Hydration and pressure ulcer prevention: a pilot study

KEY WORDS

- Dehydration risk assessment
- GULP risk assessment
- Hydration
- Pressure ulcer prevention
- Nurse-led care

ABSTRACT: Links between nutrition and pressure ulcer (PU) prevention and wound healing are well known and documented (Saghaleini et al, 2018). Less well documented is the link between hydration and pressure care. It was recognised that many patients admitted to acute hospitals are dehydrated (El-Sharkawy et al, 2015); this is particularly relevant to Gastroenterology patients based on the classifications of dehydration (Posthauer, 2016), although all patients are at risk. Dehydration status is not routinely assessed without painful and costly blood tests. Through the use of an adapted version of the GULP Dehydration risk screening tool (Food First Nutrition and Dietetics Team, 2012) and the implementation of a hydration-focussed care plan, it may be possible for a nurse-led assessment to identify dehydration risk and plan care accordingly. A pilot study showed that 50% of the sample group gained an improved level of hydration throughout their hospital admission and a decrease in their Waterlow score.

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The role of nutrition in both wound healing and pressure ulcer (PU) prevention is well documented (Saghaleini et al, 2018). However, what is less well known is the link between hydration, wound healing and PU prevention due to the effect of dehydration on blood volume and skin turgor. Fluids are responsible for providing transport of vitamins and nutrients to, and waste products away from, cells as well as allowing oxygen perfusion and hydration to wounds (Posthauer, 2012).

Classification of dehydration is as follows (Posthauer, 2012):

- Isotonic dehydration — an equal loss of both water and sodium caused by diarrhoea and vomiting
- Hypertonic dehydration — the loss of total body weight due to reduced water intake, pathologic fluid loss or both
- Hypotonic dehydration — a predominant loss of sodium over water loss, resulting in extracellular fluid loss. This can occur due to renal disease, diuretic usage or reduced intake of both water and sodium.

Dehydration facts

Nearly two thirds of hospital admissions are of people over the age of 65 years old, 37% of these admissions are dehydrated on arrival to hospital, with 62% remaining so 48 hours after admission. (El-Sharkawy et al, 2014). Dehydration can lead to an increased risk of mortality in patients who are acutely unwell and an increase in the risk of further illnesses including urinary tract infections (UTIs), seizures, acute kidney injury (AKI) and hypovolemic shock, as well as increasing the risk of PU and falls.

This all suggests that there needs to be more emphasis on prevention of dehydration and a proactive rather than a reactive approach is required.

In 2020, an acute gastroenterology (GI) ward at the Leicester Royal Infirmary was chosen to participate in the Trust's Pressure Ulcer Collaborative as part of a 'Pathway to Excellence' journey. Representatives from seven wards in the Trust came together to discuss their ward's achievements, and areas in which they needed development to improve the pressure area care they were providing.

Noting that many patients on a GI ward are dehydrated due to their illnesses and conditions, the acute GI ward chose to concentrate on the problem of dehydration. It was identified that, within the Trust, patients are not formally assessed for dehydration on admission or throughout their stay unless blood tests are taken, which causes discomfort to the patient and incurs a financial cost. As part of the collaborative a review was undertaken to determine if there was an existing risk assessment tool that could be piloted in the acute area.

WHAT IS GULP?

A review of available literature identified that a risk assessment exists and is used in community settings in some areas of the country; this is called the GULP dehydration risk screening tool and was developed by the Food First Nutrition and Dietetics Team (2012).

The original tool was developed for use in community settings and assesses three factors to gain an overall risk score of low, medium or high. This risk score is then used to implement the correct suggested plan of care based on the level of harm that continued dehydration poses:

- **G** Gauge 24-hour fluid intake and measure against an identified requirement
- **U** Urine colour
- **L** Look for signs, symptoms and risk factors for dehydration
- **P** Plan

It was determined that, with some modification, the assessment was suitable for use with inpatients in an acute hospital setting and written permission was obtained to adapt the tool accordingly from the Food First Team.

The adapted tool

- **G**:The 24-hour fluid requirement was made more specific to an individual's needs by using a person's age and weight to identify their fluid requirement based on a formula of 30ml/kg of weight for patients 60 and over (Hodgkinson et al, 2003) and 35ml/kg for patients under 60 years old (Zeman, 1991) and adding an estimated guide of how many cups of drink are required to meet this, based on the cup size and a fluid estimation tool already in use within the Trust
- **U**: As many GI patients have dark urine due to jaundice, which may be unrelated to their dehydration status, this was highlighted on the urine colour assessment to reduce the incidences of false high scores in this category. Incontinence was also addressed, with the addition of monitoring of wet incontinence products and consideration of how strong the urine smells. A urine colour guide was also added.
- **L**: The signs and symptoms of dehydration were reviewed and additions were made to account for patients who struggle to get to the toilet as fluid intake may be deliberately reduced by these patients. The use of thickened fluids was also added, as this can be a predisposing factor to poor oral intake as a result of patients' dissatisfaction with thickened fluids (McCurtin et al, 2018) due to the texture, taste and sensation as well as an increased feeling of satiety and thirst felt with their use (Cichero, 2013).
- **P**: The low, medium and high-risk care plans were altered to make them more relevant to acute hospital settings.

Formal validation of the amended tool may need to be considered in the future.

