Generation of thirst: a critical review of dehydration amongst older adults living in residential care

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Abstract

Dehydration is common amongst older adults and exacerbated in residential care. Herein we summarise the reported prevalence of dehydration in this sub-population group and evaluate the associated risks before reviewing interventions designed to improve hydration. Heterogeneity in methods to assess dehydration inhibits interpretation of both prevalence and intervention studies (primarily small randomised control trials and case-control observational studies).

The estimated prevalence of dehydration amongst older adults in residential care is 20-38%, with further increased prevalence of inadequate fluid intake, leading to increased urological, gastrointestinal, circulatory and neurological disorders or, in extreme cases, death. Multi-component interventions that include changes to drinks, vessels, placement and drinking opportunity alongside staff training and support are most effective in tackling dehydration in residential care. The detection and prevention of dehydration is crucial and a practical, population-specific reference standard for adequate fluid intake is warranted. Future research should prioritise interventions that are individualised to residents' needs according to dehydration typology. Ongoing investment in the care sector should address staff-to-resident ratios and enhance staff training on the detection and prevention of dehydration.

Key words: Older adults, elderly, residential care, dehydration, fluid intake, intervention, rehydration, euhydrated, drinking, thirst

Key Points: Older adults, particularly those in residential care settings, are susceptible to dehydration. Dehydration is associated with increased morbidity, and in extreme cases premature mortality. As dehydration and/or reduced fluid intake occur with relative frequency amongst older adults in residential care, strategies known to improve hydration are of significant interest. Research in this area is hindered by heterogeneous methods, in particular due to inconsistency in the assessment of dehydration itself. Multicomponent interventions tailored to individual need are likely most effective in tackling dehydration, though such implementation warrants central investment in staffing resource, as well as specific training and support for those providing day-to-day care.

Reflective questions:

- What three key measures would help you to encourage hydration in older adults?
- Consider what barriers prevent adequate hydration in the adults under your care.
- Consider whether you have the confidence to recognise dehydration in those who you care for.
- What cognitive factors may indicate signs of dehydration?
- Which intervention(s)/technique(s) do you employ in your care setting that you believe encourages adequate hydration?
- Which intervention(s)/technique(s) that support hydration require additional support such as training and/or funding?
    - Of these listed techniques, which one would you be most like to see implemented or continued?

1.0 Introduction

The global population is ageing with over a fifth of people predicted to be over 60 years old by 2050 (World Health Organisation 2018). Approximately 8% of older adults live in residential care in Canada (Statistics Canada 2018). In the United Kingdom (UK), as reported by the LaingBuisson report, there are approximately 410,000 people aged over 65 years who live in nursing and residential care homes (Oliver

2020). Dehydration, or net fluid loss, is a particular risk in older adults (National Health Service 2019a; Volkert et al. 2019). Age-related deterioration of neuroendocrine homeostatic mechanisms inhibits normal physiological responses to maintain hydration including impaired thirst sensation and renal resistance to antidiuretic-hormone (ADH) which normally stimulates water reabsorption and reduces urine output preventing body water loss (Phillips et al. 1993). Dehydration risk can be exacerbated in residential care (Hong 2020) due to physical dependence, dysphagia, morbidities, conscious inhibition of fluid intake due to fear of incontinence incidents, limited access to fluids, impaired cognitive awareness of when fluids were last ingested, fluid refusal and use of medications such as diuretics (British Nutrition Foundation n.d.; Begum and Johnson 2010; Shaw and Cook 2017). Whilst dehydration can result from low fluid intake or volume depletion (e.g. following sickness or diarrhoea) or both, this paper focusses primarily on low-intake dehydration amongst older adults in residential care.

2.0 Assessing dehydration

Dehydration research involving older adults living in residential care employs heterogeneous methods of assessment for dehydration, making interpretation and comparison of published literature challenging. Table 1 shows a summary of routine assessment methods for assessing hydration status. Serum osmolality, an invasive measure of osmotic concentration in blood serum, is the reference standard to diagnose dehydration in older adults living in residential care, as researchers are able to determine individual hydration status with very low intra- and inter-individual variation (Hooper et al. 2014; Cheauvront et al. 2010). Serum osmolality > 300 mOsm/kg indicates dehydration and 295-300 mOsm/kg impending dehydration (Hooper et al. 2015). A systematic review assessed different screening tests of dehydration in older adults against the reference standard and found bioelectric impedance analysis (BIA) at 50 kHz, missing drinks between meals, and expressing fatigue had the highest sensitivity and specificity. However, no tests were consistently useful in diagnosis (Hooper et al. 2015). The review was limited due to the diversity in reference standards and cut-offs, for example in fluid intake (Holben et al. 1999). Fluid intake is a statistically significant predictor of hydration status (Gaspar et al. 2019), frequently used amongst studies assessing dehydration, especially when equipment and budget are constrained, but is not synonymous with

