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Hydration education: developing, piloting and evaluating a hydration education package for general practitioners

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ABSTRACT

Objectives: To (1) assess the hydration knowledge, attitudes and practices (KAP) of doctors; (2) develop an evidence-based training package; and (3) evaluate the impact of the training package.

Design: Educational intervention with impact evaluation.

Setting: Cambridgeshire, UK.

Participants: General practitioners (GPs (primary care physicians)).

Interventions: Hydration and healthcare training.

Main outcome measures: Hydration KAP score before and immediately after the training session.

Results: Knowledge gaps of doctors identified before the teaching were the definition of dehydration, European Food Safety Authority water intake recommendations, water content of the human body and proportion of water from food and drink. A face-to-face teaching package was developed on findings from the KAP survey and literature search. 54 questionnaires were completed before and immediately after two training sessions with GPs. Following the training, total hydration KAP scores increased significantly ($p<0.001$; median (25th, 75th centiles); 32 (29, 34)). Attendees rated the session as excellent or good (90%) and reported the training was likely to influence their professional practice (100%).

Conclusions: The training package will continue to be developed and adapted, with increased focus on follow-up strategies as well as integration into medical curricula and standards of practice. However, further research is required in the area of hydration care to allow policymakers to incorporate hydration awareness and care with greater precision in local and national policies.

Strengths and limitations of this study

- The findings of this study supported the development of general practitioners' (GPs') understanding and application of hydration promotion in the community.
- The training package significantly improved GP's overall hydration knowledge, attitudes and practice score immediately after the training session and was highly rated by the attendees who all reported it would influence their professional practice.
- Key limitations include the small number of GPs who attended the training sessions and the lack of longer term follow-up of the attendees.

INTRODUCTION

The body's homeostatic mechanism for hydration status is controlled within very small margins by hormones which stimulate thirst and conserve or excrete water from the kidneys. Dehydration can be defined as isotonic (loss of water and sodium in equal amounts), hypertonic (water loss exceeds salt loss) or hypotonic (more sodium lost than water).[1] Evidence suggests that dehydration can have important health outcomes such as, constipation,[2–4] cognition,[5–8] falls[3 9 10] and kidney-related impairments.[11–14] However, measuring dehydration levels in the population is challenging, not least because hydration status is dynamic and affected by a wide range of factors. A number of reviews have been conducted to identify an appropriate gold standard or collection of appropriate measures, and while some consensus has been reached, this is still a work in progress.[15–19] Despite this challenge, recommendations have been developed by a number of national and international organisations for fluid intakes that aim to avoid dehydration for the majority of the population. One example for the general population in Europe is from the European Food Safety Authority (EFSA), which recommends a total water intake of 2.5 and 2.0 L/day for adult

men and women, respectively.[20] These were developed based on studies that measured fluid intakes and considered desirable urine osmolarity and desirable water intakes per energy unit consumed. These are the most comprehensive recommendations currently available; however, they remain limited given the inconsistent methods used by the studies throughout Europe. In the USA, the Institute of Medicine recommends a considerably higher amount of 3.3 and 2.3 L/day (total water) for adult men and women, respectively, which were derived from average intakes from national surveys in the USA.[21] Both organisations concluded that estimated average requirements were not possible due to individual variability and lack of evidence regarding chronic diseases. A recent measure of fluid intakes from drinking water and beverages in 13 developed and developing countries found that of those surveyed, >50% of children and adolescents and 40% of men and 60% of women under 65 years failed to meet the EFSA adequate intake recommendations.[22]

As with malnutrition, dehydration is likely to begin in the community yet may only be recognised in the clinical setting when it exacerbates other conditions. General practitioners (GPs) in the UK are physicians that work in primary care and attend to patients in clinics, residential and care homes by taking account of physical, psychological and social factors and will refer to secondary healthcare providers as necessary.[23] They therefore provide an invaluable link for the prevention and treatment of dehydration in the community and transition of care from the hospital to the community. Additionally, a significant number of patients seen by GPs will be over the age of 65, whose ability to maintain water balance effectively is diminished during ageing, such as thirst sensation, kidney function and a decrease in body water content (as a result of a decreased lean body mass). Therefore, it may be worth considering that dehydration across different patient population groups, and especially in older people, can contribute to a poor quality of life and economic burden to the health service.[24–27] Given the increasing demands on GPs, the increasing ageing population and the likely high level of dehydration in the community, the question is raised, are GPs well equipped to adequately assess and advise on hydration in the primary care setting?

