Rapid Responses to:

PRIMARY CARE:
Michelle P B Guppy, Sharon M Mickan, and Chris B Del Mar
"Drink plenty of fluids": a systematic review of evidence for this recommendation in acute respiratory infections
BMJ 2004; 328: 499-500 [Full text]

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Sunit Singhi (22 May 2004)

Fluids and URTI's — 27 February 2004

Peter J Collignon,
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Australia
Garran 2607

Send response to journal:
Re: Fluids and URTI's

I worry that the authors of the recent article "Drink plenty of fluids": a systematic review of evidence for this recommendation in acute respiratory infections" have left readers with recommendations and implications that are not supported by the data they have reviewed. Upper respiratory tract infections

(URTI's) and episodes of bronchitis are very common and presumably outnumber episodes of pneumonia by a factor of more than 100. The only data they give to show excess fluid may potentially be harmful in acute respiratory infections is from studies with moderate to severe pneumonia. While they give a number of theoretical reasons why antidiuretic hormone may be increased in respiratory infections, most of those mechanisms would not be relevant in conditions where pneumonia was not present. Their article would have been better entitled "Drink plenty of fluids": a systematic review of evidence for this recommendation in moderate to severe pneumonia".

The title of their article has implication for all respiratory infections including URTIs I however do not believe the data they have reviewed should be used to extrapolate for conditions other than moderate to severe pneumonia (and with these latter cases one would hope close medical or hospital supervision was taking place and so hyponatraemia could be avoided). We need to ensure that we do not leave the community with the implication that this advice applies to the much more common URTIs. As they state in the first paragraph of their paper it appears self -evident that there are many benefits in keeping patients with less serious respiratory tract infections well hydrated. They have presented no data to show that this "common sense" approach should not continue to be the case.

Competing interests: None declared

Hyponatremia In Endurance Athletes

2004

Bill D. Misner Ph.D.,
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Spokane, WA, 99205
USA

Send response to journal:
Re: Hyponatremia In Endurance Athletes

Each year during the heat early spring and summer, my e-mail is flooded with reports from endurance athletes who drink too much fluid, take too few electrolytes, or consume too much carbohydrates for energy during a hyperthermic prolonged endurance event.

Proportionate to the increase in temperature and humidity above 60 degrees F. and 60% respectively in relationship to the athlete's exposure to training-induced adaptations are the reports of dilutional hyponatremia. The endurance athlete requires approximately 10-14 days training in exposure to similar heat and humidity as imposed during an event that lasts 3-6 hours in length at an exercise pace of 75-85% VO2 Maximum Heart Rate. If 10-14 days of adaptation to heat and humidity is accomplished, the athlete is also advised to consume from 24-28 fluid ounces liquid with 0.3-0.7 g sodium and no more than 280 calories from carbohydrates each hour divided

dose to prevent dilutional hyponatremia.

If the adaptation training exposure is not completed, the fluids, electrolytes, and carbohydrate caloric replenishment formula may lead to severe dehydration, tempting the athlete to consume too much fluids above 1 liter per hour, leading to dilutional hyponatremia. It is observed that the athletes who consume in excess of 1 liter fluid per hour in prolonged endurance events are most likely to experience the symptomatic malaise observed in 1st-stage hyponatremia.

Competing interests: None declared

Yiu Wing Cheung,
Medical Officer,
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Hong Kong SAR, China

Send response to journal:
Re: Plenty of Fluid and Respiratory Infection

I am not convinced that drinking fluid is harmful to all patients with respiratory infection (RTI).

It is not correct to think that increased antidiuretic hormone (ADH) secretion in lower respiratory tract infection (LRTI) is a common phenomenon. Hyponatraemia is a well known complication of LRTI but it is not common. Furthermore, it is difficult to prove that the incidence or the death of the LRTI related hyponatraemia cases were associated with increased water intake or not.

I believed that hyponatraemia could still occur even with normal fluid intake. Fluid restriction may not be helpful to all LRTI. It can be even harmful if we restricted fluid too much to the extent of causing dehyration.

I did not think that the data the authors found could be extrapolate to patients with upper respiratory infection (URTI) because there was no definite evidence.

In Hong Kong, the newspaper had quoted the study and said "plenty of fluid in flu can be harmful"! I worried the community might have misconception about the finding of the study.

Competing interests: None declared

[redacted] 29 February 2004

Richard G Fiddian-Green,
None
None

Guppy et al report that they had found "two prospective prevalence studies [which had] reported hyponatraemia at rates of 31% and 45% for children with moderate to severe pneumonia. None of these

Send response to journal:
Re: Cellular benefits of keeping children "dry" rather than "wet".

children showed clinical signs of dehydration. Symptoms associated with hyponatraemia were not reported, but four children with a serum sodium below 125 mmol/l died during one study" (1).

