

Advising patients to increase fluid intake for treating acute respiratory infections (Review)

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[Intervention Review]

Advising patients to increase fluid intake for treating acute respiratory infections

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ABSTRACT

Background

Acute respiratory infection is a common reason for people to present for medical care. Advice to increase fluid intake is a frequent treatment recommendation. Attributed benefits of fluids include replacing increased insensible fluid losses, correcting dehydration from reduced intake and reducing the viscosity of mucus. However, there are theoretical reasons for increased fluid intake to cause harm. Anti-diuretic hormone secretion is increased in lower respiratory tract infections of various aetiologies. This systematic examination of the evidence sought to determine the benefit versus harm from increasing fluid intake.

Objectives

To answer the following questions.

- (1) Does recommending increased fluid intake as a treatment for acute respiratory infections improve duration and severity of symptoms?
- (2) Are there adverse effects from recommending increased fluids in people with acute respiratory infections?
- (3) Are any benefits or harms related to site of infection (upper or lower respiratory tract) or a different severity of illness?

Search strategy

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library* 2005, issue 2) which contains the Acute Respiratory Tract infection Group's Specialized Register, MEDLINE (1966 to July Week 1, 2005), EMBASE (1974 to Week 29, 2005), Current Contents (current 5 years) and CINAHL (1982 to July week 3 2005). Reference lists of articles identified were searched, and experts in the relevant disciplines were contacted.

Selection criteria

Randomised controlled trials (RCTs) that examined the effect of increasing fluid intake in people with acute respiratory infections.

Data collection and analysis

Each author assessed the identified studies to determine eligibility for inclusion.

Main results

No RCTs assessing the effect of increasing fluid intake in acute respiratory infections were found.

Authors' conclusions

There is currently no evidence for or against the recommendation to increase fluids in acute respiratory infections. The implications for fluid management in acute respiratory infections have not been studied in any RCTs to date. Some non-experimental (observational) studies report that increasing fluid intake in acute respiratory infections may cause harm. RCTs need to be done to determine the true effect of this very common medical advice.

PLAIN LANGUAGE SUMMARY

Advising patients to increase fluid intake for treating acute respiratory infections

Doctors commonly recommend that people with acute respiratory infections drink extra fluids. Acute infections include colds, acute sinusitis, tonsillitis, laryngitis, bronchitis, pneumonia and influenza. This review intended to find out the benefit or harm from this recommendation. Possible benefits of fluids are to replace fluid lost because of fever or rapid breathing, treat dehydration and reduce the viscosity of mucus. Possible harmful effects might be a dilution of the blood sodium concentration, leading to headache, confusion and seizures. This review found no evidence for or against the use of increased fluids in acute respiratory infections. No randomised controlled trials have been conducted to determine the benefit or harm from extra fluids. It is important that further studies be done in order to determine the true effect of this very common medical advice.

BACKGROUND

Description of the condition

Acute respiratory infections form a large proportion of disease seen in primary care settings. Some studies estimate this as the reason for presentation in up to 15% of primary care consultations (Fry 1993).

Description of the intervention

Advice to increase fluid intake is a common treatment recommendation (Evans 1998; Murtagh 1996; Rosser 1998). This advice is often non-specific in terms of quantity of fluid recommended, but the usual implication is to drink more than normal. However, there is debate over what is a normal healthy fluid intake (Valtin 2002). The type of fluid is not usually specified but is usually confined to oral fluids normally consumed by the patient. Sometimes specific fluids are recommended, such as fruit juice, soup, lemonade and tea (Kirkpatrick 1998; Schmitt 1999).

How the intervention might work

Benefits from fluids are attributed to: replacing increased insensible fluid loss from fever and from respiratory tract evaporation with tachypnoea (Dhawan 1992; Shann 1985); correcting dehydration from reduced intake (Gerigk 1996); reducing the viscosity of mucus (Middleton 1991; Rosser 1998); loosening nasal mucus (Saketkhoo 1978) and moistening the respiratory tract to maintain comfort (Evans 1998; Middleton 1991).

