

Improving fluid consumption in frail older people in care homes: an exploration of the factors contributing to under-hydration

Abstract

Background: Age-related changes which occur in older people put them at risk of dehydration and care home residents are particularly vulnerable. Evidence suggests that hydration care in this setting may be inadequate, but few UK studies have explored the extent of the problem. *Aim:* To determine the amount of fluids care home residents received and consumed, and identify the barriers and facilitators to optimising hydration care in two private nursing homes to inform the design and implementation of a subsequent service improvement initiative. *Methods:* A pragmatic descriptive observational design using multiple data collection methods. *Results:* Mean fluid intake was 1031ml/day; with 50% of residents offered more than 1500ml/day. Residents in communal areas received more drinks than those in their own rooms (74.8% vs 42.6%), and overall residents consumed 69% of fluids they were offered. Those who required assistance to drink consumed the least amount of fluids. *Conclusion:* Adequately hydrating older people is essential if associated morbidity and hospital admissions are to be prevented. This study has identified the challenges experienced by care homes and residents in meeting this fundamental care need. It demonstrates the importance of a coherent strategy to improve hydration in this population.

Key points:

- Older people are vulnerable to dehydration due to changes which occur with ageing
- Dehydration can cause serious health events such as falls, delirium and infections
- There is little known about fluid consumption by older people in residential care
- Older people in care homes do not consume sufficient fluids and are therefore at risk of dehydration

- Interventions which target optimisation of fluid provision in care homes are needed

Reflective questions:

How might the drinks you offer and the cups you offer them in affect how much residents in your care drink?

How do you identify residents whose fluid intake might be poor?

How many opportunities during the day do your residents have for drinking and how does hydration fit within your care routines?

What actions or strategies can you put in place to help residents increase their fluid intake?

Background

Dehydration is recognised as a significant problem among older people residing in long-term care settings (Hooper et al. 2016). If untreated dehydration leads to rapid deterioration requiring complex medical interventions (Campbell 2011). The consequences of dehydration include delirium, falls, constipation, urinary and respiratory tract infections (Benelam and Wyness 2010; Szafara et al. 2012), leading to recurrent hospital admissions, poor clinical outcomes, prolonged length of stay and mortality (Benelam and Wyness 2010; Wolff et al. 2015). In the UK, people aged 75 or over have a significant risk of developing bloodstream infections secondary to urinary tract infection, and the pattern of marked increases in cases of *Escherichia coli* bloodstream infections during summer months suggests that dehydration may be a contributory factor (Wilson et al. 2011).

Nonetheless, dehydration remains difficult to assess in practice (Cheuvront et al. 2013) and particularly in older people, is under-recognised (Oates and Price 2017). Of 200 older people admitted to hospital in the United Kingdom (UK), 37% had elevated blood osmolality indicating hyperosmolar dehydration, with only 8% having a clinical diagnosis of dehydration

and nearly two thirds remained dehydrated 48 hours later (El-Sharkawy et al. 2014). Among emergency hospital admissions, care home residents are 10 times more likely to be dehydrated than older people admitted from their own homes (Wolff et al. 2015). Hooper et al (2016) found that 48% of care home residents were either dehydrated or close to dehydration based on their serum osmolarity.

A number of factors contribute to the increased risk of dehydration among older people, including reduced thirst reflect, cognitive and physical impairments and reduced renal function (El-Sharkawy et al. 2014; Hooper et al. 2014).

Although there are different recommendations for minimum fluid intake (Popkin et al. 2010; EFSA Panel 2010; Volkert et al. 2018), 1500ml/day is generally agreed to be the absolute minimum for maintaining health (Ferry 2005). Fluids refers to any liquid that can be drunk e.g. water, juice, tea/coffee, but solid food moisture e.g. gravy, custard is also considered as fluid when measuring intake (EFSA Panel 2010).

Evidence for how hydration care can be effectively delivered in UK care homes is limited. A qualitative study by Godfrey et al. (2012) suggests that problems with hydration care are linked to limited opportunities, choice and support for drinking. However, they did not systematically observe hydration care or fluid intakes. Another study investigated the use of fluid diaries for increasing fluid intakes of care home residents but did not explore the extent to which residents consumed the minimum recommended amount of fluid (Jimoh et al, 2015). A recent Canadian study identified poor fluid intakes among nursing home residents, with many failing to consume the recommended minimum of 1500ml a day (Namasivayam-MacDonald et al. 2018).