In the UK, GPs must successfully complete medical school, a 2-year postgraduate foundation programme and GP specialty training before being eligible for full certification. Hydration beyond hospital-based learning is not very well detailed in General Practice curricula, and there is a paucity of research assessing GP knowledge or confidence in providing hydration advice to key population groups in primary care. Thus, the aims of this project were to: (1) assess the hydration knowledge, attitudes and practices (KAP) of medical doctors, and in particular GPs; (2) develop a hydration evidence-based training package for GPs; and (3) evaluate the impact of the training package.

METHODS

Needs assessment and questionnaire development

Literature search: The first step in the needs assessment was to conduct a literature search with support from the British Medical Association (BMA) to identify relevant key topics for GPs and subsequently develop a questionnaire. The databases used for the search were Ovid Medline and EMBASE with the search terms 'hydrat$ or dehydrat $ or water or beverage$ or thirst'. Published texts, 'grey literature', clinical guidelines and expert opinion (such as, hydration scientists) were also consulted to identify key topics for translation into practice.

Curricula assessment: The extent to which hydration was taught during training was determined by reviewing the curricula for the presence of hydration. Relevant academics and students were also consulted.

Baseline questionnaire: Findings from the literature search and curricula assessment were used to develop a survey that measures the self-perceived competence of primary health professionals in providing nutrition and hydration care to patients with lifestyle-related chronic disease. The aim was to make this reliable and to account for differences in KAP in nutrition and hydration care.

An extensive review of the questionnaire was conducted by doctors, dietitians and hydration experts while medical students, junior doctors and GPs piloted the baseline questionnaire. The final questionnaire included 18 questions and was designed to take no longer than 10 min to complete. Dissemination was undertaken over February–May 2014 via the BMA list servers for GP members, partner organisations of Cambridge and Ulster Universities (using http://www.SurveyMonkey.com) and at GP conferences (completed hard copies of the questionnaire).

Hydration training intervention

Material development

Development of the training materials was based on an existing educational framework[28 29] and results from the needs assessment. The training materials were drafted by the authors and reviewed by hydration experts for content. GP trainers also reviewed the material to ensure it was appropriate within GP training and relevant to the GP role. A pilot was conducted with the target audience, GPs (n=6) as well as primary care nurses (n=3) and dietitians/nutritionists (n=4) to achieve multidisciplinary feedback. Evaluation of the pilot recommended a condensed time frame, addition of a reflection activity and a reordering of the topics.

Delivery of the hydration training

The training was conducted by medical doctors, dietitians and nutrition researchers to a postgraduate specialist programme framework—based in the Cambridgeshire area, UK. Teaching styles included interactive presentations, case studies, individual and group activities. Online supplementary materials were created

to respond to questions raised on the feedback forms and provided online shortly after the final face-to-face session.

Evaluation of the hydration training

The hydration questionnaire (same questionnaire used in the needs assessment) was administered before and at the end of the training sessions to determine if there were any changes in hydration KAP. Knowledge questions were scored by allocating a score of 1 to correct answers and a score of 0 to incorrect answers. Attitude and practice questions were scored using a Likert Scale (1–4) with the most negative options scored as 1 through to most positive options scored as 4. Questionnaire items were randomised at each time point to minimise recall bias. Generic feedback forms were used to assess the overall teaching and included open and closed questions.

Ethical approval was not required as this was an evaluation of a teaching package; however, attendees were informed that consent would be assumed if questionnaires were completed to use the data anonymously.

