

## **Over-feeding and over-hydration in elderly medical patients – Lessons from the Liverpool Care Pathway.**

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*'If a convalescent while taking nourishment remains weak, it is a sign that the body is being overnourished'* Hippocratic Aphorism – 4<sup>th</sup> century BC

### **Abstract**

This paper describes three elderly patients who were admitted to hospital with aspiration pneumonia. They were kept nil by mouth (NBM) for a number of days, while being given intravenous hydration initially and enteral feeding subsequently. During that time they deteriorated and appeared to be dying, so the Liverpool Care Pathway (LCP) for the dying was used to support their care. Artificial nutrition and hydration were stopped. They quickly improved and the LCP was discontinued. Two of the patients deteriorated again on reintroduction of enteral feeding and/or intravenous fluids, only to improve a second time following withdrawal of feeding and fluids. Vulnerable elderly patients should not be made NBM except as a last resort. Clinicians should be alert to the possibility of refeeding syndrome and overhydration as reversible causes of clinical deterioration, particularly in frail elderly patients. Use of the LCP in these patients provided a unique opportunity to witness the positive effects of withdrawal of excessive artificial nutrition and hydration.

**Keywords:** 'Liverpool Care Pathway', dying, elderly, over-hydration, 'refeeding syndrome'

### **Key points:**

1. Vulnerable elderly patients should not be made Nil By Mouth except as a last resort
2. Clinicians need to actively exclude reversible causes of deterioration in patients, before diagnosing dying
3. Clinicians should be alert to the possibility of refeeding syndrome as a reversible cause of clinical deterioration, particularly in the frail elderly
4. Overprovision of fluid, particularly saline, can lead to deterioration in undernourished patients, especially the elderly, who may handle excess salt and water badly due to reduced reserve capacity
5. The LCP when used appropriately can be a beneficial and valuable clinical pathway

## **CASE 1**

A 92-year-old lady, with multiple co-morbidities was admitted to hospital from a residential home with community-acquired pneumonia. She was judged to be at high risk of aspiration, so she was put Nil By Mouth (NBM), pending review by a speech and language therapist (SLT). Her body weight, body mass index (BMI) and history of weight change were not recorded on admission. She was given intravenous (IV) antibiotics and IV fluids at a rate that cannot be determined by retrospective examination of the medical notes. On day 4 (D4) of her admission she was reviewed by a SLT who advised to continue keeping her NBM and consider an alternative route of feeding. On D9 she was reviewed by a dietitian. The physiotherapist who treated her commented that she had grossly oedematous arms and legs. On D10, she received nasogastric tube feeding (NGTF) and was started on a low energy feeding regimen (30ml/hr given over 16 hours) to avoid refeeding syndrome (RFS) (Table 1). IV fluids were continued for one day and on D2 of NGTF serum magnesium was found to be low. 8 mmols of magnesium were given IV. On D3 of NGTF her respiratory function deteriorated, antibiotics were changed and the feeding rate was increased to 75 mls/hr. Her phosphate had fallen to 0.5 mmol/L. A further six days later, she pulled out her feeding tube on the day that she was judged clinically to be dying. IV fluids were discontinued and the LCP was used to support her care. Within four days she had dramatically improved, was no longer oedematous or breathless and was asking for a cup of tea. The LCP was discontinued. However, she continued to be at high risk of aspiration so she was again kept Nil By Mouth and, since she refused NGTF, IV fluids were re-started to avoid dehydration. Two days later she deteriorated again and appeared clinically to be dying. She was again supported by the LCP and IV fluids were stopped. Ten days later she had improved so much she started to eat and drink for pleasure, despite the high risk of aspiration. She was eventually discharged to a nursing home where she died ten months later.

