

Developments in clinical enteral nutrition: fragments from the 'Archives'

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INTRODUCTION

This paper touches on some of the history of clinical nutrition as published in the pages of *Archives of Disease in Childhood* since January 1926. It neither purports to be a scholarly historical review nor a comprehensive account of this huge field of nutritional science. In fact, the vast majority of important nutritional papers are to be found in publications other than *Archives*. We have searched through the contents lists and arbitrarily selected 10 references representing most decades over a 90-year period. These give an indication of how the science of clinical nutrition has developed. Many other references might have been cited, but we have chosen ones that span most of the history of the journal. While some are scientifically important investigations, others are merely commentaries or reviews indicating something about the state of knowledge at the time. Earlier publications from an era of relative food poverty focus on nutritional deficiencies. Later on comes the understanding of the importance of effective nutritional support in a wide range of chronic conditions. Parenteral nutrition deserves its own review and has not been included here. This approach, attempting to construct a pleasing picture with only a few randomly selected pieces of jigsaw, might be criticised as fanciful. Although indeed challenging, the intention is no more than an entertaining meander through some of the journal's distinguished history.

Infant feeding and nutritional deficiency states

Coverage of nutritional deficiency diseases featured prominently from issue 1, where Sir Thomas Barlow opined: 'The most efficient of all foods in the prevention of rickets in the infant period is admittedly mother's milk, but fresh cow's milk, cream, butter, suet, egg, dripping and animal fats have all to be reckoned with as useful and efficient substitutes under certain limitations'.¹ He

also remarked on the importance to the infant of good nutrition in the mother, and notes that in the case of scurvy, proprietary infant foods: 'retain their supremacy as among the chief offenders in the causation of the disease'.¹ Barlow identified the development of safe and effective artificial infant feeding as one of the most pressing challenges in paediatrics.

Revisiting this theme 30 years later, emeritus professor of paediatrics from McGill University, Alton Goldbloom, addressed the British Paediatric Association in his Windermere lecture.² While progress had undoubtedly been made, Goldbloom referred to some of the intractable debates about feed volume for infants, the merits or otherwise of boiling milk, and the academic obsession with stool examination both as a way of divining gastrointestinal function and informing decisions about feed manipulation.² He wryly commented that 'a young and progressive paediatrician travelling abroad would often bring home with him a complete set of moulages depicting in realistic form every variety of stool in every conceivable, real or imaginary, digestive derangement'. Many years later, this kind of three-dimensional aide-mémoire re-emerged in the pages of *Archives* to more useful purpose as Weaver's 'stercometer'. This was a set of plasticene models used to help mothers assess the volume of their child's motions in an important study establishing normal bowel habit.³

Nutritional deficiency states continued to be topics for articles, including the first description in western medical literature of kwashiorkor, by Cicely Williams in 1933.⁴ Republished 50 years later, it was then described as 'perhaps the most important paper that ever appeared in *Archives*' (see figure 1). Williams made her observations based at the Children's Hospital, Accra, in what was then the Gold Coast Colony and is now Ghana. She concluded her paper by saying: 'Finally, the absence of any quotations from the literature, for which I tender apologies, is due to the fact that I am out of reach of reference libraries'. Osler ('To study the phenomena of disease without books is to sail an uncharted sea, while to study books without patients is not to go to

sea at all.') would doubtless have recognised her as an intrepid navigator.

In 1934, Widdowson and McCance⁵ devoted a paper to their scientific interrogation of a food product. The laboratory analysis of bone and vegetable broth (commonly fed to infants) convincingly showed it to be of low nutritional value. Over the next 36 years, the pair went on to publish regularly in *Archives* on topics including the effect of kwashiorkor on absorption and excretion of nitrogen, fat and minerals; protein catabolism in the newborn and caloric requirements for growth after severe malnutrition. This research partnership persisted over a period of 60 years and was documented in a book published by the British Nutrition Foundation celebrating their internationally recognised contributions to nutritional science.⁶

