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Review Article

Increasing Fluid Intake and Reducing Dehydration Risk in Older People Living in Long-Term Care: A Systematic Review



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A B S T R A C T

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Objective: To assess the efficacy of interventions and environmental factors on increasing fluid intake or reducing dehydration risk in older people living in long-term care facilities.

Design: Systematic review of intervention and observational studies.

Data Sources: Thirteen electronic databases were searched from inception until September 2013 in all languages. References of included papers and reviews were checked.

Eligibility Criteria: Intervention and observational studies investigating modifiable factors to increase fluid intake and/or reduce dehydration risk in older people (≥ 65 years) living in long-term care facilities who could drink orally.

Review Methods: Two reviewers independently screened, selected, abstracted data, and assessed risk of bias from included studies; narrative synthesis was performed.

Results: A total of 4328 titles and abstracts were identified, 325 full-text articles were obtained and 23 were included in the review. Nineteen intervention and 4 observational studies from 7 countries investigated factors at the resident, institutional, or policy level. Overall, the studies were at high risk of bias due to selection and attrition bias and lack of valid outcome measures of fluid intake and dehydration assessment.

Reported findings from 6 of the 9 intervention studies investigating the effect of multicomponent strategies on fluid intake or dehydration described a positive effect. Components included greater choice and availability of beverages, increased staff awareness, and increased staff assistance with drinking and toileting. Implementation of the US Resident Assessment Instrument reduced dehydration prevalence from 3% to 1%, $P = .01$. Two smaller studies reported positive effects: one on fluid intake in 9 men with Alzheimer disease using high-contrast red cups, the other involved supplementing 13 mildly dehydrated residents with oral hydration solution over 5 days to reduce dehydration. Modifications to the dining environment, advice to residents, presentation of beverages, and mode of delivery (straw vs beaker; prethickened drinks vs those thickened at the bedside) were inconclusive.

Two large observational studies with good internal validity investigated effects of ownership; in Canada, for-profit ownership was associated with increased hospital admissions for dehydration; no difference was seen in dehydration prevalence between US for-profit and not-for-profit homes, although chain facilities were associated with lower odds of dehydration. This US study did not suggest any effect of staffing levels on dehydration prevalence.

Conclusions: A wide range of interventions and exposures were identified, but the efficacy of many strategies remains unproven due to the high risk of bias present in many studies. Reducing dehydration

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publish. There are no additional data available, but the full set of data tables for the review is found in the submitted online supplementary materials.

Systematic review registration: International Prospective Register of Systematic Reviews, http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42012003100. Protocol registered October 2012.

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prevalence in long-term care facilities is likely to require multiple strategies involving policymakers, management, and care staff, but these require further investigation using more robust study methodologies.

The review protocol was registered with the International Prospective Register of Systematic Reviews (http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42012003100).

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Water-loss dehydration, when fluid output exceeds fluid input, leads to raised serum osmolality, common in older people living in long-term care facilities,¹ as demonstrated in our own study where 85 (46%) participants had impending or current dehydration (serum osmolality ≥ 295 mmol/kg).² Residents of long-term care facilities (which include residential care, long-term nursing care, and dementia care units) are particularly vulnerable to developing dehydration because they are more likely to experience cognitive and physical problems affecting their abilities to remember and obtain beverages. Anxiety about incontinence and toileting assistance often lead to a conscious reduction in fluid intake. This is complicated further by the physiological effects of aging, diminishing the thirst sensation and reducing the body's capacity to maintain an effective water-balance.

As dehydration in the elderly is associated with poor health outcomes,³ including increased risk of disability and mortality,⁴ prevention may improve health, functional status, and quality of life. Although drinking adequate fluids is the most effective method of preventing dehydration, this becomes complex for older people with a range of physical, cognitive, sensory, and behavioral needs.

Many articles describe ways of encouraging older people to drink more, but few studies, and only 1 systematic review, have evaluated their effectiveness.⁵ The 2003 systematic review included 2 small ($n = 39$, $n = 16$) randomized crossover trials assessing the effectiveness of interventions to increase fluid intake in older people. Without reporting the validity or findings of these studies, the review concluded that fluids should be offered more frequently to bedridden older adults, and additional help provided when people were uncooperative or refused to drink.⁵ The purpose of the current systematic review was to assess the effectiveness of interventions and environmental factors to increase fluid intake or hydration status in older people living in long-term care.

Methods

As recommended by the Cochrane Collaboration,⁶ our review team independently duplicated screening, eligibility, data extraction, and validity assessments. A third reviewer arbitrated when disagreements were not resolved by discussion. Where a reviewer was also a study author, she was not involved in study selection or data extraction. Results were reported following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.⁷

Search Strategy and Study Selection

We included intervention and observational studies involving older people (≥ 65 years) living in residential, long-term nursing care, or specialist dementia units (together called long-term care facilities), who could drink orally. Studies examined an association between the intervention, or modifiable exposure, and hydration status and/or fluid intake (primary outcomes). Secondary outcomes with a likely link to dehydration (such as constipation, falls, urinary and upper respiratory tract infections, or death) were noted where a primary outcome was described.

DB developed and performed complex systematic searches using text and indexing terms to search 13 databases from inception until September 30, 2013, with no language restrictions. The full Medline (Ovid SP) search strategy was published with the protocol on Prospero⁸ and adapted for Embase, PsychInfo (both OvidSP), CINAHL (EBSCO Host), British Nursing Index, CRD and Prospero, Cochrane CENTRAL, ISCRTN, ICTRP (WHO), Open Thesis, ProQuest Theses and Dissertations, and Kings Fund databases. Further searches were undertaken of key authors (>3 relevant publications) and references of included papers and reviews were checked.

Titles and abstracts were screened and full-text papers obtained if either reviewer considered it potentially eligible; full-text papers were grouped into studies and assessed for inclusion. Corresponding authors were contacted when papers were published in languages other than English or there were insufficient data to assess suitability for inclusion or outcomes.

Data Extraction, Risk of Bias, Quality Assessment, and Data Synthesis

We extracted bibliographic details and information on country, funding source, ethical approval, participants, study design, details of the intervention, and control or exposure and outcomes. For dichotomous outcomes we extracted numbers of participants, events, and odds ratios (ORs) or relative risks (RRs). For continuous outcomes we extracted number of participants, means and SDs of change in, or final readings of, outcomes in each treatment arm. *P* values were checked using reported data and these values reported if different.

Internal validity, evaluating the effects of systematic error, was assessed using the Cochrane Risk of Bias tool for intervention studies.⁶ Each item was judged high or low risk of bias or “unclear” when there was insufficient evidence to judge.

The Newcastle-Ottawa Scales (NOS)⁹ for cross-sectional and cohort studies were adapted for this review. Criteria were specified by 2 authors (DB, LH) and included definitions for dehydration and fluid intake assessment, whether age, gender, and frailty were controlled for and adequacy of follow-up (Web Table 6). Both scales had 8 items assessing 3 criteria: selection of participants, comparability of groups, and ascertainment of exposures and outcomes. Each item contained between 2 and 4 categories; those associated with the lowest risk of bias were starred. A maximum of 9 stars was achievable.

For all study types, risk of bias associated with assessment of dehydration status and fluid intake ascertainment was assessed, particularly whether fluid intake was assessed over 24 hours (to evaluate the effectiveness of the intervention on total fluid intake) or whether a valid assessment of dehydration had been used.

Studies were grouped according to type of intervention or exposure in narrative synthesis. The planned random effects meta-analysis, combining study estimates for similar effects of interest, was not possible due to the heterogeneity of interventions and outcomes.

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