The aim of this study was to develop an understanding of current practice and the barriers and facilitators influencing the amount of fluids served to, and consumed by, residents in a care home setting. The specific objectives were to determine:

1. How much individual residents consumed during the day and factors associated with the amount consumed.
2. When and how fluids were offered to residents during the day.
3. Who was involved in offering fluids, how hydration care was organised and monitored, and what drinks and drinking vessels were used.
4. Resident fluid and drinking vessel preferences and the extent to which these were taken into account by care staff.

Methods

Setting: The study was undertaken in two separately operated care homes in West London. Home A had a total of 160 rooms distributed in eight units; Home B had a total of 146 rooms distributed in five units. The participating units were designated as providing care for frail older people; some residents also had a diagnosis of mild to moderate cognitive impairment. The units included in this study comprised 25 (Home A) and 34 (Home B) beds and were managed by a registered nurse (RN) and a ratio of one healthcare assistant (HCA) to five residents.

Design

We used a pragmatic descriptive observational design using multiple data collection methods. Pragmatic designs involve utilising the method best suited to the research problem and the data collection methods, techniques and procedures that fit the question

or objective being addressed (Creswell and Plano Clark, 2011). Pragmatic approaches place practical solutions above philosophical discussions and acknowledge that each method has limitations and that the different approaches can be complementary.

Non-participant observation of practice was used to gain insight into the structures and processes relevant to supporting the hydration of residents. A stratified sample including residents with varying levels of independence in relation to fluid consumption was used to capture data on the volume of fluids offered and consumed in a day. Semi-structured discussions with residents, staff and relatives were undertaken to seek their opinions and experiences of various aspects of hydration care. A structured testing method was used to determine residents' drinks preferences. Data derived from all these sources were then integrated in order to describe the range of barriers and facilitators affecting the delivery of hydration care.

Observations of fluids offered, consumed and recorded

To meet objective 1, eight residents in each home (33% of residents in the Home A unit, 24% of the Home B unit) were observed between 6am and 9pm. The sample of residents was stratified to include each of the three levels of independence in relation to fluid consumption described in Table 1. The amount of fluid served, consumed, and documented by the care staff was recorded. This number of residents was chosen as it had previously been established that one researcher could not accurately record data for more than eight residents at any one time. The volume of each of the standard drinking vessels and bowls in use in each home were measured prior to commencing observations. Fluid rich foods such as porridge, ice cream, custard, were also recorded.

Table 1: Levels of resident dependency

<i>Independent</i>	a resident who could pick up and manoeuvre a vessel to drink themselves, without the need for assistance or encouragement from staff
<i>Needs prompting</i>	a resident who needed the vessel to be placed in, or close to, their hand, could hold/manoeuvre it to drink themselves but needed encouragement from staff to remind them to finish the drink
<i>Needs assistance</i>	a resident who was unable to pick up, manoeuvre or hold a vessel and needed full assistance from staff to drink

Residents receiving end of life care or Percutaneous Endoscopic Gastrostomy (PEG) feeds were not included.

Structures and processes of hydration care

Objectives 2 and 3 were addressed through structured, non-participatory observation of practice relating to the overall provision of hydration care for all residents in each unit. Conducted over five separate days with observations scheduled to capture care for all residents present in three locations (resident rooms, lounge and dining room). The observation period was divided into seven drinking opportunities (6am to 9pm) when drinks could have been served (Table 2). An episode of hydration care was defined as one resident observed during one drinking opportunity. The number of drinks and types of fluids offered were recorded, together with contextual data on factors that affected serving and/or consumption of fluids e.g. type and number of staff present, general environment, drink supplies.

Information about current systems of work in relation to drinking opportunities were obtained through semi-structured conversations with unit managers, nurses, HCA, catering , housekeeping and activity staff.

Resident fluid and drinking vessel preferences

To address objective 4, residents' opinion about availability of drinks and drinking vessel preferences was obtained through semi-structured discussion. Structured tasting sessions were undertaken to determine which fluids residents preferred to drink. Residents participating in tasting sessions were asked to rate a variety of drinks and compare them to a drink that was commonly served in the home (e.g. squash). Test drinks included different fruit juices, carbonated beverages and dairy alternatives. Residents were given 50ml of both fluids in identical disposable cups and asked to rate each drink on a five-point Likert scale ranging from 'I like very much' to 'I dislike very much' (Pouyet et al 2015).