Data analysis

The KAP scores from the needs assessment and training session questionnaires were not normally distributed, therefore medians (25th, 75th centiles) are presented. A Wilcoxon Signed Rank Test compared KAP scores before and after the intervention. For the evaluation questionnaires, a quantitative content analysis was used to report the number of responses to quantitative questions. A qualitative content analysis was used to summarise free-text responses to open questions by first coding the responses and then grouping them under similar themes. SPSS (IBM SPSS Statistics for Windows, V.20.0. Armonk, New York, USA: IBM Corp.) was used for all statistical analyses and p values of <0.05 were considered to be statistically significant.

RESULTS

Needs assessment and questionnaire development

In the UK, the GP curriculum is noted to have coverage of hydration from an end-of-life care and health promotion (obesity management) perspective—however, there appear to be gaps in elderly care hydration management.[30] The key topics identified by the literature search for translation into practice were: hydration physiology, dehydration, fluid intakes, kidney function and associated conditions, vulnerable groups relating to hydration such as older people, obese and those with diabetes, hydration assessment and practical advice. These topics formed the basis of the hydration KAP questions for the questionnaire and the content of the education materials.

Baseline questionnaire: There were 49 completed responses; predominantly from the BMA dissemination (63%) and also from GP-targeted conferences (24%) and other sources (4%), such as Cambridge and Ulster University partners. A range of specialisms responded including GPs (45%), medical students and junior doctors (14%), anaesthetics (8%), psychiatry (8%), cardiology (6%), dermatology (2%), emergency (2%), general surgery (2%), geriatrics (2%), infectious diseases (2%), neurology (2%), obstetrics and gynaecology (2%), paediatrics (2%) and public health (2%). The respondents had been in their current post for a mean of 8 years with a range of 0–30 years. Twenty-six per cent of respondents had been practising for up to 1 year.

The percentage responses for each question are listed in table 1.

Response to knowledge questions

Key deficit knowledge areas were noted in the amount of water in the body (59%) and the amount of fluid obtained from food compared with beverages (76%) while fluid intake recommendations were underestimated (67%).

Response to attitude questions

The majority of respondents scored positively towards hydration care, including the need for hydration training for the profession (83%). Personal hydration status at work was rated as bad or average (76%).

Doctors acknowledged the need for further training in hydration in the open-ended responses:

> As it [hydration] is a topic that can be overlooked in my opinion unless the person is very old or very young

> to be able to adequately advise patients.

Response to practice questions

Scores were mixed relating to patients with stroke but of the 19 additional comments, 14 reported never seeing patients with stroke. The majority of doctors reported encouraging patients to consume all types of beverages to stay hydrated (78%) with comments such as 'as part of lifestyle education' and 'doesn't form part of routine assessment or discussion' were provided. Approximately half (55%) of respondents reported spending <10 min giving hydration advice in a 4-hour clinic session with comments highlighting that clinics were too variable to quantify.

Consequently the need for an evidence-based training package for GPs was identified.

Hydration training intervention

The aim of the final training package was to encourage GPs to incorporate hydration into patient care in the primary care setting and optimise hydration status with a particular focus on practical skills and change management to lead change throughout the whole multidisciplinary team (MDT). The intervention was a half-day workshop with interactive lectures, case studies and a reflection activity with additional information provided online for viewing after the session. Tutors were medical doctors and dietitians.

