Clinical Nutrition 32 (2013) 77–82

Contents lists available at SciVerse ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

Original article

Intestinal failure and home parenteral nutrition: Implications for oral health and dental care

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ARTICLE INFO

Article history:
Received 16 November 2011
Accepted 29 May 2012

Keywords:
Intestinal failure
Home parenteral nutrition
Oral health
Dental care

SUMMARY

Background & aims: Background disease processes, medication and therapies in people with intestinal failure receiving home parenteral nutrition may affect their oral health. To inform oral health advice for this group a study of their oral health status was carried out.
Methods: Fifty-two HPN outpatients recruited from specialised nutrition clinics at a national referral centre listed their medical and medication history, perceived oral health and dental treatment experience in a structured interview and underwent an oral health examination. Findings were compared with 2009 UK Adult Dental Health Survey data, using one-sample *t* tests.
Results: Oral health of the HPN cohort was poorer than the UK norm; patients had more decay ($p < 0.001$), fewer teeth ($p < 0.001$) and fewer sound and untreated teeth ($p = 0.023$) despite similar dental attendance. Hyperphagia, sip feeds, oral rehydration fluids and polypharmacy (in 96%) are identifiable risk factors for caries, xerostomia (in 81%) and thus oral infection risk (including oral candidiasis). Patients were experiencing current problems (60%) and psychological discomfort (56%) from poor oral health. The patient pathway does not include oral health information.
Conclusion: Dental teams should be aware of the management and prevention of HPN related complications with bisphosphonates, anticoagulant therapy, and parenteral antibiotic prophylaxis. HPN patients may benefit from increased awareness of their oral health risk factors.

1. Introduction

Patients with Intestinal Failure (IF) receiving long-term intravenous nutrition, Home Parenteral Nutrition (HPN), have specific health care needs that relate to their current and background medical condition, nutritional management, and central venous catheter care. It was speculated that this group's oral health may be compromised, and delivery of dental care complicated, by their medical condition.

Oral health in IF, as in other medical conditions,[1–3] is likely to be influenced by the duration of illness, timing of its onset, nutrition and medication. Common factors, secondary to IF, likely to impair oral health are nutrition (hyperphagia and dietary changes), therapeutic dehydration and xerostomia as a side effect of medication. Further, the need to manage HPN related complications may have implications for oral health and access to dental care.

2. Oral health in home parenteral nutrition patients

Oral findings in patients with Inflammatory Bowel Disease (particularly Crohn's Disease) have been widely reported.[4–7] They include ulceration, labial swelling, cobblestone mucosa and also angular cheilitis, due to malabsorption. Flemmig et al.[8] reported increased prevalence but reduced severity of periodontal disease; higher caries rates[9,10] are attributed to diet, malabsorption and oral health neglect during periods of disease activity.[9] Scleroderma, a cause of IF by pseudo-obstruction has been shown to impact on oral health,[11] possibly in some part by limitation of mouth opening constraining oral hygiene and dental care[12] and restricted facial and tongue movements reducing oral clearance.[13]

Intestinal failure medication regimes aim to restrict gut secretion, motility and control inflammatory bowel disease processes,[14,15] and can have oral side effects. Dysgeusia (altered taste) has been reported in patients prescribed baclofen, methotrexate, sulfalazine and omeprazole.[16] Mucositis and stomatitis are associated with cytotoxics,[17,18] and proton pump inhibitors such as

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0261-5614/$ – see front matter
http://dx.doi.org/10.1016/j.clnu.2012.05.018

lansoprazole in combination with amoxicillin.[19] Gingival overgrowth has been related to ciclosporin.[20,21]

Polypharmacy in patients with complex medical conditions is frequently associated with xerostomia (dry mouth).[22–24]

Johnson[25] and Siepler[26] found that malnutrition and dehydration reduce salivary secretion. Even when rehydrated, reduced parotid gland output continues.[27] Dehydration in IF patients is generally due to malabsorption and therapeutic dehydration to control fluid losses and stoma output. Reduced basal and stimulated salivary flow rates have been demonstrated after major small intestinal resection.[28]

Saliva is essential to taste, lubrication, oral hydration and enamel remineralisation. It has antimicrobial properties.[29] Deficiency can lead to increased caries (despite good oral hygiene), exacerbation of periodontal disease and acute gingivitis. Oral infections are more likely, commonly candidal, particularly erythematous and pseudomembranous candidiasis and angular cheilitis.[30–32] Oral candidiasis and CVC infection have been linked.[33]