Why it is important to do this review

However, there are theoretical reasons for increased fluid intake to cause harm. Anti-diuretic hormone (ADH) secretion is increased in lower respiratory tract infections of various aetiologies. Excessive ADH secretion has been reported in bronchitis, bronchiolitis and pneumonia (Dreyfuss 1988; Gozal 1990; Heim 1982). The mechanism of increased ADH secretion might be due to a resetting of the osmostat (Dreyfuss 1988; Hill 1990) or a response to the perception of hypovolaemia by intrathoracic receptors (Gozal 1990; Van Steensel-M 1990). Giving increased fluids (or even nor-

mal maintenance) might theoretically lead to hyponatraemia and fluid overload (Dhawan 1992).

OBJECTIVES

To answer the following questions.

1. Does recommending increased fluid intake as a treatment for acute respiratory infections improve duration and severity of symptoms?
2. Are there adverse effects from recommending increased fluids in people with acute respiratory infections?
3. Are any benefits or harms related to site of infection (upper or lower respiratory tract) or a different severity of illness?

METHODS

Criteria for considering studies for this review

Types of studies

All randomised controlled parallel group trials that examined the effect of treatment with, or recommendation for, increased oral fluid intake in people with acute respiratory infections. Comparison groups included one group receiving no treatment with, or no recommendation for, increased oral fluid intake.

Types of participants

People of all ages with an acute respiratory infection and presenting for treatment in a primary care setting.

Participant age groups included infants, children, adults and geriatrics.

Acute respiratory infection was subdivided into upper and lower respiratory tract infection and included the following clinical entities, as defined by the international classification of health problems in primary care (ICHPPC) (WONCA 1983).

Upper respiratory tract infection (URTI)

This included the ICHPPC-defined conditions: acute upper respiratory tract infection (cold, nasopharyngitis, pharyngitis, rhinitis), acute sinusitis, acute tonsillitis, acute laryngitis and tracheitis. There had to be an absence of abnormal chest signs to define these conditions.

Lower respiratory tract infection (LRTI)

This included the ICHPPC-defined conditions: acute bronchitis, bronchiolitis (which includes tracheobronchitis) and pneumonia.

Influenza was defined according to two ICHPPC categories. Influenza without pneumonia was included as an URTI. Influenza pneumonia was included in the ICHPPC category of pneumonia and was considered as a LRTI.

For the purposes of this systematic review we excluded otitis media. People with underlying medical conditions were excluded as their fluid requirements may differ from the normal population. Patients with central nervous system (CNS) infection were excluded as this alters their fluid management (Brown 1994). People with diarrhoea were excluded as discussion of their fluid requirements has been covered in a previous systematic review (Hahn 2003).

Types of interventions

Treatment with, or recommendation for, increased oral fluid intake.

Types of outcome measures

Symptoms:

- severity and duration, however measured in the studies;
- including but not restricted to fever, mucus production, nasal congestion, sore throat, cough, headache.

Complications:

- symptoms of dehydration (nausea, vomiting, postural dizziness);
- symptoms of water overload and hyponatraemia (behavioural disturbance, headache, confusion, convulsions, coma).

Health service utilisation:

- including requirement for hospital admission;
- visits to primary care facility.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library* 2005, issue 2) which contains the Acute Respiratory Tract Infection Group's Specialized Register, MEDLINE (1966 to July Week 1, 2005), EMBASE (1974 to Week 29, 2005), Current Contents (current 5 years) and CINAHL (1982 to July week 3 2005).

We combined the following search strategy with the Cochrane highly sensitive search strategy phases one and two as published in appendix 5c of the Cochrane Reviewers' Handbook (Clarke 2003). There were no constraints based on language or publication status when searching for trials. The following terms were also searched

on CENTRAL and adapted for EMBASE, Current Contents and CINAHL as necessary.