Table 1 Frequency responses from the baseline questionnaire

Question	Response options	n=49	Per cent
Knowledge questions		0	0
Some physical signs of dehydration may include	Dry mucous membranes	0	0
	Headaches	0	0
	Increased pulse rate	0	0
	All of the above	49	100
What is the proposed definition of dehydration?	Loss of water from the body in excess of the amount consumed	28	57
	≥10% loss of body mass (assuming that there is no weight loss because of negative energy balance) due to fluid loss	20	41
	When someone feels thirsty, has a dry mouth and has pitting oedema	0	0
	Excessive addition of body water with an accompanying disruption of metabolic processes	1	2
Water forms how much of an adult person's body weight?	30–40%	2	4
	40–50%	2	4
	50–60%	16	33
	70–80%	29	59
Mild-to-moderate dehydration can impair performance on tasks such as:	Short-term memory	0	0
	Arithmetic ability	0	0
	Psychomotor skills	2	4
	All of the above	47	96
As recommended by the European Food Safety Authority (EFSA), total daily water for adult men is accepted as _____ litres?	1.5 L	7	14
	2.0 L	26	53
	2.5 L	8	16
	3.0 L	8	16
In general, does the average older person have a similar water requirement to that of a 30-year-old?	Yes, if the older person is active and healthy	34	69
	Yes, if the older person is inactive and unhealthy	1	2
	No, if the older person is active and healthy	8	16
	No, if the older person is inactive and unhealthy	6	12
Recommended adequate intake of fluid for an adult refers to:	Drinking water	5	10
	Drinking water plus beverages (ie, tea, coffee, juice)	15	31
	Drinking water plus food moisture (ie, soup, fruit, vegetables)	2	4
	Drinking water plus beverages plus food moisture	27	55
Water can be found in food and drinks. On average, what is the proportion of water in food and drinks consumed by UK adults?	10% Food:90% Drink	3	6
	20% Food:80% Drink	9	18
	30% Food:70% Drink	23	47
	40% Food:60% Drink	14	29
Attitude questions			
How would you rate your general hydration status when at work?	Bad	21	43
	Average	16	33
	Good	11	22
	Excellent	1	2
How important do you feel giving hydration advice is to people with kidney stones?	Very important	40	82
	Somewhat Important	8	16
	Unimportant	0	0
	Very unimportant	1	2
How important do you feel hydration education is for your profession given competing priorities in training?	Very important	11	22
	Somewhat Important	30	61
	Unimportant	5	10
	Very unimportant	3	6
Is managing hydration the responsibility of:	Dietitian	0	0
	Doctor	0	0
	Patient	3	6
	All of the above	46	94
	Never	2	4

Continued

Table 1 Continued

Question	Response options	n=49	Per cent
Do you think consuming too much water can be detrimental to the health of a patient?	Rarely	11	22
	Sometimes	34	69
	Always	2	4
Practice questions			
Patients who have had a stroke may have an altered sensation of thirst. Do you regularly ask your stroke patients about their hydration?	I never ask	19	39
	I occasionally ask	16	33
	I regularly ask	9	18
	I always ask	5	10
Do you encourage your patients to drink water to stay hydrated?	No	6	12
	No, but I tell them to decrease tea and coffee (caffeine intake)	1	2
	Yes, water only	4	8
	Yes, water and other non-caffeinated and within-reason caffeinated beverages	38	78
Urine colour may reflect the patient's current state of hydration. Have you ever asked about the colour of the patient's urine, relevant to hydration status?	I never ask	6	12
	I occasionally ask	20	41
	I regularly ask	19	39
	I always ask	4	8
Does your main place of work have easily accessible water dispensing facilities?	Yes, and I make use of it	25	51
	Yes, but I do not use it	8	16
	No, and I would use it if available	15	31
	No, but I don't see the need	1	2
Approximately how many minutes on average would you spend in a 4-hour clinical session on giving hydration advice to patients?	0	5	10
	<10	27	55
	>10	3	6
	Difficult to quantify	14	29

A total of 59 GPs from Addenbrooke's Postgraduate Medical Centre and West Cambridgeshire GP network attended as part of their training programme. All completed the preteaching questionnaire. Five GPs were unable to stay for the duration of the training resulting in 54 questionnaires being completed immediately after the teaching. The response rate for the 3-month follow-up was low, thus results are not presented.

All participants were currently working in County Cambridgeshire as GPs (ST1 n=15, ST2 n=15, ST3 n=22, undefined level n=7) and had been in their current post for 2 months to 3 years. The following sections present the results for the KAP scores and more details are provided in tables 2–4.

Total KAP score

The total KAP score increased significantly after the training ($p<0.001$; median (25th, 75th centiles); 32.0 (29, 34)) compared with before (30.0 (28, 32)).

Knowledge

Responses to the knowledge questions pre and post the teaching session are listed in table 2. The median number of questions answered correctly before the teaching was 5 (4, 5) and after the teaching was 7 (6, 8) out of a possible 8 ($p<0.001$). All of the GPs responded correctly before and after the teaching for questions regarding physical signs and effects of dehydration. Knowledge of the definition of dehydration, EFSA water intake recommendations, water content of the human body and proportion of water from food and drink was very mixed prior to the teaching but the majority answered correctly after the teaching (91%, 78%, 82%, 83%, respectively).