A Danish study of HPN users[34] reported mandibular osteoporosis in 47% but neither dental nor periodontal health differing from the norm. Nightingale observed "*patients complaining of loose teeth*" and a general belief that "*teeth falling out* [soon after starting HPN] *may relate to alveolar bone loss*."[35] Premature tooth loss has been reported in paediatric HPN patients,[36] it was viewed that poor nutrition accelerated (but did not initiate) their periodontal support loss.[37]

3. Prevention of home parenteral nutrition related complications

3.1. Catheter related bloodstream infections

Catheter related bloodstream infections (CRBSI) have been attributed to dental infection[38,39] and treatment.[40] Associated with morbidity, mortality[41] and costly management, including lengthy in-patient stays,[42] infections can result in the need for catheter removal and sequential loss of multiple venous access routes.[38] Concern amongst physicians to mitigate the risk of CRBSI from procedural bacteraemia results in the recommendation of antibiotic prophylaxis for dental procedures by some.[43,44]

3.2. Venous thrombosis

HPN patients with IF of ischaemic origin may be anticoagulated, most commonly with Warfarin[45] to reduce the risk of thrombosis and emboli formation associated with central catheterisation.[42,46,47]

3.3. Metabolic bone disease

Several studies on the prevalence of bone disease in chronic IF and HPN patients, relate osteopaenia to nutrition and malabsorption.[48–50] Steroid and ciclosporin use,[51] a sedentary lifestyle,[52] and disrupted parathyroid hormone secretion by overnight feeding[53] may also contribute. Management may involve bisphosphonate prescription. Variable absorption of oral medication means monthly intravenous pamidronate is the recommended bisphosphonate regimen for this patient group.[51] Ruggiero et al.[54] report that patients receiving IV and high potency preparations (especially the nitrogenous group pamidronate and zoledronate) are at greater risk of bisphosphonate related osteonecrosis of the jaws than patients taking oral bisphosphonates.

4. Methods

Oral health can affect food choices, general health and well-being. To inform guidance for HPN patients, and the dental and nutrition teams providing their care a study was designed to measure oral health in the HPN population.

The cohort of 52 patients, 28% of the HPN patient population of St Mark's Hospital, Harrow, was a volunteer convenience sample recruited from specialist outpatient nutrition clinics over a 6-month period. Permission for the study from the Research and Development Department of North West London Hospitals followed project approval in April 2008 by Harrow Research Ethics Committee.

Participants reported their medical and medication history, and answered structured interview questions about their perceived oral health, dental treatment history, oral health behaviours and attitudes, nutritional intake, experience of, and access to, dental care.

Caries experience and oral health were recorded using the standardised examination and diagnostic criteria of the Adult Dental Health Survey 2009 (ADHS)[55] to establish normative treatment need. Interview questions were also drawn from the ADHS so that cohort results could be compared with the general population.

The cohort comprised 17 males and 35 females with an age range of 19–77 years and a median age of 53 years, age distribution and diagnoses afforded comparison with BAPEN[56] data, Figs. 1 and 2. As nationally, Crohn's Disease, ischaemia and surgical complications were the commonest background causes of IF (63.5%). Alongside radiation enteritis this may have contributed to the sample female bias. The length of time people had been using HPN ranged from 6 months to 18 years with a median of 7 years 9 months.

While noting that the St Mark's patient group are likely to have a protracted disease history and complications prior to referral,[57] it seems reasonable for the main findings of the study to be extrapolated to the HPN population as a whole.

Processing of the data was principally via descriptive means and standard deviations. Data was analysed using Stata 10 (Statacorp, TX77845, USA). The decayed, missing and filled teeth (DMFT) data were described using mean and standard deviation, despite the fact that some of the measures did not conform to a normal distribution. This approach was used so that the data could be compared with the equivalent ADHS data using weighted samples from the ADHS one-sample *t* tests comparing HPN variable means with the ADHS means.

5. Results

5.1. Nutrition

Alongside their oral intake, 87% (44) of respondents were receiving total parenteral nutrition the remainder intravenous fluids and electrolytes. Forty-four percent (23) had used sip feeds and 64% (33) electrolyte mix, one person remembered receiving advice on their potential implications for oral health.

5.2. Xerostomia

Eighty-one percent (42) perceived that their mouth felt dry at least some of the time, 50% (26) relating that to starting HPN. Almost the entire group, 96% (50), listed medications for which the BNF[14] lists dry mouth as a side effect.