Analysis: A Chi-squared test was used to compare the effect of time of day and resident location on the proportion of residents who received drinks. A p value of less than 0.05 was considered as statistically significant. Barriers and facilitators of resident hydration were coded using framework analysis (Ritchie & Lewis, 2003) and organised under the following themes: opportunities for drinking, location of resident, equipment to support hydration, prioritisation of hydration, meeting resident needs and preferences, and monitoring of fluid intake. Preferences for drinks were ranked by the proportion of positive responses (I like/like very much).

Ethics: The Health Research Authority categorised the study as service evaluation that did not require submission to a national research ethics committee. Ethical approval was obtained from the University Research Ethics Committee.

Results

Observations of the type and volume of fluids offered (objective 1)

Observations of fluid intake were undertaken for 16 residents. Data for two residents were incomplete and excluded from the analysis. For the remaining 14, the mean fluid intake during the day was 1031ml (min-max, 450ml-1580ml). This represented 69% of the 1500ml minimum requirement; 36% of the mean requirement based on their body surface area; and only 1 consumed the recommended daily intake of 1500ml. Of the 14 residents, fluid intake was being recorded for 4 (29%).

Intakes varied according to the category of resident dependence. The lowest mean intake (660ml) was observed in residents in their own rooms who needed assistance to drink (n=2). Residents in their own room who could drink independently consumed 1173ml (n=4).

The mean volume of fluids served was 1512ml (min-max, 600-2425ml); only 50% (7/14) of residents were served more than 1500ml; residents in their own rooms who needed assistance (n=2) were served the least (850ml). Overall, residents consumed 68% (14430/21165ml) of the fluids they were served. Those who needed prompting (n=2) consumed 54% (2080/3875ml), those needing assistance (n=4), 80.5% (3785/4700ml) and independent drinkers (n=8) 68% (8565/121590ml). Those who needed assistance (n=4) were served 70% of the fluids (826/1175) at mealtimes.

Fluid rich foods accounted for 33% (4730/14430ml) of the fluid consumed, with a higher proportion of the total intake in those needing assistance (36%; 423/1175ml).

Observations of drinking opportunities (objective 2 and 3)

A total of 294 individual episodes of hydration care were observed over five days during which 198 drinks and 123 fluid rich foods were served. More than one drink was offered at

only 11.6% (34/294) of episodes. Fluids were served to a greater number of residents at mealtimes (75%; 85/113) than between meals (39%; 71/181; Chi² of difference between proportions p<0.01). Few residents were offered drinks before breakfast (26%; 20/78) or mid-morning (34%; 34/100) (Table 2).

Residents were given little autonomy to make individual choices and there was a limited variety of drinks offered. Tea accounted for 55% (109/198) of drinks served. Fruit juice, coffee and milky drinks were available but not routinely offered or served.

The proportion of residents located in a communal area who received a drink was significantly higher (75%; 83/111) than those located in their own rooms (43%; 78/183, Chi² of difference between proportions p<0.01) (Table 2). The exception to this pattern was during the evening period when most residents were back in their own rooms.

Table 2: Number and percentage of residents who received a drink by location in unit and opportunity* between 6am and 9pm. Data derived from observation of patterns of fluid delivery in Homes A and B.

Drinking Opportunity	Own Room		Dining Room/Lounge		Total	
	No of residents	No. (%) residents served drink	No. residents	No. (%) residents served drink	No. residents	No. (%) residents served drink
Early morning	36	7 (19.4%)	3	3 (100%)	39	10 (25.6%)
Breakfast	23	21 (91.3%)	12	12 (100%)	35	33 (94.3%)
Mid-morning	30	3 (10.0%)	20	8 (40%)	50	11 (22%)
Lunch	10	6 (60.0%)	28	25 (89.3%)	38	31 (81.6%)
Mid-afternoon	27	12 (44.4%)	20	18 (90.0%)	47	30 (63.8%)
Dinner	22	11 (50.0%)	18	14 (77.8%)	40	25 (62.5%)
Evening	35	18 (51.4%)	10	3 (30.0%)	45	21 (46.7%)
Total	183	78 (42.6%)	111	83 (74.8%)	294	161 (54.8%)

* Formal opportunities to obtain fluids were mealtimes and the 'afternoon tea'.