The fall in tissue pH that may develop either regionally or systemically in acute illnesses and severe exercise, because of unreversed ATP hydrolysis, is accompanied by a rise in ionised [Ca++] and may cause intracellular calcium overload which if excessive is toxic to cells. This may be accompanied by a rise in intracellular [Na+] because the sodium pump is inhibited by an extracellular acidosis because protons are buffered intracellularly in exchange for potassium. The hyponatraemia might be compounded by activation of the Na(+)-Ca(2+) exchanger (2). Activation of pH regulatory mechanisms, including Na+/H+ exchange, may also compound the severity of the hyponatraemia to a degree limited by its stimulation of Na+/ K+-ATPase activity (3).

These changes could account for the hyponatraemia seen in the children with respiratory infections, and its association with poor outcomes. They might also account for the antidiuretic hormone secretion that increases in proportion with the extent of lung parenchymal involvement. In fetal sheep normocapnic hypoxia releases vasopressin and hypercapnia/acidemia augments the response to hypoxia (4).

Fluid intake, particularly if excessive, may compound the severity of these changes in patients with acute respiratory infections in the same manner that it does in marathon runners (5). The fluid intake could have an adverse effect by causing oedema and increasing the diffusional distances for the transport of oxygen, nutrients and metabolic by- products between capillaries and cells. They might also make matters worse be decreasing the a-v pressure gradient in capillaries by increasing venous outflow pressure. Some degree of dehydration may have the reverse effects and increase capillary flow rates as observed in the electronic discussion of Noakes' paper. Keeping patients "dry" rather than "wet" improves outcome patients in haemorrhagic shock.

Shock, defined as the presence of an impairment of tissue energetics evident from the presence of a gastric intramucosal acidosis, was undoubtedly present in those children with respiratory infections who died. In which case the translocation of endotoxin, and its release of cytokines, may have been another compounding factor as proposed in marathon runners.

1. Michelle P B Guppy, Sharon M Mickan, and Chris B Del Mar "Drink plenty of fluids": a systematic review of evidence for this recommendation in acute respiratory infections BMJ 2004; 328: 499-500

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3. Harvitt DM, Bonanno JA. pH dependence of corneal oxygen consumption. Invest Ophthalmol Vis Sci. 1998 Dec;39(13):2778-81.

4. Raff H, Kane CW, Wood CE. Arginine vasopressin responses to hypoxia and hypercapnia in late-gestation fetal sheep. Am J Physiol. 1991 Jun;260(6 Pt 2):R1077-81.

5. Noakes TD. Overconsumption of fluids by athletes BMJ 2003; 327: 113-114

Competing interests: None declared

Ronald Eccles, Director
Common Cold Centre, School of Biosciences, Cardiff University, Cardiff Cf10 3US,
Martez Jawad, Medical Director

Send response to journal:
Re: No harm in fluids for colds and flu

Editor- The article by Guppy, Mickan and Del Mar as a systematic review of evidence for the effects of fluid intake on the course of acute respiratory infections has been interpreted in the press as a warning against fluid intake whilst suffering from acute upper respiratory tract infections such as common cold or flu. Headlines in newspapers and the inter-net warn that the 'age old advice on fluids for colds' is now disputed by research out of Australia.

The authors have mischievously taken an old folk-lore on fluids and colds and presented evidence on severe lower respiratory infections in infants to make a case that intake of fluids may be harmful. The press and public have got the wrong message because of the confusion in the article. The saying "Drink plenty of fluids" is generally accepted to refer to common colds and is not normally associated with acutely ill and hospitalised infants. By linking these two together the authors have created a scare story, but they have not addressed the main issue of the folk-lore. There are no controlled clinical trials in the literature to support any beneficial effect of maintaining fluid intake whilst suffering from an acute upper respiratory tract infection, but neither is there any evidence that indicates that this remedy is harmful in any way when applied as intended to colds and flu.

Competing interests: RE and MJ conduct sponsored

clinical trials for the pharmaceutical industry on common cold medicines at the Common Cold Centre.

[redacted] | 26 March 2004

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Department of Medicine for the Elderly, Arrowe Park Hospital, Upton, Wirral, CH492PE.,
Barrett James,
Stevens Rob

Send response to journal:
Re: 'Drink plenty of water' may be fatal

We read with interest Guppy et al's recent paper [1] as we have concerns that routinely advising patients to increase their fluid intake, especially in the elderly and after some procedures, can have serious consequences. Post operative urological patients are often routinely advised to drink plenty of fluids to keep a urinary catheter flushed. It is not unusual for these patients to drink an extra 5 litres of water per day in addition to their normal fluid intake. A recent case has highlighted to us that older patients don't always handle this extra volume well, which is consistent with age related renal changes [2]. Polydipsia can lead to severe hyponatraemia with serious consequences, including death, even in apparently healthy individuals with normal renal function [3 - 5].

References

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2. Andreucci VE, Russo D, Cianciaruso B, Andreucci M. Some sodium, potassium and water changes in the elderly and their treatment. Nephrol Dial Transplant 1996; 11 Suppl 9: 9-17.