dehydration. Observational symptoms are often used by care home staff, however, many of these signs are used to assess dehydration in children and older adults (Bunn and Hooper 2019); although it is important to recognise that both the assessment, and indeed the possible solutions to dehydration management in residential care facilities are most effective when individualised (as will be eluded to in sections 4.2 and 5.0). Bunn and Hooper (2019) concluded that relying on observational symptoms (including mouth, eye, skin, cardiovascular, urinalysis, temperature, self-report symptoms) may not accurately identify low-intake dehydration in residents living in care homes. Although in a small-scale study of 188 care home residents, no observable symptoms could distinguish between those who were dehydrated and those who were not (as identified by serum osmolality) (Bunn & Hooper 2019).

Table 1.

Reported methods of dehydration assessment adapted from Hooper et al. (2015), Thomas et al. (2008) and Volkert et al. (2019).

Physical Tests and Signs	Urinary Analysis	Blood Analysis	Self-reported symptoms	Other analysis
● Skin turgor* ● Capillary refill ● Dry underarm ● Dry oral mucosa* ● Dry mucus membranes ● Tongue Furrows ● Sunken eyes ● Weight change*	● Urine specific gravity* ● Urine colour* ● Urine output	● Serum Osmolality ● Blood Urea Nitrogen (BUN): creatinine ratio ● Serum sodium	● Thirst ● Dry mouth ● Dizziness ● Feeling sick ● Weak ● Headache	● BIA resistance at 50kHz* ● Blood pressure ● Fluid intake

* Not recommended for assessment of hydration status in older adults (Volkert et al. 2019)

3.0 Prevalence

Establishing the prevalence of dehydration amongst older adults living in residential care is challenging. Published figures vary, largely due to heterogeneous methods used in the field. Direct measures (serum or plasma osmolality) are invasive, though warranted where there is a specific increased risk of dehydration (such as in acute deterioration in health or significantly diminished appetite). Day-to-day, the monitoring of hydration in residential care is more subtle and reliant on subjective measures (such as urinary output and colour) or approximated (via fluid intake records).

3.1 Serum Osmolality and Osmolarity

It is acknowledged that a direct measure of serum osmolality >300 mOsm/kg should be used to identify low-intake dehydration in older adults. Where this is not possible, careful calculation of serum osmolarity for 'suitable' individuals (free from diabetes with adequate renal function), 65 years and older, including those in residential care, may be employed as a substitute for direct measurement providing the equation used is appropriate for the sub-population group (Volkert et al. 2019).

Up to 38% of older adults living in residential care have serum osmolality levels that indicate dehydration or impending dehydration (Marra et al. 2016; Gaspar et al. 2019). The UK Dehydration Recognition In Our Elders (DRIE) study found prevalence of dehydration and impending dehydration to be 20% and 28% respectively (Hooper et al. 2016). Participants were younger and better nourished than typical older adults living in residential care and those who are cognitively impaired were under-represented. Other studies (also under-representing cognitively impaired individuals) found higher prevalence of dehydration and impending dehydration of 38% and 30-38% respectively (Marra et al. 2016; Gaspar et al. 2019). These study cohorts included only those with memory-care and caloric supplementation needs. The study sample sizes analysed are small making generalisation inappropriate. We have found there is a paucity of large-scale studies exploring the prevalence of dehydration in older adults living in residential care, although best estimates to date suggest a likely range of 20-38%.

3.2 Fluid Intake

Daily fluid from drinks guidance for adults from the European Society for Clinical Nutrition and Metabolism (ESPEN) recommends 2.0L and 1.6L of fluid drinks per day for males and females of all ages respectively (Volkert et al. 2019). This represents approximately 80% of the recommended adequate intake (EFSA 2010) with the remaining 20% assumed to come from foods. No differentiation in fluid intake needs by age has been established, despite typically lower energy intakes in older adults in residential care and age-related inhibition of key homeostatic mechanisms previously described. Evidence-based fluid calculators can be used to compare intake against individualised daily targets for those most at risk, however, globally accepted specific guidelines for fluid intake for older adults in residential care settings do not currently exist. This is evident from qualitative interview and questionnaire reports of care home staff whereby inconsistencies were apparent in the recommendations of the quantity of fluid residents should consume (Cook et al. 2018). This may contribute to the risk of dehydration for some residents.