Drinks were rarely given out outside mealtimes or designated drinks rounds. Apart from breakfast, hot drinks were not routinely offered with or after meals. Drink rounds between meals primarily focused on providing fluids to independent drinkers, with those asleep generally not woken up to have a drink. Bed-bound residents were not always adequately positioned for drinking nor have their drinks within reach.

Equipment: Straws and spouted beakers were often used for residents needing assistance to drink. For residents with swallowing difficulties, specialised cups were not routinely in use. Equipment to distribute drinks to residents outside mealtimes were insufficient or sometimes unavailable.

Monitoring of fluid intakes: Neither home had a routine system for identifying, and responding to, poor fluid intake. Fluid charts were used for a small number of residents. Documentation on fluid charts customarily reflected drinks offered rather than consumed, exacerbated by staff not allocated to specific residents for the duration of their shift. With no formal daily review of documentation, addressing inadequate intake appeared ad hoc.

Interviews with residents and their families (objective 4)

Twenty-seven residents and family members were interviewed across both homes. Their comments reflected the observed patterns of care, for example: *"I like a cup of tea first thing in the morning, I wake up early but sometimes don't get tea until later"* (Resident, CB2) and *"Sometimes I feel like a nice cup of tea, but I don't ask for it because they are so busy..."* (Resident, GD2).

Residents also commented on how their specific preferences were not always met: *"[I don't like squash but] I have to drink it"* (Resident, GD13); *"I am not always being given what I like"* (Resident, GD10); and *"I have started getting a hot chocolate with breakfast as once I declined tea because it was cold, but I don't prefer hot chocolate"* (Resident, GB7).

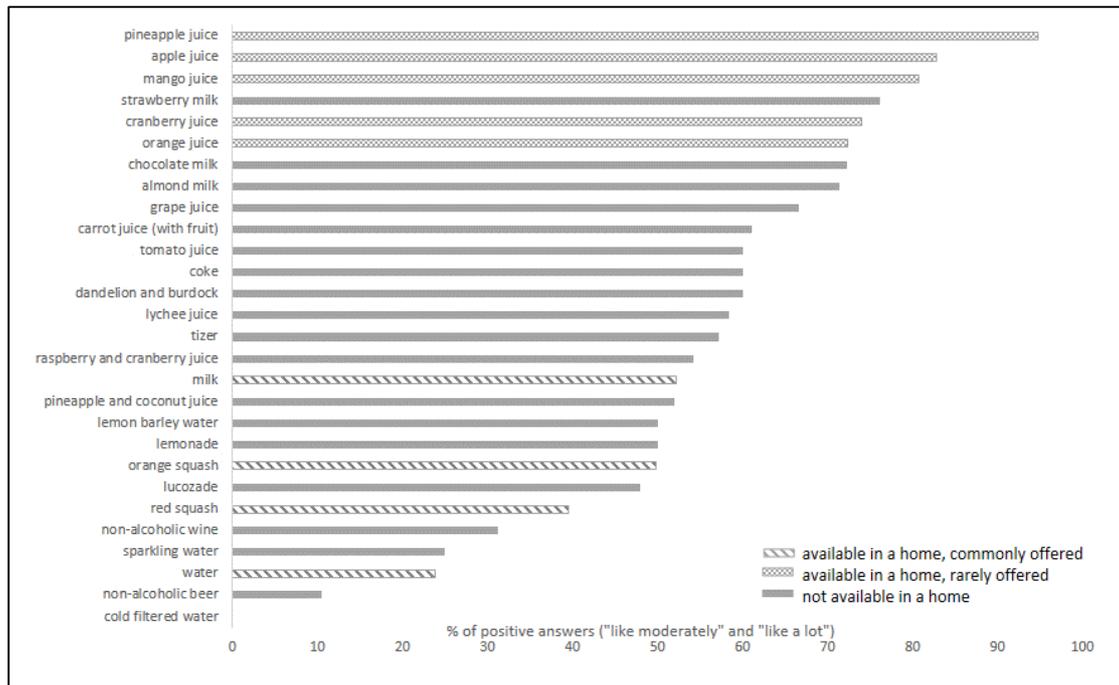
Most residents reported tea as their favourite drink (24/27; 88%). One resident, who preferred coffee, was told *"...tea is better for you"* (Resident, GD8). Residents were not aware of all drinks available yet not offered by staff. The most popular fluid rich foods were ice cream (19/25; 76%), yogurt (14/25; 56%) and jelly (14/25, 56%).

