Malnutrition affects one in four acute hospital admissions and one in three admitted to care homes. While many clinical staff may fail to recognise the signs of malnutrition, the use of screening tools such as ‘MUST’ are used in both hospital and community settings. With greater identification of those at risk of malnutrition comes the responsibility of managing these individuals. This article presents the launch of the BAPEN decision trees that are designed to help healthcare professionals manage malnutrition.

Key words: Decision trees Nutrition Re-feeding

Malnutrition is still a common occurrence, affecting one in four acute hospital admissions, and one in three admitted to care homes. The cost of malnutrition is not only that to the patient and carers: increasing infectious episodes, number of prescriptions required, poor wound healing and increase in pressure ulcers, but also financial, with cost estimates of £7.3 billion in 2003 and more recently, in the region of £13.3 billion1. While many clinical staff may fail to recognise the signs of malnutrition, the use of screening tools such as Malnutrition Universal Screening Tool (MUST), is becoming increasingly common in both hospital and community settings. With greater identification of those at risk of malnutrition comes the responsibility of managing these individuals.

While a wealth of evidence exists in nutritional practice, there are also a number of areas where research is unable to provide conclusive results to govern pathways of care. This in part is due to the complexities of investigating the influence of nutrition and the ethics surrounding clinical intervention versus none2. Not all health professionals are able to be up-to-date and hold expertise in the care of complex malnutrition. Thus, there is a need for guidelines and standards of care to assist in its management. While many guidelines exist, the sources are varied, and often too thorough for ease of use immediately in the care setting. The BAPEN Principles of Good Nutritional Practice have been devised to draw together existing guidelines, the existing evidence base and best practice (where no research is possible), to produce decision trees to help guide all levels of health care professionals through the pathway of care of those with malnutrition3. The decision trees are designed by experts in their field and peer-reviewed by members of BAPEN to produce a pragmatic and effective tool to assist in the care of those at risk of malnutrition and its consequences.

**Re-feeding syndrome**

One of the first decision trees produced was that concerning identification and management strategies for re-feeding syndrome (Figure 1). This decision tree is particularly well suited as a decision tree as there is very little clinical research and thus scant and robust evidence surrounding re-feeding syndrome and its management. The literature is mainly focused on case-reports and retrospective observational studies. On the background of these observations and expert opinion, several guidelines have been produced, including National Institute for Health and Clinical Excellence (NICE) guidance4. Whilst such guidance is of excellent quality and very detailed, it is generally found in large documents that are not always readily to hand for many. Moreover, there is much variation in the practice of following the NICE guidance5, probably as a result of varied localised experience and the heterogeneous observational evidence base. By producing a decision tree, BAPEN aims to provide practitioners with a strategy or framework around which healthcare professionals may base decisions in managing those patients potentially at risk of re-feeding syndrome.

**Re-feeding syndrome**

It is noted that re-feeding syndrome is more likely to occur upon introduction of enteral intake, oral or tube delivered, after a prolonged period of starvation and/or metabolic stress through illness, rather than when delivered via the parenteral route6. Re-feeding syndrome was first described in the literature following release of prisoners of war, when the reintroduction of nutrition led to a mortality of 21 per cent7. Upon re-introduction of nutrition and calories, mainly carbohydrate, the catabolic state becomes anabolic with a sudden shift of electrolytes and fluid. With a shift of glucose into the cells, potassium follows and phosphate is required in the release of energy via the mitochondrial pathways of oxidative phosphorylation utilising adenosine diphosphate (ADP) and adenosine triphosphate (ATP). Many articles discuss the hypophosphatemia of re-
Re-feeding syndrome: Identification of those at risk –

Decision Tree

Re-feeding: starting to feed safely

Commence feeding: can the oral route be used?