Published studies indicate the prevalence of inadequate fluid intake in older adults in residential care to be between 39-100% (Kayser-Jones et al. 1999; Holben et al. 1999). These equivocal findings result from heterogeneity of standards used to determine 'adequate fluid intake'. Standards and findings are summarised in Table 2. All of these studies, apart from the multi-site study undertaken by Namasivaya-Macdonald et al. (2018), have very small sample sizes and few are recent. The more contemporary, larger study by Namasivaya-Macdonald and colleagues (2018) recruited a representative sample of older adults in residential care, and observations were carried out by trained research personnel.

Older adults who do not drink sufficient amounts of fluids are consequently at risk of dehydration (Volkert et al. 2019). Typically, estimates of fluid intake from staff assessment compared to direct observation are poorly correlated (Volkert et al. 2019). It is timely for experts to agree one practical universal reference standard for adequate fluid intake for older adults specifically suited to residential care settings *and* an agreed, accurate methodology for monitoring fluid intake, in order to enable meaningful research in this area to progress.

Table 2.

Heterogeneity in fluid intake recommendations historically and a paucity of contemporary data has led to inconsistent estimates of fluid intake inadequacy

Standard number	Volume of liquid recommended per day	Prevalence of studied older adults in residential care settings not meeting standard
1	30mL/kg body weight	• 50% (Holben et al. 1999) • 52% (Chidester and Sprangler 1997) • 95% (Kayser-Jones et al. 1999)
2	1mL/kcal energy consumed	• 39% (Holben et al. 1999) • 60% (Chidester and Sprangler 1997) • 98% (Kayser-Jones et al. 1999)
3	100mL/kg for the first 10kg, 50mL/kg for the next 10kg and 15mL/kg for the remaining kilograms of bodyweight	• 49% (Holben et al. 1999) • 90% (Chidester and Sprangler 1997) • 100% (Kayser Jones et al. 1999)
4	30mL/kg bodyweight with a minimum of 1500mL	• 50% (Holben et al. 1999) • 74% (Hendry and Ogden 2016)
5	1,600mL/m^2 body surface area	• 92% (Gaspar 1999)
6	1,500mL	• 85% (Namasivaya-MacDonald et al. 2018) • 98% (Kayser-Jones et al. 1999)
7	2.0L and 1.6L of fluids per for males and females of all ages respectively (*ESPEN/EFSA (food contributing to an additional 20% of fluids)	• 45% (Jimoh et al. 2019)

*The European Society for Clinical Nutrition (ESPEN)/European Food Safety Authority (EFSA)

4.0 Risks associated with chronic and acute dehydration in older adults living in residential settings

A seminal paper from the 1990s reported observed associations between dehydration and acute infections. This included respiratory illnesses and urinary system infections, in addition to chronic conditions such as frailty, cancer, diabetes, and most importantly mortality, established using data from all elderly Medicare beneficiaries in the United States (US) in 1991 (Warren et al. 1994). More contemporary literature has established a link between dehydration with urological, gastrointestinal, circulatory and neurological disorders as outlined in Table 3. In most cases evidence lacks consistency, is largely associative

and the bi- or multi- directional relationships involved add complexity which inhibits interpretation (Bunn and Hooper 2019; Begum and Johnson 2010; El-Sharkawy et al. 2015).

Table. 3

Disorders associated with dehydration, adapted from El-Sharkawy et al. (2015)

Urological	Gastrointestinal	Circulatory	Neurological
● Urinary tract infections ● Urolithiasis ● Chronic kidney disease ● Bladder cancer	● Functional constipation ● Colorectal cancer ● Gallstones	● Deep vein thrombosis ● Cerebral infarct ● Coronary heart disease ● Orthostatic hypotension ● Mitral valve prolapse	● Delirium ● Headache

Hereafter we consider the literature linking dehydration in older adults living in residential care settings to mortality and cognitive function specifically.