Attitude

Table 3 lists the participants' responses to the attitude questions pre and post the teaching session. The median attitude score before the teaching was 16 (15, 17) and after the teaching was 15 (15, 17) out of a possible 20 ($p=0.745$). The majority of GPs had positive hydration attitudes with regards to kidney stones, training for their profession and responsibility of care with a negative perception of their own personal hydration status (table 3).

Practice

Table 4 lists the participants' responses to the self-reported practice questions pre and post the teaching session. The median practice score was 10 (9, 11) and 10 (9, 10) before and after the teaching, respectively, out of a possible 20 ($p=0.103$). Self-reported practice in relation to fluid advice for patients and access to, and drinking of, water in work was predominantly scored positively. Hydration advice for patients with stroke, asking patients about their urine colour and minutes spent on hydration in a clinic session were predominantly scored negatively.

Table 2 General practitioners' knowledge of hydration and patient care before and after the training session

Question	Response options	Pre n=59	Pre Per cent	Post n=54	Post Per cent
Some physical signs of dehydration may include	Dry mucous membranes	0	0	0	0
	Headaches	0	0	0	0
	Increased pulse rate	0	0	0	0
	All of the above	59	100	54	100
What is the proposed definition of dehydration?	Loss of water from the body in excess of the amount consumed	28	48	49	91
	≥10% loss of body mass (assuming that there is no weight loss because of negative energy balance) due to fluid loss	31	53	5	9
	When someone feels thirsty, has a dry mouth and has pitting oedema	0	0	0	0
	Excessive addition of body water with an accompanying disruption of metabolic processes	0	0	0	0
Water forms how much of an adult person's body weight?	30–40%	2	3	1	2
	40–50%	4	7	0	0
	50–60%	16	27	44	82
	70–80%	37	63	9	17
Mild-to-moderate dehydration can impair performance on tasks such as:	Short-term memory	0	0	0	0
	Arithmetic ability	0	0	0	0
	Psychomotor skills	0	0	0	0
	All of the above	59	100	54	100
As recommended by the European Food Safety Authority (EFSA), total daily water for adult men is accepted as _____ litres?	1.5 L	5	9	0	0
	2.0 L	23	39	9	17
	2.5 L	18	31	42	78
	3.0 L	12	20	3	6
In general, does the average older person have a similar water requirement to that of a 30-year-old?	Yes, if the older person is active and healthy	34	58	42	78
	Yes, if the older person is inactive and unhealthy	0	0	0	0
	No, if the older person is active and healthy	13	22	6	11
	No, if the older person is inactive and unhealthy	11	19	6	11
Recommended adequate intake of fluid for an adult refers to:	Drinking water	7	12	3	6
	Drinking water plus beverages (ie, tea, coffee, juice)	14	24	17	32
	Drinking water plus food moisture (ie, soup, fruit, vegetables)	7	12	2	4
	Drinking water plus beverages plus food moisture	31	53	32	59
Water can be found in food and drinks. On average, what is the proportion of water in food and drinks consumed by UK adults?	10% Food:90% Drink	2	3	1	2
	20% Food:80% Drink	18	31	45	83
	30% Food:70% Drink	22	37	4	7
	40% Food:60% Drink	17	29	4	7

Feedback

Of the 51 completed evaluation forms (94% response rate), 90% (n=46) rated the content of the session as excellent or good with the remainder rating it as average (10%, n=5). Ninety per cent (n=46) reported the session would encourage them to drink more water while those who reported it would not affect them (10%, n=5) stated they already drank more than the recommendations (n=2), had no time (n=1) or did not provide a reason (n=2). All GPs reported the training

Table 3 General practitioners' attitude towards hydration and patient care before and after the training session