MEDLINE (OVID)

1 exp Respiratory Tract Infections/
2 respiratory infection*
3 upper respiratory tract infection*
4 URTI
5 1-4 OR
6 exp Fluid Therapy/
7 fluid therapy
8 exp Water-Electrolyte Balance/
9 water electrolyte balance
10 fluid balance
11 exp water/
12 exp drinking/
13 exp drinking behaviour/
14 drink* adj (fluid* or water)
15 exp Infusions, Parenteral/
16 parenteral infusion*
17 exp thirst/
18 thirst*
19 exp water deprivation/
20 water intake
21 fluid intake
22 rehydration
23 exp Rehydration Solutions/
24 rehydration solution*
25 oral rehydration therapy
26 (give fluid*)
27 (give NEAR fluid*)
28 6-27
29 5 AND 28

Searching other resources

Reference lists of articles identified were searched, and experts in the relevant disciplines were contacted.

Data collection and analysis

Selection of studies

Abstracts found from the initial search were read to identify studies that met the inclusion criteria. Full text articles were retrieved and reviewed to determine eligibility. These studies were assessed independently by at least two authors. Differences of opinion among the authors were resolved by discussion.

No studies met the inclusion criteria. If any eligible studies are performed in the future we will use the following protocol.

Data extraction and management

- Data will be extracted from the studies independently by two authors using a standard form.
- Differences in extraction will be compared and resolved by discussion.

Assessment of risk of bias in included studies

Study quality assessment will be done using a modification of the method outlined in the Cochrane Reviewers' Handbook and that published in the literature (Chalmers 1990).

1. Method of treatment assignment:

- (3) adequate, blinded randomisation technique described ;
- (2) randomised plus double blind stated but method not described or method suspect, for example, envelopes;
- (1) randomisation stated but method not described plus investigator not blinded;
- (0) randomisation not mentioned.

2. Control of selection bias after treatment assignment:

- (3) intention-to-treat analysis and full follow up;
- (2) intention-to-treat analysis and less than 15% loss to follow up;
- (1) analysis by treatment received only, or no mention of withdrawals;
- (0) analysis by treatment received and no mention of withdrawals or more than 15 % withdrawals or loss to follow up or post randomisation exclusions.

3. Blinding:

- (3) blinding of patient, care giver and investigator;
- (2) blinding of investigator assessing outcome or patient and care giver;
- (1) blinding impossible, or impossible to judge if attempted;
- (0) blinding not done when it could have been.

4. Outcome assessment:

- (2) all patients had standardised assessment;
- (1) no standardised assessment, or not mentioned.

Unit of analysis issues

Data analysis will be on an intention-to-treat basis. Both fixed and random-effects models will be used. However, only the random-effects model will be used if significant heterogeneity is found. Continuous data will be analysed using weighted mean differences and 95% confidence intervals. Dichotomous data will be expressed as odds ratios with 95% confidence intervals.

If data of sufficient quality is obtained, subgroup analysis will be performed on the basis of:

- upper and lower respiratory tract infection (as already defined);
- age groupings with infants younger than two years old; children, as defined in the studies; adults, older than 18 years old;

- severity of illness, as measured in the studies and also determined on the basis of health service utilisation, that is to say, requirement for admission to hospital.

RESULTS

Description of studies

See: [Characteristics of excluded studies](#).

Results of the search

No studies met the inclusion criteria.

Excluded studies

Of those studies that were excluded, one RCT looked at the effect of fluids in healthy volunteers ([Saketkhoo 1978](#)). A second RCT looked at the effect of fluids in chronic bronchitis ([Shim 1987](#)). The other excluded studies were observational rather than interventional ([Dhawan 1992](#); [Gozal 1990](#); [Shann 1985](#); [Van Steensel-M 1990](#)).

Risk of bias in included studies

No studies met the inclusion criteria.

Effects of interventions

No studies met the inclusion criteria.

DISCUSSION

Summary of main results

We came to this review expecting to find little research done on the topic and only evidence that fluids would be beneficial. We were, therefore, somewhat surprised by the studies we found, which raise the question that there may potentially be a problem with excess fluids and that further research is worth doing on this question.