4.1 Mortality

Warren et al. (1994) found that amongst the elderly who were hospitalised with a principal diagnosis of dehydration, almost half died within a year. Mortality rates have also been shown to be higher amongst older adults living in residential care who are suffering from hypernatremia (Chassange et al. 2006) and high plasma osmolality (O'Neil et al. 1990). In case-control studies, statistical significance was only reached in hypernatremic participants. Where measured, plasma osmolality was high amongst both cases and controls; median survival time for the highest osmolality group was significantly reduced (O'Neil et al. 1990). Another case-control study found no association between mortality and dehydration in older adults, however, almost none of the study population were admitted for hypernatremia (volume-depletion was used) and all were male (Wakefield et al. 2008). Unsurprisingly, mortality risk in older adults living in residential care is highest in the hottest weeks of the year (Mackenbach et al. 1997).

4.2 Cognitive Function

It has been established that dehydration can be associated with delirium in older adults living in residential care (Volkert et al. 2019; Culp et al. 1997). Delirium (i.e. acute confusion) is a transient, reversible indicator of cognitive dysfunction (Fong et al. 2009). Analysis of data from US nursing homes found inadequate fluid intake was significantly associated with delirium episodes (Mentes et al. 1999). This study used a large, representative sample of older adults living in residential homes; however, there was no definitive diagnosis of delirium and no quantitative measure of fluid intake. Mentes and Culp (2003) carried out a case-control study to determine if an eight-week hydration intervention reduced occurrence of delirium. There was a lower incidence of delirium in the treatment group, however, this was non-significant (perhaps due to selection bias, as the treatment group had significantly greater risk of delirium) (Mentes and Culp 2003). In another study, Cacchione et al. (2003) recruited 74 adults (83% women; mean age 82 years) from two long-term care facilities. Participants either had no cognitive impairment, a diagnosis of dementia or a recent change in mental status. Following the analysis of clinical assessment profiles specifically for acute confusion, infection followed by dehydration was the most common cause (Cacchione et al. 2003). Stratified sampling ensured a representative sample of older adults living in residential care were recruited to participate, however, the authors reiterate the multifactorial aetiology of delirium and the importance of avoiding assuming a causal relationship. Multidisciplinary interventions that incorporate hydration strategies may be effective in preventing delirium (Volkert et al. 2019).

Significant associations have been found between dehydration and cognitive function (Hooper et al. 2016), dementia (Chassange et al. 2006; van der Steen et al. 2007), confusion and speech difficulties (Gross et al. 1992). In addition, older adults with impaired cognition living in residential care received significantly less fluid than their more lucid counterparts when observed (Armstrong-Esther et al. 1996), making it difficult to determine the direction of this relationship. Typically, dementia can interfere with an individual's ability to recognise thirst, as well impeding their ability to remember where to get drinks, and to drink them when they are provided (Hooper 2020; Shaw and Cook 2017). Studies that have found only non-significant associations between dehydration and cognitive function (Culp et al. 2003; Mccrow et al. 2016) tend to have small sample sizes, and/or missing data, or poor compliance. Refusal to drink remains a

specific problem for some with dementia, not least where this is complicated by dysphagia (Shaw and Cook 2017).

Brain tissue fluid (related to volume changes of the whole brain, white matter, hypothalamus/thalamus) has shown *in vivo* to decrease when dehydrated (Biller et al. 2015) resulting in cellular dehydration. This effect is exacerbated in older adults in residential care as a result of ageing-related physiological brain deterioration (Peters 2006). Dehydration has also shown to significantly increase cortisol levels (Castro-Sepulveda et al. 2018) which is also negatively associated with cognitive function (Vedhara et al. 2000; Comijs et al. 2010). There appears to be a cyclic nature to cognitive decline and dehydration, with both likely causing exogenous effects on the other.

Although many of the studies reported cannot assume cause and effect of dehydration on delirium and cognitive effects, it is apparent that the cognitive status of older adults living in care homes requires careful monitoring. Associated signs of possible dehydration, including acute confusion, speech and memory should be carefully monitored by staff. Subtle changes in these factors, although may be linked to other neurodegenerative disease, could possibly be minimised through hydration interventions. Further investigative studies are warranted to provide further evidence for the causal effects in conjunction with dehydration preventative interventions.