One of the first nutritional textbooks to be reviewed in *Archives* was EWH Cruickshank's 1951 'Food and Nutrition'.⁷ The reviewer's perceptive opening comment remains pertinent: 'Eating is a subject on which we are all expert because we have years of experience of it, a bundle of prejudices, racial, familial and personal, and a sketchy memory of the physiology we once studied'. In the early decades of publication of *Archives*, there is little sense of how illness in general impacted on nutritional status and how this in turn might affect outcomes. Nevertheless, it is possible to trace the development of awareness of the importance of clinical nutrition over a more recent period, and the introduction of new techniques (tube feeding) and specialist feed products. This effectively laid to rest the concept that malnutrition was an inevitable consequence of chronic disease about which little could be done.

Enteral nutritional support

Enteral nutritional support refers to feeding into the gastrointestinal tract distal to the oesophagus. Different feeding tubes became available for delivery of exclusive or supplemental feeding in children who could not maintain growth and nutritional status with oral feeding alone. Gastric feeding using a nasogastric tube was the most common method employed. However, jejunal feeding developed for patients with contraindications such as gastroparesis or severe gastro-oesophageal reflux disease. Further progress included feeding via gastrostomy or jejunostomy tube (inserted through a variety of methods) for children requiring long-term enteral nutritional support.

In a paper from 1986, Bougle *et al*⁸ demonstrated that for a group of infants

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FIG. 4.—Photograph of Case 2, taken after death.



FIG. 5.—Photograph of Case 3, taken three days before death.

Figure 1 Adapted from Williams.⁴

with congenital heart disorders awaiting surgical intervention, normal growth could be achieved if energy requirements were met by nasogastric tube feeding. This intervention was also safe and did not precipitate heart failure through increasing fluid intake. Although it was recognised that growth faltering in children with congenital heart disease was common and related mainly to poor oral intake, there had been few previous attempts to prevent or correct malnutrition. Potential benefit included making subsequent surgery less hazardous through decreasing the many negative effects of malnutrition.

Recognition of such benefit went together with developing awareness of widespread malnutrition among children with chronic disease, both in and out of hospital. This led to widespread use of enteral nutritional support, including at home. In 1991, Holden and colleagues⁹ explored the safety of home nasogastric tube feeding and parental perceptions of benefits in a questionnaire survey completed by 70 families. This study illustrates the wide range of underlying diagnoses in children then being tube fed, including chronic renal failure, cardiac disease, cerebral palsy, malignancy, chronic liver disease, Crohn's disease, severe food intolerance, gastro-oesophageal reflux disease, short bowel syndrome, dysphagia and growth faltering. New and softer

polyurethane feeding tubes needed to be changed only every 4 weeks; growth improved in all patients. Sleep disturbance (for both carers and child) was the most commonly reported complication, but parents were very positive. Many felt their child had become more happy and active, had been kept out of hospital, and in some cases, that life had been prolonged. Significantly, these children were now under the supervision of a multidisciplinary nutritional support team (NST). Training and preparation of parents and children prior to discharge was extensive, and the need for good community handover and ongoing support emphasised.

Where we are now

Over time, the assessment and management of nutritional problems has become integral to the medical treatment offered across specialties for children with chronic illness. The expert knowledge contributed by specialist nurses, dieticians and pharmacist colleagues working in NST has been recognised and welcomed by paediatricians. As the scientific justification for preventing or reversing malnutrition has grown, recommendations for routine assessment of nutritional status have been implemented in many hospitals. Developments in feeding tubes, enteral feed pumps and specialist dietary products have facilitated effective nutritional intervention in ever greater numbers

of children, according to a variety of feeding guidelines from specialist societies. One recent example is guidance for professionals caring for children with severe anorexia nervosa, disseminated through the Education and Practice section of the journal.¹⁰ We conclude that much historical progress can be traced in the pages of *Archives*. It continues to live up to Barlow's expectation of setting forth 'in concrete and detailed form the results of new discoveries in diagnosis and treatment with a view to their employment in practice for the public good'.¹

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