Overall completeness and applicability of evidence

We found that there is much written about hyponatraemia in the hospital setting. The reported incidence in children ranged from 1.38% ([Wattad 1992](#)) to 30% ([Prasad 1994](#)) and 1% ([Wattad 1992](#)) of all admissions in adults. Debate is ongoing about appropriate fluid therapy in sick hospitalised children in order to prevent iatrogenic hyponatraemia ([Hatherill 2004](#); [Holliday 2003](#); [Kaneko 2004](#); [Moritz 2003](#); [Taylor 2004](#)).

In this review we were interested in the primary care situation because this is where the majority of people with acute respiratory infections are treated. Given that these individuals are likely to be less sick than those hospitalised with an acute respiratory infection, do the same potential benefits and adverse effects of fluids apply? Are there similar implications for fluid management in the primary care setting?

(1) Does recommending increased fluid intake as a treatment for acute respiratory infections improve duration and severity of symptoms?

No RCTs were found to definitively answer this question. Further research needs to be done to determine the true benefits from recommending increased fluids in acute respiratory infections.

The main potential benefit from fluids would be to prevent or treat dehydration ([WHO 1990](#)). We found only observational data in children relating to this. [Singhi 1992](#), in a study of hospitalised children with pneumonia found a 25% incidence of hyponatraemia, with 7% of these children being hypovolaemic.

Another potential benefit is reducing the volume and viscosity of mucus. [Saketkhoo 1978](#) reported that nasal mucus velocity was increased by drinking hot liquids in a small controlled trial in healthy individuals. However, [Shim 1987](#) reported no change in mucus production in a controlled trial of hydration versus dehydration in patients with chronic bronchitis. Neither of these studies were performed in people with acute respiratory infections so we are unable to extrapolate the results to our study question.

(2) Are there adverse effects from recommending increased fluids in patients with acute respiratory infections?

No RCTs were found to definitively answer this question. Further research needs to be done to determine any true adverse effects from recommending increased fluids in acute respiratory infections.

Only observational data suggests potential adverse effects from recommending increased fluids. A summary of these studies is provided in 'Additional tables', an abridged version of which has previously been published ([Guppy 2003](#)).

Two prospective observational studies investigated the frequency of hyponatraemia in children admitted to hospital with pneumonia. [Shann 1985](#) reported an incidence of 45% and [Dhawan 1992](#) reported an incidence of 31%. In an observational study of infants with bronchiolitis none were found to have hyponatraemia, despite 22 out of the 23 having elevated ADH levels ([Gozal 1990](#)). In contrast, the frequency of hyponatraemia was reported as 21%

in an observational study of infants admitted to hospital with respiratory syncytial virus (RSV) infection, which included infants with bronchiolitis (Van Steensel-M 1990). The symptoms of hyponatraemia were not reported.

These studies were in hospitalised children. The incidence and clinical significance of this observational data for the primary care setting, and implications for fluid management, need to be determined with further research. Further research also needs to be done to determine the incidence and clinical significance of any adverse effects in adults.

(3) Are any benefits or harm related to site (upper or lower respiratory tract), or different severity of illness?

Site of Infection

No RCTs were found to answer this question. Further research needs to be done to determine if any benefit or harm from fluids is related to site of illness.

Observational data suggest hyponatraemia may be more commonly associated with infections of the lower respiratory tract. We have reported an association with pneumonia and bronchiolitis in children. Hyponatraemia has also been associated with lower respiratory tract infections in adults, including pneumonia (Breuer 1981; Pollard 1975; Rosenow 1972) and bronchitis (Heim 1982). Two cases have been reported of symptomatic hyponatraemia in infants with upper respiratory symptoms (Lipsitz 1984; Lubitz 1982). However, the incidence of hyponatraemia in upper respiratory infections appears to be rare. In a study of children with RSV infection none of the infants in the upper respiratory infection group had hyponatraemia (Van Steensel-M 1990).