## **CASE 2**

An 86-year-old man with dementia and Parkinson's disease was admitted to hospital from a nursing home with suspected aspiration pneumonia. He was overweight with a BMI of 28. He was started on antibiotics and approximately 2 litres of IV 0.9% Sodium Chloride daily. On D6 he was found to be at high risk of aspiration so he was made Nil By Mouth and the SLT suggested considering alternative route of feeding. On D14 NGTF was commenced using a low energy feeding regimen (25 mls/hr over 20 hours) with supplemental vitamins (Pabrinex), in view of his refeeding risks (Table 1). The feed was increased to 40

mls/hr on D2 of NGTF while he continued on IV fluids. His serum phosphate level was not checked. By the 3rd day of NGTF he was judged clinically to be dying and the LCP was used to support his care. IV fluids and NGTF were stopped. Three days later he had improved significantly, so his care needs were re-evaluated and the LCP was discontinued. He was restarted on NGTF, but not on IV fluids. Once again a low energy feed was given (25 mls/hr for 20 hrs on the 1<sup>st</sup> day, increased to 50 mls/hr on the 2<sup>nd</sup> day and 75 mls/hr on the 3<sup>rd</sup> day), increasing daily. On the 4<sup>th</sup> day his condition deteriorated again. NGTF was discontinued and the LCP was used for a second time. His serum phosphate at this stage was low at 0.64 mmol/L. He improved once more and managed to resume oral intake of food and fluids so six days later the LCP was discontinued, although unfortunately he died suddenly one week later.

### **CASE 3**

An 87-year-old man with advanced Alzheimer's disease was admitted to hospital with suspected aspiration pneumonia. He was started on antibiotics and IV fluids, approximately 1 litre of 5% Dextrose and 1 litre of 0.9% Sodium Chloride daily. He was also started on a diet of thickened fluids only, awaiting assessment by a SLT. When weighed on D5, he had lost 14 Kg (15.5% of his BW) since a previous admission 6 weeks earlier, but remained of normal overall weight (76 kg). On D6 due to high risk of aspiration he was made Nil By Mouth by an SLT and was reviewed by a dietitian. Repeated attempts to insert an NGT were unsuccessful and later attempts were delayed due to a high INR. Eventually, on D16 he was started on NGTF on a low energy feeding regimen (initially 25 mls/hr for 10 hours and then 500 mls at 50mls/hr for 10 hours) due to RFS risk (Table 1). 1 litre of 0.9% Sodium Chloride was also given, plus thiamine 100 mgs tds and vitamin B- co-strong orally. On D2 of NGTF the feeding rate was increased to 50mls/hr for 10 hours and later 450mls at 75mls/hr for 10 hours, plus IV fluids. On D3 of NGTF he deteriorated with a serum phosphate of 0.6 mmol/L. The feeding rate was reduced to 50mls/hr for 20 hrs. 1 litre of 0.9% Sodium Chloride was given IV. 8 mmols of IV Magnesium were administered. On D5 of NGTF he was judged clinically to be dying. The NGTF and IV fluids were stopped and the LCP was used to support his care. Five days later his condition had improved. He started to eat and drink for pleasure and the LCP was discontinued. 1 litre of 0.9% Sodium Chloride was given SC daily for 11 days. He died suddenly six weeks later.

## **COMMENT**

The LCP has been introduced in many National Health Service hospitals and hospices in the United Kingdom to support healthcare professionals in providing better care for imminently dying patients. This includes individual assessment and regular monitoring of ongoing clinical interventions<sup>1</sup>. Focus is on comfort and includes consideration of discontinuation of artificial feeding and intravenous hydration which happens in most cases<sup>2</sup>. The pathway has become a matter of considerable debate recently in the lay press. Many of the issues raised concern patient and family consent and information given before using it. Some of its' critics suggest that it is used to withdraw drugs, fluids and food and hence hasten death. However, it is not uncommon for patients placed on the LCP to improve unexpectedly. In hospitals, at least three percent of patients supported by the LCP improve clinically<sup>3</sup>. This has been attributed to difficulties in estimating prognosis and diagnosing dying, especially during the last few days of someone's life<sup>4</sup>. Although this may be true in most cases, those presented in this paper alert us to the possibility that withdrawal of excessive feeding and hydration can contribute to unanticipated clinical improvement.