Question	Response options	Pre n=59	Pre Per cent	Post n=54	Post Per cent
How would you rate your general hydration status when at work?	Bad	22	37	24	44
	Average	22	37	16	30
	Good	15	25	13	24
	Excellent	0	0	1	2
How important do you feel giving hydration advice is to people with kidney stones?	Very important	48	81	48	89
	Somewhat Important	10	17	2	4
	Unimportant	0	0	0	0
	Very unimportant	1	2	4	7
How important do you feel hydration education is for your profession given competing priorities in training?	Very important	20	34	27	50
	Somewhat Important	35	59	26	48
	Unimportant	4	7	1	2
	Very unimportant	0	0	0	0
Is managing hydration the responsibility of:	Dietitian	0	0	0	0
	Doctor	0	0	0	0
	Patient	1	2	1	2
	All of the above	58	98	53	98
Do you think consuming too much water can be detrimental to the health of a patient?	Never	0	0	0	0
	Rarely	15	25	28	52
	Sometimes	39	66	24	44
	Always	5	9	2	4

was likely to influence their professional practice and reasons included, discuss hydration more with patients and provide practical advice for increasing fluid intakes, consider hydration more in nursing homes, ask patients about their urine colour and be more aware of asking about and advising on sugar-sweetened beverages.

The GPs were also asked to list key learning points and the following were identified as key themes: calories/sugar in sugar-sweetened beverages (n=21), daily fluid intake recommendations (n=11), more aware of the importance of hydration (n=9), practical tips for fluid intakes (n=9), everyone should drink more water (n=6), hydration and kidney stones (n=3), caffeine and hydration (n=2) and personal fluid intakes (n=2). Topics that the GPs advised they would like more information on were the following: practical advice for difficult patients, for example, children or older people who do not like the taste of water, when increased fluid intake can be harmful, sweeteners in drinks and use of subcutaneous fluids for patients unable to drink enough. Discussions were generated about hydration status in patients repeatedly prescribed diuretics for swollen legs without any other cardiovascular/primary medications. The use of subcutaneous fluids for patients, such as those with dysphagia, who are unable to physically meet their fluid requirements, was identified as another area requiring research to inform practice.

DISCUSSION

The total KAP score of the attendees increased significantly following attendance at the evidence-based training session. Attendees rated the session as excellent or good (90%) and reported the training was likely to influence their professional practice (100%). The training package will continue to be developed and adapted, with increased focus on follow-up strategies as well as integration into medical curricula and standards of practice.

The KAP questionnaire used in the needs assessment and evaluation identified key gaps in knowledge. The EFSA water intake recommendations were not well known among the GPs, concurring with previous research of a range of healthcare professionals across Europe[31] and previous research conducted by the research group with dietitians.[32] The lack of awareness among professions in the UK and Europe warrants further exploration of how to increase dissemination of such recommendations. Furthermore, a lack of understanding of the body water content and the proportion of fluid obtained from food were overestimated by participants of this study and previous research of healthcare professionals,[31 32] questioning the priority placed on hydration care by all healthcare professionals. The improved knowledge by the GPs after the training in this study may highlight the value of continuing professional development training for all healthcare professionals.

The lower practice scores may be attributable to the lack of clinical guidelines for hydration in the primary care setting. The dynamic nature of body water balance and the number of factors affecting hydration status make researching the effects of poor and optimal hydration status complex. As a result, GPs and other healthcare professionals may be reluctant to base their practice on such evidence without the support of training. A follow-up of the practice from the GPs in this study

Table 4 General practitioners' self-reported hydration and patient care practice before and after the training session

Question	Response options	Pre		Post	
		n=59	Per cent	n=54	Per cent
Patients who have had a stroke may have an altered sensation of thirst. Do you regularly ask your stroke patients about their hydration?	I never ask	15	25	10	19
	I occasionally ask	36	61	36	67
	I regularly ask	7	12	7	13
	I always ask	1	2	1	2
Do you encourage your patients to drink water to stay hydrated?	No	2	3	2	4
	No, but I tell them to decrease tea and coffee (caffeine intake)	1	2	2	4
	Yes, water only	13	22	13	24
	Yes, water and other non-caffeinated and within-reason caffeinated beverages	43	73	37	69
Urine colour may reflect the patient's current state of hydration. Have you ever asked about the colour of the patient's urine, relevant to hydration status?	I never ask	5	9	7	13
	I occasionally ask	32	54	31	57
	I regularly ask	20	34	16	30
	I always ask	2	3	0	0
Does your main place of work have easily accessible water dispensing facilities?	Yes, and I make use of it	44	75	39	72
	Yes, but I do not use it	12	20	12	22
	No, and I would use it if available	3	5	3	6
	No, but I don't see the need	0	0	0	0
Approximately how many minutes on average would you spend in a 4-hour clinical session on giving hydration advice to patients?	0	6	10	4	7
	<10	34	58	24	44
	>10	8	14	15	28
	Difficult to quantify	11	19	11	20