5.0 Interventions

A recent editorial published in 'Nursing and Residential Care' highlighted that support to avoid dehydration in older residents in care settings warranted careful attention and that multiple strategies, ideally in combination, may be effective (Hong 2020). Similar suggestions are eloquently offered in an article by Shaw and Cook from 2017. From drinking vessel type, drink range and proximity, drinking opportunity frequency and environment, to continence support, staff training and provision of 'wet foods', there are multiple ways in which dehydration risk can be addressed. Each intervention comes with specific challenges for staff and residents, and in reality, a multi-pronged approach individualised to each resident is likely to be most successful (Ashurst 2011; Hong 2020; Volkert et al. 2019; Shaw and Cook 2017).

A systematic review found multicomponent strategies tackling dehydration in older adults living in residential care were most effective, particularly increased staff assistance and choice/availability of fluids (Bunn et al. 2013). Results were inconclusive for adjustments to advice given to residents, dining environment, presentation of beverages and their drinking vessel. High risk of bias was found amongst studies that differed in length of observation, assessment method and employed varying definitions of "fluids" (Bunn et al. 2013). It acknowledged that high drink availability coupled with varied beverage choice is important (Volkert et al. 2019).

One observational study generated a typology of oral hydration problems, categorising participants into subgroups, determined by the cause of dehydration and suggesting interventions to tackle each subgroup as shown in Table 4 (Mentes 2006). Although these interventions were not tested for their effectiveness, the descriptive longitudinal approach combined quantitative and qualitative data simplified the complex issue, identifying the importance of individualised care. Future research may draw inspiration from this typology to address the need for large-scale case-control studies. Assessing and categorising the risk of dehydration in older adults living in residential care would allow associated interventions to be implemented, alongside increased staff support for drinking and for incontinent residents (discussed later), in order to enhance our understanding of this important issue.

Table 4.

Typology of hydration problems among frail nursing home residents with suggested interventions (Taken from Mentes 2006).

Typology	Subgroups	Suggested intervention
Can Drink	Independent	• Educate • Use graduated cup • Provide preferred beverages
	Forgets (Cognitively Impaired)	• Frequent offers • Fluid during activities • Teatime/happy hours • Beverage cart
Can't Drink	Dysphagic	• Swallowing exercises • Foods rich in fluid (smoothies) • Oral care • Educate family to help
	Physically Dependant	• Sports cup with straw • Physical aids to assist with drinking
Won't Drink	Sipper	• Frequent small amounts at each contact • Fluid with activities • Provide preferred beverages
	Fears Incontinence	• Educate about maintaining fluid intake • Kegels, urge inhibition • Medication as last resort
End of Life (Terminally ill)		• Resident and family preference • Advance directive

Mixed methodologies have been used to investigate the effectiveness of intervention strategies, reflecting the diverse needs of older adults in residential care, but compounding the difficulty of determining the effectiveness of individual intervention methods.

5.1 Drinking Vessels

Various studies have found improvements in hydration of older adults in residential care as a result of changing the type and/or colour of drinking vessels. A phased intervention involving alternative drinking vessels that had been evaluated and rated highly by residents (phase 1) reported a significant increase in mean fluid intake compared to baseline measurements (number of drinks provided, volume of fluids at

246 breakfast) (Bak et al. 2018). The amount of fluids served was also significantly higher with the new drinking
247 vessels. Baseline measurements were taken from the fluid intakes recorded from routine measurements
248 and compared to phase 2 intervention measures taken over three consecutive days. It was suggested that
249 results were partly due to increasing the size of the drinking vessel and using vessels that were easier to
250 hold. Replacing white for high-contrast drinking vessels increased fluid intake in residents with Alzheimer's
251 disease (Dunne et al. 2004) in a small study, not necessarily generalisable to all older adults living in
252 residential care, though similar results have been found in other populations including community-dwelling
253 elderly and hospital patients (Gordon and Henson 2017; Hollis 2011). Allen et al. (2011) found significantly
254 more oral nutritional supplement drinks were consumed and deemed acceptable by residents who were
255 provided with a glass or beaker rather than the container with a straw. This method is found to be effective
256 for some older adults living in residential care. Those residents with mobility or dexterity difficulties
257 predominantly benefitted when vessel type was changed, whereas those with cognitive dysfunction
258 benefited more from changes made to vessel colour.

259 Mode of delivery for fluids in residential care settings continues to be challenging. Provision of
260 water-rich foods can be useful for residents with dementia alongside prompts/encouragement to drink and
261 regular provision of drinking opportunities irrespective of thirst (Hooper 2020). Ongoing research supports
262 evolution of existing methods, and emergence of new and novel solutions in line with developing
263 technologies, as evidenced by the development of jelly 'sweets' containing 90% water offering an attractive
264 alternative to drinking (Bakar 2019) for example.

