion

We present a characterization of nutritional practices in the management of patients with hip fracture preoperatively at a regional level. This multicenter study analyzed the nutritional intake of 848 patients with a hip fracture across 6 hospitals over a 6-month period. We have identified high rates of prolonged preoperative fasting to both solid meals and clear fluids, exceeding twice the recommended duration for solids and 4 times the recommended duration for fasting to clear fluids.

Rates of supplementation remain low despite evidence that their use is associated with lower rates of postoperative infection among other complications. Less than half of patients received snacks or nutritional supplements preoperatively, and only 56% of patients received a solid meal prior to surgery.

Age and gender had no impact on nutritional intake in the preoperative period. Nottingham Hip Fracture score and Rockwood score also have no statistically significant impact on nutritional intake. Surprisingly, when stratified by AMTS scores, as an indicator of cognitive impairment, we found little difference in nutritional practice between cognitively intact and impaired patients.

In conclusion, there is room for a great deal of improvement to be made in pursuit of optimized nutrition for patients with a hip fracture. As evidence continues to emerge showing that improved nutrition can improve hip fracture outcomes and reduce mortality, the need for optimization of current practices cannot be understated.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

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