Yes
Consider oral nutrition supplements or naso-gastric feeding if not adequate. Seek dietetic input

Concerns
Assess swallow referring to Speech and Language therapist, and consider placing a naso-gastric tube

No
Consider parenteral nutrition via appropriate venous access

Commence nutrition at a maximum of 10kcal/kg/day increasing to meet needs by 7 days
High risk patients are those with BMI<14kg/m² or prolonged poor intake of >15 days and should commence at 5kCal/kg/day

Measure electrolytes: even if normal, replace potassium, phosphate and magnesium (see 3). Only withhold supplementation if levels are high

Monitor glucose (BMIs) several times per day, and observe potassium, calcium, magnesium, phosphate and sodium closely as well as fluid balance clinically

Keep fluid input low, but enough to maintain renal function
Restrict sodium replacement (see 4)

Figure 1: BAPEN re-feeding decision tree. This represents just one page of the decision tree and does not include the full referencing. Use of the decision tree should be made from the full version which can be found on the BAPEN website: www.bapen.org.uk
Fortisip Compact Protein contains 18g protein per 125ml bottle – so just two bottles per day can help patients meet their protein needs.

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feeding syndrome that can lead to muscle weakness, convulsions and cardio-respiratory arrest, but the shift of potassium, magnesium, calcium, sodium and water may have equally deleterious effects, leading to oedema, muscle weakness and cardiac dysrhythmias. Vitamin deficiencies, especially thiamine, can result in abnormal biochemical pathways occurring, with consequences such as Wernicke-Korsakoff syndrome and beri-beri. Moreover, upon refeeding, renal excretion of sodium ceases, with the potential consequences of salt and fluid retention. This has led to recommendations of restricting fluid and sodium replacement, an important consideration when many intravenously delivered medication and vitamins need a deliver solution such as 5% glucose or 0.9% saline.

Thankfully, many healthcare professionals will never encounter refeeding syndrome, but this in itself leads to less experience. The decision tree helps to guide healthcare professionals through the decision processes to avoid any pitfalls, and directs to appropriate help where needed. Figure 1 illustrates the re-feeding decision tree in its current format.

Malnutrition in the community

Managing adult malnutrition (undernutrition) in the community is a practical guide that aims to assist, community healthcare professionals in identifying and managing the three million people in the UK at risk of disease-related malnutrition. It has been developed by a multi-professional team and is supported by ten key organisations including the British Association for Parenteral and Enteral Nutrition (BAPEN), the Royal College of Nursing (RCN), Royal College of General Practitioners (RCGP) and the National Nurses Nutrition Group (NNNG). Whilst not formally a BAPEN decision tree, its structure and aims are very similar and has been endorsed and promoted by BAPEN. The fully referenced document is based on clinical experience and evidence alongside accepted best practice. It includes:

• an overview of malnutrition including its clinical consequences, cost implications, details on the prevalence across healthcare settings and information on key patient groups at risk
• information on the identification and management of malnutrition according to risk category
• guidance on optimising oral intake including dietary advice and the appropriate use of oral nutritional supplements
• a practical ‘decision -tree’ style pathway on the identification of under-nutrition and treatment including appropriate use of oral nutritional supplements in the management of malnutrition

‘Managing Adult Malnutrition in the Community’ is available as an interactive website or to download for free via www.malnutritionpathway.co.uk. Further information is currently being developed to provide valuable resources embedded within the website which can be downloaded and used by healthcare professionals, patients and carers to provide practical advice they can implement to treat and/or prevent malnutrition.

The pathway can be implemented locally as is or can be used as a framework to adapt to take into account local settings and service provision.

The future

In addition to the above decision trees, BAPEN also launched several others in December 2012 which are soon to be available on the BAPEN website (http://www.bapen.org.uk). These include placement of naso-gastric tubes, adapted by and from the National Nurses Nutrition Group (www.nnn.org.uk), peri-operative nutritional care, ethics of feeding at the end of life, and identification and management of buried bumper syndrome. Subsequent decision trees will be available via the members section. Further work is already on going with other decision trees that are disease specific, such as inflammatory bowel disease, chronic obstructive pulmonary disease and renal disease, further issues surrounding PEGs, for example, ethical consideration for patient selection, identification of gastrostomy tube type and enteral feeding tube care, and use of other enteral feeding tubes. The decision trees are not designed to remove the clinical judgement for those managing the patient, more to help guide through the process of delivering good nutritional practice.

References:

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Re-feeding decision tree kindly reproduced with permission from BAPEN.