Clinical signs of dehydration in older people: a diagnostic systematic review

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Dehydration in older people...

- **Common** – in UK Care homes 20-30% dehydrated\(^1\)
- Associated with major causes of **mortality and morbidity** in older people\(^2-4\)
  - Falls & fractures
  - Confusion & delirium
  - Heat stress, infections
  - Stroke, myocardial infarction
  - Poor wound healing, pressure ulcers
  - Drug toxicity (and more)
Dehydration in older people...

- Associated with risk of adverse outcomes\textsuperscript{5}
  - 17\% 30-day mortality in those admitted with main diagnosis of dehydration

- Expense
  - High levels of unplanned hospital admissions (John Reid, Sec. State for Health, 2004)\textsuperscript{6}
  - 1999 US hospital costs for 1\textdegree dehydration \textasciitilde$1.1-1.4$ billion/yr and rising fast\textsuperscript{7}
To summarise:

- Early identification, prevention and treatment of dehydration in the community would be good for older people and reduce NHS costs
Problem... identifying dehydration:

- How do GPs do it?
- Clinical skills textbooks for doctors:
  - Assess skin turgor (Crawford, Handbook of Signs and Symptoms\textsuperscript{8})
  - BUT “Unreliable in older people”
  - (need careful evaluation of dry oral mucosa, dry axillae and reduced urine output)
Problem... identifying dehydration:

- How do GPs do it?
- Ask a junior doctor!
  - “In hospital blood tests are often relied upon ...
  - whilst these are still used in general practice their usefulness is limited by the time taken to get the results –
  - if someone is unwell enough to have deranged blood results then they probably need acute intervention and we shouldn’t be delaying this waiting for results”
Problem... identifying dehydration:

How do GPs do it in the community?

- “we assess dehydration in the elderly most often when there is an acute cause for dehydration, such as diarrhoea or sepsis”.
- Outside ...hospital “we rely heavily on our history and examination findings.... fluid intake, quantity and colour of urine passed.... dry mucus membranes.... rapid pulse or prolonged capillary refill time”
Problem... identifying dehydration:

How do GPs do it?

- Signs of advanced dehydration, when action needs to be taken fast, include “headache, dizziness and vasovagal collapse ....
- dropping blood pressure or postural drop is a late and therefore worrying sign”
Problem... identifying dehydration:

- Every clinician and every book seem to give a different set of clinical signs, including:
  - skin turgor, dry axillae
  - tongue dryness or furrows, dry oral mucosa
  - urine specific gravity,
  - urine volume and/or colour, fluid intake
  - sunken eyes,
  - upper-body weakness,
  - bio-electrical impedance,
  - checklists of risk factors,
  - rapid pulse, prolonged capillary refill time....

- BUT - which are accurate? In the elderly?
Problem... identifying dehydration:

1. How to identify dehydration in community & care homes early (blood tests rare)?

- We need to clarify which clinical signs truly do indicate early dehydration and late dehydration older people.
- We also need to clarify what we mean by dehydration – signs in people with blood loss may be different from signs in people not drinking enough, or losing fluid due to diuretics, diarrhoea or fever.
Problem... identifying dehydration:

- We are systematically reviewing the diagnostic accuracy of clinical and physical signs vs. reference standards for dehydration.
- The protocol is being registered with the Cochrane Renal Group.
How do we define dehydration? (Reference Standard)
- experimentally induced dehydration
- change in total body water, estimated using deuterium oxide dilution
- raised serum osmolality
- a ≥3% drop in body weight over a week or less, or the same increase in body weight after rehydration
Systematic review methods

- Included studies will
  - compare an index test (clinical or physical sign) with a reference standard for impending and/or existing dehydration, and
  - Be in people aged at least 65 years who are hospitalised, living in the community, or living in institutions, in a developed country
  - Without diagnosed renal failure
Systematic review search

- We have searched on Medline and EMBASE:
  - [older people] AND [hydration/osmolality terms] AND [clinical and physical signs]
- 2040 possible titles and abstracts checked
- Additional searches: 2913 Medline
- 142 papers collected as full text so far
- We are just about to complete inclusion/exclusion
- Initial impressions: 10-15 relevant studies
Next steps

- Working with a group of 7 medical students (research project)
- Complete inclusion/exclusion of studies
- Data extraction and assessment of validity
- Analysis
- Write up

- Likely not to completely answer the question BUT will provide a set of likely biomarkers for a future cross-sectional study
Earlier Systematic review

- included studies published up to late 1997
- few relevant studies (4)
- limited evidence that in older people
  - dry axilla supported diagnosis of hypo-volaemia (pos. likelihood ratio 2.8, 95% CI 1.4 to 5.4)
  - moist mucous membranes or tongue without furrows supported lack of hypo-volaemia (neg LR 0.3, 95% CI 0.1 to 0.6).
  - Capillary refill time and poor skin turgor were not diagnostic⁹ (McGee 1999)
Earlier Systematic review

- A recent Australian cohort study in older people found that
  - systolic blood pressure drop on standing,
  - sternal skin turgor,
  - tongue dryness and
  - body mass index
- were good indicators of early dehydration on hospital admission
- BUT the standard was “subjective clinically assessed dehydration”
References