would be interesting to determine if the training had any effect on long-term practice.

Reflections by the GPs in relation to their individual practice raised key questions for future hydration research to address. First, the GPs were interested in the inappropriate use of loop diuretics in older people in the community. It is not a new phenomenon that the use of diuretics for ankle swelling alone, particularly in those without cardiac conditions, may perpetuate a cycle of chronic dehydration.[33] Water retention is likely in patients with a continually raised Arginine Vasopressin axis caused by chronic low drinking.[34 35] Therefore, there is a need for GPs to thoroughly review repeat prescriptions for loop diuretics when there is no known cardiac condition and consider the need to monitor hydration status and advise on increased fluid intakes.

Second, the use of subcutaneous fluids in patients who are physically unable to consume enough fluids orally was viewed as unethical by one group of attendees, for example, it would not be appropriate to provide artificial fluids to a dehydrated resident in a nursing home, while the other group considered it a necessity to treat the dehydration in those unable to drink enough orally. A study in care homes reported that residents requiring texture modification consumed significantly less fluid compared with residents on normal texture diets.[36] A review concluded more, better quality research is needed for the prevention and treatment of dehydration in care home residents.[37] To this end, the entire MDT should consider, on an individual basis, if artificial hydration is appropriate.

Before the training, the GPs were found to have a positive attitude towards hydration care and training for their profession which may explain the lack of change in hydration attitude. Personal hydration status was rated negatively despite the majority reporting access to, and usage of, water facilities in the workplace. Doctors have previously been found to advocate personal practices or personal health aspirations to patients,[38–41] therefore promoting fluid intake in the workplace by, for example, provision of drinking water facilities or posters of urine colour charts in washrooms, may have benefit for doctors and patients. The baseline questionnaire completed as part of the needs assessment found similar attitudes towards hydration; however, individuals with a particular interest in hydration may have been more likely to complete the questionnaire.

It is the UK Need for Nutrition Education/Innovation Programme's philosophy (NNEdPro) to combine technical training with change management and clinical leadership training.[29] This novel aspect of training better equips attendees to integrate the knowledge into clinical practice, as well as anticipate and overcome resistance likely to be faced by a MDT. The authors are, therefore, optimistic that the GPs can better translate the training into their practice and be change drivers for the MDT they work within.

An advantage of this training was the variety of expertise in the review of the teaching materials and the multidisciplinary tutors delivering the training to ensure appropriate translation of the evidence into practice. Hydration in clinical practice is an emerging field;

therefore, more research is required to improve the quality of existing evidence, particularly in the area of optimal hydration status and convenient, accurate measures of hydration status. Population-level assessment of dehydration is needed to better determine the level of impact required by healthcare professionals when treating patients. Limitations of the study include the small number of GPs who attended the course, the questionnaire at the beginning of the training session may have primed the attendees to the answers throughout teaching and the low response rate to the longer term follow-up preventing evaluation of the same.

CONCLUSION

The GPs had a positive attitude towards hydration care and the training package significantly improved knowledge of hydration in clinical practice. However, there remains room for improvement and this training aimed to provide more practical advice and skills for GPs. The training package will continue to be developed and adapted, with increased focus on follow-up strategies as well as integration into medical curricula and standards of practice. To ensure dehydration in the primary care setting is prevented, it is important to reach agreement on a method to conduct population assessments and consult with stakeholders on how best to overcome it. Policymakers will then have the knowledge to incorporate hydration care with greater precision in local and national policies.

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