Equipment used to serve drinks: Residents reported that the teacups and saucers, were difficult to hold: *“He finds a tea cup too slippery, handle is too small and it burns his fingers”* (Family, GF1). The standard cups in use at both homes were difficult to hold and awkward to balance. A preference for mugs was expressed: *“Mugs are better although I'm not keen on plastic... nice big handles that don't slip through the fingers and bigger than a cup”* (Resident, GD11). Some residents commented that whilst they did not like drinking from a plastic cup, they used them because they were easier to grasp and held more fluid than the teacups.

Concerns about incontinence: Some residents voiced concerns about getting to the toilet and staff being available to assist them, 50% (10/20) indicated that they restricted their fluid intake to avoid going to toilet and risk incontinence. *“Sometimes I worry that they won't come and get me on time”* (Resident, GB2); *“He would like to drink more but worries about how long he would have to wait for the staff”* (Resident, GD11).

Testing of resident fluid preferences: Forty-seven residents participated in the cold drinks testing, with 463 comparisons between 24 test and 4 control drinks. Sweet-tasting juices were the most popular drinks, along with flavoured milk. Squash and water were not popular with these residents (Figure 1).

Figure 1: Results of testing resident preferences of different types of soft drinks



A summary of the barriers identified from the different data sources that were found to influence the amount of fluids served to, and consumed by residents is shown in Table 3.

Table 3: Summary of factors observed or reported as barriers to hydration care

Factor	Specific problem with care delivery
Opportunities for drinking	Few drinking opportunities during the 12hrs that most residents are awake
	Residents not offered more than one drink at each opportunity (or refills)
	Most residents not receiving their first drink of day until breakfast
	Hot drinks not routinely offered after meals
	Residents requiring assistance offered fewer drinks
	Few residents offered a drink mid-morning
	Drinks rounds focused on giving drinks to independent drinkers
Location of resident	Residents in their own rooms served fewer drinks than those in communal areas
	Residents in their own rooms not always woken up for drinks rounds
Equipment to support hydration	Drinking equipment not well-designed for residents with physical frailty
	Insufficient supplies of adapted cups or appropriate beakers
	Trolley not available to distribute drinks easily between meals
Prioritisation of hydration	Supporting eating/drinking observed to be a 'team' responsibility; without clear allocation and designated responsibility, residents can either be missed or not given adequate support and assistance
	During the morning, HCA time is devoted to washing/dressing residents
	At mealtimes priority is given to food rather than fluid consumption

	Residents requesting a drink outside mealtimes may be asked to wait until the next meal/drinks round
Meeting resident needs and preferences	Residents not always offered choice of drink, staff observed to choose for them
	Limited selection of drinks on offer, unless supplied by resident/family, not tailored to resident preferences
	Residents not made aware of full range of drinks available
	Residents not always positioned to drink safely
	Drinks positioned out of the reach of residents
	Thickened fluids not made up correctly or used appropriately
	Unsuitable drinking vessels used for residents with swallowing difficulties
	Limited use of fluid rich foods, preferred foods (ice cream or jelly) poorly utilised
Some residents restricting fluids for fear of incontinence	
Monitoring of fluid intake	Monitoring of all residents' fluid consumption not universally employed
	No formal system or processes for monitoring and acting in response to residents with poor fluid intake
	Inaccurate documentation of fluid consumption for residents on fluid charts

Table 4 indicates the facilitators for improving hydration care derived from the data captured in this study and used to inform a subsequent improvement study that has been reported separately (Wilson et al, 2018).

Table 4: Driver diagram summarising the contributory factors linked to enabling care home residents to drink enough fluid and strategies to overcome the barriers

Aim	Factors contributing to achieving aim	What can be done to improve
Residents drink enough fluid during the day to sustain their health	Understanding each residents drinking needs, preferences and abilities	Staff training on hydration Evaluate drinks preferences Evaluate cup preferences Drinks menu
	Providing residents with the drinks and fluids to meet their needs, preferences and abilities	Staff training on hydration Drinks menu Evaluate & extend drinks choice Evaluate & extend cup choice
	Providing opportunities for fluid consumption during daily care	Staff training on hydration Protected Drinks Time Drinks & other fluids with meals
	Identifying and responding when hydration needs are not met	Staff training on hydration Record fluids offered/consumed and review daily

Discussion

The findings from this study demonstrate that many residents were at risk of chronic under-hydration by consuming less than 1500ml of fluid daily. Dehydration is recognized as a major problem among frail older people, particularly those in care homes (Wolff et al. 2015).