Severity of Infection

No RCTs were found to definitively answer this question. Further research needs to be done to determine if any benefit or harm from fluids is related to severity of illness.

Observational data suggests hyponatraemia may occur more frequently with increasing severity of illness. Dhawan 1992 reported hyponatraemia was twice as common in children with severe pneumonia. Dreyfuss 1988 found that impairment of water excretion in adults with pneumonia was roughly proportional to the degree of severity of pneumonia, as seen radiographically. Hanna 2003 reported a 33% incidence of hyponatraemia in infants admitted to intensive care with bronchiolitis and a seizure rate of 4%. However, Van Steensel-M 1990 found in infants with RSV infection that mean sodium levels were normal and did not differ with severity of illness, despite a difference in mean ADH levels.

Singhi 1992 reported prolonged hospitalisation and increased

mortality in children with pneumonia and hyponatraemia, but whether this is due to the underlying disease process or the hyponatraemia is uncertain.

The observational data we found predominantly related to hospitalised children. There were only a small number of reports that we found pertaining to adult patients and, again, all these were hospitalised. We did not find any studies relating to fluid management in primary care. The significance of this data in relation to both children and adults in the primary care situation needs to be determined with further research.

AUTHORS' CONCLUSIONS

Implications for practice

The implications for fluid management in acute respiratory infections have not been studied in any RCTs to date. There is currently no evidence for or against increased fluids in acute respiratory infections.

Non-experimental (observational) data suggests that there may be a risk of symptomatic hyponatraemia due to increased antidiuretic hormone secretion in lower respiratory tract infections, particularly in children. The incidence in the primary care setting and the clinical significance of this observational data needs to be determined with further research, conducted as randomised controlled trials.

Implications for research

No randomised controlled trials have been performed to determine any benefit or harm from extra fluids during acute respiratory infections. Randomised controlled trials need to be done to determine the true effect of this very common medical advice.

ACKNOWLEDGEMENTS

Thanks to: Ruth Foxlee (the Acute Respiratory Infections Group's Trials Search Co-ordinator) for performing the searches; the Australian Government (through General Practice Education and Training) for funding the Academic GP Registrar position; and the following peer referees for helpful and thoughtful comments: Amy Zelmer, Andrew Argent, Robert Hash, Nely Rodriguez and Cheryl Flynn.

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References to other published versions of this review**Guppy 2003**

Guppy MPB, Mickan SM, Del Mar CB. “Drink plenty of fluids”: a systematic review of evidence for this recommendation in acute respiratory infections. *BMJ* 2003;**328**:499–500.

* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of excluded studies *[ordered by study ID]*

Dhawan 1992	Excluded as observational study only
Dreyfuss 1988	Excluded as it is not a randomised controlled trial
Gozal 1990	Excluded as observational study only
Saketkhoo 1978	Excluded as did not meet inclusion criteria for acute respiratory infection. All participants were healthy
Shann 1985	Excluded as observational study only
Shim 1987	Excluded as did not meet inclusion criteria for acute respiratory infection. All participants had chronic bronchitis
Van Steensel-M 1990	Excluded as observational study only

DATA AND ANALYSES

This review has no analyses.

WHAT'S NEW

Last assessed as up-to-date: 15 July 2005.

21 January 2010	Amended	Contact details updated.
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HISTORY

Protocol first published: Issue 4, 2003

Review first published: Issue 4, 2005

15 July 2008	Amended	Converted to new review format.
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CONTRIBUTIONS OF AUTHORS

The initial idea was conceived by Chris Del Mar. The review was written by Michelle Guppy. Formulating the question and editing the review was carried out by Chris Del Mar and Sharon Mickan.

DECLARATIONS OF INTEREST

None known.

INDEX TERMS

Medical Subject Headings (MeSH)

*Drinking; Acute Disease; Dehydration [etiology; therapy]; Fluid Therapy [*adverse effects]; Respiratory Tract Infections [complications; *therapy]

MeSH check words

Humans