

Is nasogastric tube intubation an alternative method to intravenous fluid replacement for dehydration?



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Introduction

Dehydration is a common cause of acute hospital admissions, particularly in older people. It is also a secondary symptom experienced by some patients during their hospital stay.^{1,2} Dehydration and specific initiatives aimed at addressing hydration in older people have been devised in an attempt to tackle this issue but their impact has been variable. Earlier this year, the NACC³ launched their hydration campaign to raise awareness of the problems associated with adequate fluid intake in older people and highlighted the risks associated with inadequate fluid intake. Unfortunately, this initiative was not publicised sufficiently within secondary care and may have been a missed opportunity to raise hydration issues to a wider audience.

To avoid the unnecessary prolongation of dehydration a thorough assessment is vital. Kidney function, urine output, biochemical markers and vital signs often assist in providing a diagnosis and subsequent management required.² In secondary care, a frequent response to rapidly replete the acutely dehydrated older person is the administration of eight hourly intravenous fluids. This article aims to explore the potential of using an alternative method of fluid provision to rehydrate patients – the nasogastric route, by briefly exploring both routes.

Good hydration is essential to assist in maintaining homeostasis, alertness and cognitive function.^{4,6}

Fluid balance

The body's fluid composition is principally made up of two main compartments, intracellular and extracellular spaces. Intracellular fluid comprises of the greatest amount of fluid within the body totalling approximately 27 litres. This fluid is stored within the body's cells and is separated from extracellular fluid by a cell membrane. It is rich in potassium and magnesium and low in sodium and ions.⁴

Fluid in the extracellular space is made up of other sub compartments, including interstitial fluid, intravascular and transcellular fluid, totalling approximately 15 litres.⁵ Fluid moves constantly between the different compartments via osmosis i.e. from an area of high concentration to an area of low concentration through a semi permeable membrane. Put simply, fluid balance is maintained when the amount of fluid that is excreted through the kidneys, perspiration, respiration and faecal elimination is met by the level of fluid consumed, plus any additional fluid produced through metabolic activity.⁴

Dehydration

Good hydration is essential to assist in maintaining homeostasis, alertness and cognitive function.^{4,6} For some people the sensation of thirst may decline with age,³ or they may become less able to consume oral fluids due to a diminishing swallow as a consequence of underlying pathology. This may lead to a gradual reduction in the level of fluid consumed. Initially, the individual may experience little more than dryness of the lips or oral cavity. However, if left untreated it may lead to loss of concentration, memory loss, constipation, or urinary tract infections. This will, in turn, exacerbate a confused state or affect physiological functioning, increasing the risk of falls and the likelihood of an unplanned admission to hospital.^{7,8}

Physiological fluid maintenance

In the initial stages of dehydration the movement of fluid through osmosis compensates for the level of circulating fluid. Ensuing hypotension and low volumes of circulating sodium develop, leading to the stimulation of the sympathetic nervous system. This, in turn, affects the glomerular filtration rate through the kidneys, causing the enzyme, renin to be released into the blood stream. In the presence of renin, angiotensinogen, provided by the liver, is converted to angiotensin I, which is activated by an angiotensin converting enzyme (ACE) in the lungs, leading to the creation of angiotensin II.

These physiological changes, brought about by angiotensin II, attempt to conserve homeostasis by acting on the adrenal cortex, releasing aldosterone. At the same time, the pituitary gland releases an antidiuretic hormone, leading to the conservation of fluid by reducing fluid loss via the excretion of urine. In addition, angiotensin II stimulates the hypothalamic thirst centre so the person feels the desire to drink. Systemic vasoconstriction occurs to increase central blood volume and maintain blood pressure and cardiac function.

However, this process can only be maintained for so long before the resultant drop in blood pressure damages the kidneys and adversely affects cardiac function. If this stage is reached, urgent attention is required to redress the balance which may require the rapid intravenous infusion of fluid.⁹

Redressing the balance

Intravenous fluids

It is estimated that approximately 60 per cent of hospital in-patients will require the administration of intravenous (IV) fluids/medication during their hospital stay.¹⁰ In many cases this route is needed for an acutely dehydrated patient in order to attempt to restore circulatory volume, preserve kidney function, improve blood pressure and reduce cardiac stress. The majority of individuals will receive intravenous fluids through a short-term peripheral cannula.¹¹ Short-term usually refers to a maximum duration of three to five days, at which point the risk of phlebitis increases, and an alternative access route should be considered if intravenous fluids are still required.¹² Accessing veins for insertion of a peripheral cannula may not be without problems in frail, dehydrated older people. The healthcare professional inserting a peripheral cannula needs to consider accessing the most stable vein in the lower arm, with the smallest cannula that will safely and effectively permit the administration of intravenous fluids.¹² As soon as practically possible, and safe to do so, intravenous fluids should be discontinued and oral hydration should be the preferred route.¹³