The patients presented in this paper were admitted for pneumonia, which was possibly related to aspiration in the community. After their admission they continued to be at high risk of aspiration and were made NBM to prevent such an event and further deterioration. However, starvation, even for a few days, is known to produce pronounced effects on body composition, micronutrient status and electrolyte/water balance (Table 2) that put patients at risk of fluid overload and refeeding syndrome<sup>5</sup>. A recent report by the Royal College of Physicians in London comments that: "Nil By Mouth should be a last resort, not the initial default option"<sup>6</sup>. It also highlights the need for decisions regarding artificial nutrition to be made early, which would help avoid the development of risk of refeeding syndrome. A holistic assessment of patients may show it is sometimes appropriate for them to eat and drink for pleasure, especially towards the end of life, despite the high risk of aspiration.

Refeeding syndrome is a condition that results from over-provision of food to a malnourished individual and is due to severe electrolyte and water imbalance following re-introduction of food, manifest within a few days of starting feeding<sup>7,8</sup>. Fluid intolerance, hypophosphataemia, hypomagnesaemia, hypokalaemia and hyperglycaemia are common in RFS, with clinical consequences including heart failure, respiratory failure, seizures and sudden death<sup>9</sup>. However, RFS often goes unrecognised because the signs and symptoms are non-specific and biochemical changes may be minimal. The National Institute

for Health and Clinical Excellence (NICE) guidelines in England suggested that patients at high risk for RFS should generally be started on 10 kcal/kg/day and feeds increased gradually over 5-7 days<sup>10</sup>, although others debate that the guidelines are over-cautious<sup>11</sup>. However, in the three patients reported here, even this level of feeding was possibly detrimental.

Excess IV fluid administration may also have been a contributing factor to the deterioration of these patients, given their risk of fluid intolerance resulting from the starvation initially and later by the RFS. Inadequate documentation of prescription and administration of IV fluids precludes us from making definitive comment on the extent to which excess IV fluids contributed to their general decline. In case 1, however, the clinical development of gross oedema in arms and legs suggests that she was over-hydrated. A recent consensus for fluid prescribing in surgical patients recommends particular caution when prescribing normal saline<sup>12</sup>. The Na needed to meet maintenance requirements in a normal adult is only around 1 mmol/kg/day, meaning that 0.5 litre of 0.9% Sodium Chloride solution per day is adequate for most patients (it contains 154 mmol Na/l). Elderly medical patients may need initially extra fluid resuscitation due to dehydration or sepsis, but co-morbidities and age-related decline in organ function add vulnerability to over-hydration.

The clinical deterioration of these patients, to the point that they appeared to be dying, led to the decision to use the LCP to support their care. Regular patient review, as required by the LCP, provided an opportunity to witness the positive effects of withdrawing excessive feeding and hydration, and in that respect was of clear benefit to these patients. This shows that, paradoxically, a period of reduced fluid and nutrition might actually be beneficial to a few patients. The possibility that fluid overload or refeeding issues might be complicating the clinical picture, should therefore be carefully considered (albeit mostly then rejected) before accepting that any patient is actually in the dying phase. Our observations emphasise the need for clinicians to actively exclude reversible causes of deterioration in patients, before diagnosing dying. They also suggest that:

- NICE guidance about the prevention and treatment of refeeding syndrome may not be overcautious
- overprovision of fluid, particularly saline, can lead to deterioration in undernourished, particularly elderly medical patients who handle excess salt and water badly due to reduced reserve capacity
- the education of healthcare professionals on nutritional and fluid prescribing issues is critical in ensuring good patient care.