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Competing interests: None declared

Drink plenty of fluids in acute respiratory infections | [redacted] March 2004

Wei Shen Lim,
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We read with interest this report by Guppy et al. However, their final comment that "we should be cautious about universally recommending increased

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John T Macfarlane

Send response to journal:
Re: 'Drink plenty of fluids' in acute respiratory infections

fluids to patients, especially those with infections of the lower respiratory tract" should perhaps be further qualified.

Firstly, the studies used to support their comment relate mainly to paediatric patients where the observed risk of hyponatraemia was >30%. It cannot be assumed that the same applies in adult patients. Indeed, Fine et al in cohorts of 14,199 and 38,039 adult patients with community acquired pneumonia (CAP) reported hyponatraemia (Na < 130 mmol/l) in only 7.7% and 6.5% respectively.[1]

Secondly, as hyponatraemia is a recognised poor prognostic factor in CAP [1](this is indicated by the authors as well), most patients with hyponatraemia would have disease severe enough to warrant hospital referral. This is reflected in the extremely low incidence of hyponatraemia in adults with CAP treated in the community -0.7% of 944 out -patients compared to 6.1% of 1343 in-patients in the large prospective Pneumonia PORT cohort study.[1]

Therefore, we believe the risks to adults with CAP treated in the community from hyponatraemia are not as high as suggested by the authors. Patients with severe CAP need hospital referral. In these patients, hyponatraemia will be detected from 'routine blood tests' performed to assess disease severity. A powerful marker of prognosis is a raised urea which occurs in >20% of hospitalised adults with CAP [1], mostly as a result of dehydration. In these patients, fluid replacement is essential.

References:

1. Fine MJ, Auble TE, Yealy DM, et al. A prediction rule to identify low-risk patients with community- acquired pneumonia. New England Journal of Medicine 1997;336(4):243-250.

Competing interests: None declared

[redacted]

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Department of Pediatrics, Advanced Pediatrics Centre, PGIMER, Chandigarh-160012, INDIA

Send response to journal:

The article "Drink plenty of fluids " a systematic review of evidence for this recommendation in acute respiratory infections" is misleading. The authors also have not reviewed the studies available in adults and animal models of pneumonias. The authors observe "giving increased fluids to patient with respiratory infection may cause harm", and comment that "fluid restriction may be appropriate management." They

Re: SHOULD WE RESTRICT FLUIDS IN RESPIRATORY INFECTIONS- NO PROOF YET.

base their recommendation on frequent occurrence of hyponatraemia in lower respiratory infections and higher risk of death in those with severe form of hyponatremia. Implicit in the above recommendation is the assumption that hyponatraemia caused deaths. With the current evidence this assumption is not tenable; a cause and effect relationship can not be assigned between hyponatraemia and death. It is equally possible that hyponatraemia was a marker of severe illness. In all the four patients who died, hyponatraemia was present at admission, and had nothing to do with fluids that they received.1 These patients had more severe disease, a point that was emphasized in the original paper.1 Indeed, hyponatraemia occurs more frequently in all kinds of seriously ill patients irrespective of the primary diagnosis.2 Hyponatraemia in patients with pneumonia and bronchiolitis has been attributed to impaired water excretion3-5. However, fluid restriction across the board in all the patients with respiratory infection may not be justified as about two thirds of patient with pneumonia or bronchiolitis do not have hyponatremia Why should they be given restricted fluids? Moreover, in all the patients hyponatraemia may not be because of water retention. An important mechanism of hyponatraemia in critically ill patients is translocation of sodium from extracellular to intracellular space, and leakage of intracellular solutes, so called 'sick cell syndrome. In a recent study in critically ill adults an accumulation of non-diffusible osmotically active solutes in plasma, measured was increased `osmolar gap', was observed in more than 50% of hyponatraemic patients.6 In experimental model of sepsis Hannon and Boston showed significant intracellular shift of sodium and suggested that hyponatraemia and hypo-osmolality in sepsis was caused by intracellular shift of sodium and dilution of extracellular space as a result of water retention.7 We found a significant increase in RBC sodium and impaired sodium-potassium pump coinciding with hyponatraemia in septicemic children.8 In another study we found that intracellular (RBC) sodium was significantly increased in hyponatraemic patients with pneumonia while it was normal in hyponatraemic patients having acute diarrhoeal illness (unpublished data). None of these arguments is directed towards advocating liberal fluid therapy in lower respiratory infections. Plasma volume expansion resulted in increased extravascular lung water in a canine model of pneumococcal lobar pneumonia9 and increased the extent of pneumonia in a canine model of acute Pseudomonas pneumonia.10 If one is inclined to use fluid restriction, perhaps it should be confined to hyponatremic patients and that too after correcting hypoxemia. A study published in 1970 had shown that an expansion of plasma volume in acute phase of

pneumonia in elderly patients improved cardiac output and decreased arteriovenous oxygen difference.11 However, one cannot be categorical on either side. One should take a balanced approach till such time that randomised controlled studies answer the question.

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Competing interests: None declared