Risks of intravenous therapy

The risks associated with ongoing IV fluid therapy in older people are often related to the need for repeated cannulation, which may prove uncomfortable for the patient who is dehydrated and has very fragile veins.¹⁴ The insertion and care of peripheral cannulas has been an area of concern for some time,¹⁵ and lack of care and attention to the insertion site on a daily basis can very quickly lead to complications. These complications may range from mild infiltration to more severe extravasation at the insertion site and surrounding tissue. Infiltration occurs as a result of leaking fluid or blood products from a damaged vein. The patient often displays inflammation at the insertion site, with some blanching or a feeling of coolness directly around the site due to a damp or wet dressing. They may also experience difficulty in obtaining backflow of blood into the IV tubing. Extravasation is more severe, and often results in significant leakage of fluid and damage to the surrounding tissues. The patient often complains of pain, has significant swelling and can develop ulceration or necrosis to the affected area over a period of days/weeks. This occasionally requires surgical intervention and can result in the increased risk of infection.¹⁴

Administration of IV fluid in older people can lead to fluid overload. This may occur due to the volumes of fluid prescribed, and/or the speed in

which it is infused. This can be further compounded if repeated prescriptions for IV fluid are made without adequate reassessment of the patient's fluid requirements and fluid intake via other routes.¹⁵

If the patient's medical condition is life threatening, then of course IV fluids will be used but the aim should be to remove IV access as soon as practically possible providing fluid intake can be safely maintained via an alternative route. The difficulty this presents is that many older patients, struggle with the consumption of sufficient oral fluids.³ Decreased mobility and activity often result in the older person actively trying to reduce fluid consumption because of the urgency which may be associated with elimination. So attempting to encourage dehydrated older patients to drink may prove difficult.

If functioning, the GI tract is generally seen as the best route for an individual.¹⁶ So, should the use of a fine bore nasogastric tube be considered for hydration before routinely using IV access? The administration of fluid via this route is more consistent with the physiological processes of normal fluid consumption.

Nasogastric tubes

The best and safest route to hydrate an individual is to ask them to drink more fluid. However, this can be particularly difficult,³ especially if they do not feel like drinking or are already suffering with the symptoms associated with dehydration. If the patient is struggling orally should hydration be delivered via the artificial enteral route? Nasogastric tubes can be used from between five days and up to eight weeks before the manufacturer guidance recommends they be changed. They can be placed relatively easily at the bedside, tested and used within a matter of minutes.¹⁷ Although they are predominately used for feeding, aspiration or the delivery of medication, they can be used to provide short-term supplementary infusion of fluid. Fluid administered does not have to be sterile and does not have to be treated as a medicine. One of the benefits of passing a nasogastric tube for re-hydration is it provides an opportunity to utilise the GI tract for feeding and the administration of medication should you require this route at a later stage.¹⁸

Risks

The risks associated with the use of nasogastric tubes have been the topic of much debate over recent years. The publication of the NPSA alerts (2005, 2011)^{18, 19} reinforced the need to provide robust clinical guidance for their safe use and management in practice. The deaths and serious

harm to patients has led practitioners to recognise their routine use is a medical intervention and much more than just 'providing someone with access to food' and must always be justified and in the patients best interests.

The need for a repeated alert in 2011¹⁹ suggests that learning from the first alert was not as comprehensive as had been hoped. Incidents reported to the NPSA identify feeding directly into the lungs and a significant number of misplaced feeding tubes, despite the strategies suggested to avoid such incidents. The 2011 guidance reinforces the need for nasogastric positioning checks using CE marked pH indicator paper and the robust informed interpretation of x-ray when this second line confirmation method is used.¹⁹

The decision to use this route may also be affected by the reliance on nursing staff to place a nasogastric tube at the bedside, as many junior doctors have received little or no training regarding the insertion of a fine bore nasogastric tube. This may lead practitioners to consider them to be a less attractive and possibly more risky means of access when other methods of administration can be utilised such as IV fluids via a peripheral cannula.

Conclusion/considerations for future practice

Administration of IV fluids carries significant risks, especially for older people who are susceptible to fluid overload, phlebitis and the more serious systemic infections. These issues can be particularly problematic for older people who may suffer with multiple conditions or be immuno suppressed, and by puncturing the skin, this risk increases. Similarly, nasogastric tubes present their own challenges and safety issues in practice, as reported by the NPSA.^{18, 19} Expert practitioners would argue that both interventions can be delivered safely if proper competency training is delivered and monitored. If healthcare professionals are fully competent and compliant with both routes in practice then nasogastric tubes would provide the edge by being more physiologically consistent in maintaining the function of the gastrointestinal tract. The resultant stimulation of peristalsis this provides could positively impact upon appetite issues, and in turn influence common problems older people suffer with, such as constipation and fragility of skin integrity.

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