265 ### *5.2 Prompting, Choice and Support*

266 Expanding the range of fluid choices available (Volkert et al. 2019) and/or embedding a rigorous
267 ritual of prompts to drink have been shown to be effective in improving hydration for older adults living in
268 residential care. One contemporary study increased the range and offering of drinks to older adults
269 (Wilson et al. 2019) across two residential homes. One home sustained a mean fluid intake greater than
270 1500 mL/day for three months, whereas the other did not achieve this target. A significant reduction in
271 average daily laxative use was observed across both care homes suggesting that the intervention may be

effective for decreasing the incidence of constipation. Conclusions were drawn that increasing drinking opportunities was beneficial for independent residents who tended to be in communal spaces when drinks were offered, however adequate staffing and support for the plan-do-study-act approach is required for such interventions to be sustainable.

A sub-study of DRIE found that beverage intakes were greater at non-mealtimes, demonstrating the need for more opportunities to drink outside of scheduled meals times (Jimoh et al. 2019). Observations from this study found that although 75% of DRIE care homes reported residents could help themselves to drinks, and all reported that they could ask staff for drinks, residents would seldom do so. All individuals, irrespective of age, should be supported to express personal preference with regard to beverage choice, including when and what they most prefer to drink and how they like their drink to be served (Volkert et al. 2019; Shaw and Cook 2017). This is of particular relevance to care settings where it is encouraged that careful plans detailing such preferences and any barriers to beverage consumption are kept.

In a small, nine-week study individualised care plans were developed for elderly residents based on their specific needs. These plans incorporated colourful beverage charts, pitchers, glasses and carts to enhance residents' interest in drinking; the choice of four beverages at each encounter (any special requests were also honoured); and support from a caregiver knowledgeable in the techniques for fluid administration (Robinson and Rosher 2002). Results showed that residents' total body water increased significantly with the provision of an additional two glasses of fluid daily. Laxative use was decreased, number of bowel movements significantly increased, and a decline in costs of negative outcomes due to dehydration occurred. BIA was also used, a non-invasive technique which has shown to accurately estimate total body water in geriatric patients (Ritz 2001). Once the intervention ended, residents total body water significantly declined, demonstrating the effectiveness of the intervention and the need for continuation. Although multiple variables used in this intervention led to difficulties identifying which influenced the results, from a research perspective, it reflects best practice in caring for individuals with differing and sometimes conflicting needs (Robinson and Rosher 2002).

Significant increases in fluid intake and toileting frequency were found when subjects were offered toileting assistance and choice of fluids every two hours (Schnelle et al. 2010). Concurrent results were found following similar interventions in both ambulant and non-ambulant residents (Tanka et al. 2009; Sprangler et al. 1984). However, Sprangler et al.'s (1984) study used urine specific gravity to determine dehydration status. Although in this study it is difficult to determine if prompting and choice of drinks, or the increased frequency of toileting support resulted in improvement, the combined interventions were found effective in tackling one of the main causes of dehydration in older residents living in care homes, which may dramatically improve the quality of life of residents with incontinence. In 2019 the European Society for Clinical Nutrition and Metabolism (ESPEN) issued strong consensus guidance that both staff support for drinking, and ensuring older adults are supported to visit the toilet quickly when needed were recommended to support hydration of older adults in residential care (Volkert et al. 2019).

6.0 Conclusion

Dehydration is both preventable and treatable but occurs ubiquitously amongst older residents living in care homes throughout the western world. Convenient and non-invasive methods for initial detection of dehydration risk need to be agreed for use in combination with a practical, internationally recognised reference standard for adequate fluid intake in older adults living in residential care specifically. The risks associated with dehydration are multiple and include loss of cognitive function but can ultimately result in premature mortality. In tackling dehydration amongst older residents living in care homes multi-component strategies have been shown to be most effective. Relatively simple interventions including changing drinking vessel shape and/or colour, prompting drinking, and management of toileting visits have shown to increase fluid intake and reduce dehydration in residential care dwelling elderly. However, under resourcing of the care sector, particularly in relation to staffing ratios and continued professional development are acknowledged barriers to the implementation of some of these strategies. Future research should incorporate interventions personalised to residents needs according to their dehydration typology.

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