However, little is known about the patterns of hydration care in this setting and how this might affect the volume of fluids offered and consumed (Jimoh et al. 2015). Our study is the first to provide a detailed insight into care home residents' experience of this fundamental care need. We also identified key barriers to optimizing hydration related to the organization and environment of care. Understanding these underlying reasons for poor fluid intakes is essential for informing improvement strategies.

A critical factor for poor fluid consumption was the limited opportunities for hydration.

Although there were potentially seven structured opportunities to serve fluids, drinks were predominantly served with meals and since second drinks were rarely offered, many residents would only receive 150-200ml at each opportunity.

Another key factor influencing fluid intake was the support offered to residents needing assistance to drink. There is a lack of assessment tools to help staff evaluate and address specific physical or cognitive impairments affecting frail older people's ability to drink.

Complex typologies of hydration problems (Mentes 2006) have been proposed and specific risk factors associated with dehydration identified (Namasivayam-Lengyel 2018). However, our study suggests that in practice a simple categorization of residents by their support needs ('independent', 'needs prompting' and 'needs assistance') is more practical to apply, focuses on the specific hydration care that is required, and highlights those most vulnerable to low intakes.

Our observations reflect earlier research by Mentes (2003) and suggest that hydration needs to be recognized as a more important priority in terms of care delivery. With staff activity focused on personal care, few residents were given a drink before breakfast and many not receiving a drink between breakfast and lunchtime. Godfrey et al. (2012) reported a similar finding from interviews with care home residents. In addition, the diffusion of responsibility for supporting eating and drinking led to staff being less aware of residents potentially restricting their fluid intake because of concerns about incontinence, or those residents whose fluid intake was generally poor.

In common with other studies (Jimoh et al. 2015; Kayser-Jones et al. 1999) we found that documentation of fluid intakes by staff was inaccurate. Formal monitoring of residents' fluid intake was uncommon and not systematically targeted at those most vulnerable to poor intake. Processes for reviewing those at risk of dehydration and triggers for taking action in response were absent. Residents located in their own rooms were particularly vulnerable as they were less likely to be offered drinks outside mealtimes, to be woken when drinks were being offered, and repositioned to drink safely or independently.

Staff made assumptions about resident choices and did not account for changes in preferences over time or at different times of day. Our testing of resident preferences suggests that offering a wider range of drinks may help to improve consumption. The decline in sense of taste associated with ageing and dementia may influence the preference for the stronger flavoured juices (Sakai et al. 2016).

The heavy, small-handled teacups and saucers, ubiquitous across health and social care in the UK, are difficult for residents to use. This problem was also noted by hospital participants in a study by Godfrey et al. (2012). Subsequent testing to identify vessels acceptable and suitable for use in this setting indicated resident preference for lightweight mugs with a large handle (Bak et al. 2018). Given the pressure on staff time in this resource-

limited setting, ensuring appropriate equipment such as trolleys and suitable drinking vessels are simple strategies that need to be in place to support effective and efficient hydration care (Wilson et al. 2018).

Other studies have looked at methods of identifying those at risk of dehydration by estimating serum osmolality (Hooper et al. 2016; Bak et al. 2017). However, such approaches would not be feasible or practical to apply routinely in a care home setting. Our findings suggest that a universal approach concentrated on increasing fluid intake of all residents, whilst addressing their differing support needs, is required.

The strength of this study is that it used a multiple methods approach to understand both the extent and nature of the problem of hydration care in care settings. By combining observations of practice, actual fluid intakes and perspectives of staff and residents, we were able to capture rich data on how patterns of care influenced hydration practice. The inclusion of two care homes is a strength as it provides evidence of common findings. However, using two large London care homes may not be reflective of patterns of care in smaller homes or other areas of the country. Nonetheless, a report by the CQC (2011) highlights that poor hydration is a widespread problem.

Conclusion

Adequately hydrating older people is essential if associated morbidity and hospital admissions are to be prevented. This study has identified challenges experienced by care homes in meeting this fundamental care need. It highlights the importance of a coherent strategy to support hydration of frail older people that recognises and addresses the barriers to optimising fluid intake in this challenging setting.

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