**Table 1 - Patients' characteristics and biochemical results**

	Case 1	Case 2 1 <sup>st</sup> NGTF	Case 2 2 <sup>nd</sup> NGTF	Case 3
Body Weight (Kg)	60 (on Day 10)	61		76 (on Day 5)
Body Mass Index (kg/m <sup>2</sup> ) (Normal 18.5-25)	25.3	28		26.9
Days kept NBM	10	8		10
Level of feeding – Day 1 (Kcal/Kg)	7.5	8	8	10
Level of feeding – Day 2 (Kcal/Kg)	13	13	16	15
Level of feeding – Day 3 (Kcal/Kg)	20	20	24	13
Pre-feeding phosphate mmol/L (Normal: 0.8-1.5)	0.9	1.31	Not checked	1
Post-feeding phosphate mmol/l	0.5 (on Day 4 of NGTF)	Not checked	0.64 (on Day 3 of 2 <sup>nd</sup> NGTF)	0.6 (on Day 3 of NGTF)
Post-feeding magnesium (Normal: 0.7-1 mmol/l)	0.63 (on Day 4 of NGTF)	Not checked	0.77 (on Day 3 of 2 <sup>nd</sup> NGTF)	0.72 (on Day 3 of NGTF)
Post-feeding potassium (Normal: 3.5-5.2 mmol/l)	3.2 (on Day 4 of NGTF)	3.6 (on Day 2 of NGTF)	3.9 (on Day 3 of 2 <sup>nd</sup> NGTF)	3.8 (on Day 3 of NGTF)
Days on NGTF prior to LCP	9	3	4	5
Days on IV fluids prior to LCP	18	16	0	20

**Table 2**

<b>Effect of starvation on the body</b>
Increased intracellular and whole body sodium (Na) and water
Whole body depletion of K, Mg and phosphate
Deficiency of vitamins (especially water soluble) and minerals
Renal, cardiovascular and intestinal dysfunction and resulting reduced ability to excrete excess sodium and water

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**Permission** cannot be obtained as patients are deceased. Relatives have not been approached to obtain permission, as this could potentially cause distress to them. Patients are not identifiable.

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<sup>1</sup> Ellershaw JE, Wilkinson S, eds. *Care of the Dying: A Pathway to Excellence*. Oxford: Oxford University Press; 2003

<sup>2</sup> Marie Curie Palliative Care Institute Liverpool. *National Care of the Dying Audit - Hospitals (NCDAH). Round 3. Generic report 2011/2012*. Liverpool: Marie Curie Palliative Care Institute Liverpool, 2012.

[www.liv.ac.uk/media/livacuk/mcpcil/documents/NCDAH-GENERIC-REPORT-2011-2012-FINAL.doc-17.11.11.pdf](http://www.liv.ac.uk/media/livacuk/mcpcil/documents/NCDAH-GENERIC-REPORT-2011-2012-FINAL.doc-17.11.11.pdf) [Accessed 25 April 2013].

<sup>3</sup> Edmonds P, Burman R, Prentice W. End of life care in the acute hospital setting. *BMJ* 2009;**339**:b5048

<sup>4</sup> Christakis NA & Lamont EB. Extent and determinants of error in doctors' prognoses in terminally ill patients: prospective cohort study. *BMJ* 2000; **320**:469-73

<sup>5</sup> Keys A, Brozek J, Henschel A, Mickelsen O, Taylor HF. *The Biology of Human Starvation*. Minneapolis: University of Minnesota Press; 1950

<sup>6</sup> Royal College of Physicians and British Society of Gastroenterology. *Oral feeding difficulties and dilemmas: A guide to practical care, particularly towards the end of life*. London: Royal College of Physicians, 2010

<sup>7</sup> Hearing S. Refeeding syndrome. *BMJ* 2004;**328**:908-9

<sup>8</sup> Mehanna HM, Moledina J, Travis J. Refeeding syndrome: what it is, and how to prevent and treat it. *BMJ* 2008;**336**:1495-8

<sup>9</sup> Crook MA, Hally V & Panteli JV. The importance of the Refeeding Syndrome. *Nutrition* 2001;**17**:632-7

<sup>10</sup> National Institute for Health and Clinical Excellence. *Nutrition support in adults. Clinical guideline CG32*. 2006. [www.nice.org.uk/page.aspx?o=cg032](http://www.nice.org.uk/page.aspx?o=cg032) Accessed March 2013

<sup>11</sup> De Silva A, Smith T & Stroud M. Attitudes to NICE guidance on refeeding syndrome. *BMJ* 2008;**337**:a680

<sup>12</sup> Powell-Tuck J, Gosling P, Lobo DN, Allison SP, Carlson GL, Gore M, et al. *British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients - GIFTASUP*. Redditch: BAPEN, 2008