Exceptions when using the tool

- If a patient is started on IV fluids, only oral fluid intake is to be counted when assessing GULP scores (this includes intake via enteral feeding methods)
- If the patient is started on an oral fluid restriction for any reason, the assessments should be discontinued until the restriction is lifted
- If a patient is nil by mouth (NBM) the assessment is put on hold until oral fluids are restarted (unless the patient is receiving enteral feed/fluid, in which case this should be counted as oral fluid intake).

The adapted tool was then peer reviewed by a Consultant Gastroenterologist, an Intestinal Failure Specialist Nurse and a Senior Dietician, who all gave constructive positive feedback.

How to complete the tool

1. Assess the patient's oral intake for the previous 24 hours based on the provided minimal requirements – is it:

- > their minimal requirement (Score 0)
- < their minimal requirement but > 1000ml (Score 1)
- < 1000ml (Score 2).

2. Assess the patient's urine colour based on attached guide:

- Colour 1–3, no smell, several wet pads a day (Score 0)
- Unable to assess due to non-adherence/jaundice, smells at times, only 1–2 wet pads a day (Score 1)
- Colour 4–8, very strong smell, pads only slightly wet (Score 2).

GULP Assessment			
	Score 0	**Score 1**	**Score 2**
Gauge intake (total of 24 hour oral intake)	Fluid intake > than minimal requirement	Fluid intake < minimal requirement but > 1000ml daily	Fluid intake <1000ml
Urine Urine colour (use guide) If pads - Any smell, no. of wet pads	Urine colour 1–3 No smell Several wet pads a day	Unable to assess urine colour Urine dark due to jaundice Smells at times Only 1-2 wet pads daily	Urine colour 4–8 Very strong smell Pads only slightly wet or dry most of the time
Look for signs of dehydration Signs/symptoms and risk factors	No signs or risk factors for dehydration If patient has medical cause for any signs of dehydration score 0	If any of the below reported: Repeated UTIs, frequent falls, postural hypotension, dizziness, dry mouth/lips/ eyes, taking diuretics, hyperglycaemia, open wound/pressure ulcer, on thickened fluids, struggles to get to the toilet or any other factors for low fluid intake	If any of the below are reported: Drowsiness, low blood pressure, weak pulse, sunken eyes, increased confusion or sudden changes in mental state, diarrhoea and/or vomiting, fever
Plan	**Low Risk Score Total 0**	**Medium Risk Score Total 1–3**	**High Risk Score 4+**

Minimal recommended fluid requirement in 24 hours

Patient >60 yrs old (30ml fluid x weight in kg)

Patient weight kg	Recommended fluid ml/day	200ml glass/mug
30–33	900–100	5
34–36	1000–1100	5½
37–40	1100–1200	6
41–43	1230–1290	6½
44–46	1320–1380	7
47–50	1410–1500	7½
51–53	1530–1590	8
54–56	1620–1680	8½
57–60	1710–1800	9
61–63	1830–1890	9½
64–66	1920–1980	10
67–70	2010–2100	10½
71–73	2130–2190	11
74–76	2210–2280	11½
77–80+	2310–2400	12

Patient <60 yrs old (35ml fluid x weight in kg)

Patient weight kg	Recommended fluid ml/day	200ml glass/mug
30–31	1050–1085	5½
32–34	1120–1190	6
35–37	1225–1295	6½
38–40	1330–1400	7
41–43	1435–1505	7½
44–45	1540–1575	8
46–48	1610–1680	8½
49–51	1715–1785	9
52–54	1820–1890	9½
55–57	1925–1995	10
58–59	2030–2065	10½
60–62	2100–2170	11
63–65	2205–2275	11½
66–68	2310–2380	12
69–71+	2415–2485	12½

Date	Fluid requirement	GULP Score	Care plan active low/medium/high

Low risk care plan	Medium risk care plan	High risk care plan
· Encourage patient to continue current fluid intake	· Encourage patient to increase frequency and/ or size of drinks to the recommended minimal level · Give red jug · Start oral fluid monitoring · Aim for urine colour 1–3	· Encourage patient to increase frequency and/ or size of drinks to the recommended minimal level · Give red jug · Start fluid balance chart · Aim for urine colour 1–3 · If clinically concerned refer to Dr for review

If IV fluids started only count oral intake in assessment

If fluid restriction put in place discontinue assessment

If made NBM put assessment on hold until taking oral fluids again

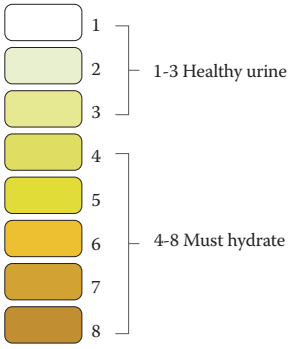

Figure 1. Adapted GULP dehydration risk assessment, by Deputy Sister Karen Green

3. Look for current signs of dehydration and medical conditions or medications which predispose the patient to dehydration:

- Score 0, 1 or 2 based on the guidance information on the risk assessment.

4. Scores are totalled to give an overall risk of Low, Medium or High.

5. Appropriate care plan can then be initiated based on patient score.

Figure 2. Results of 6-patient pilot study shown as risk level of each assessment during inpatient admission

	Tuesday	Saturday	Tuesday	Saturday	Tuesday	Saturday
Patient 1	High 6	High 5	High 4	Medium 3	Medium 1	Discharged
Patient 2	High 6	High 5	Medium 3	Discharged		
Patient 3	Medium 2	Discharged				
Patient 4	Medium 3	Medium 2	Medium 2	Low 0	Discharged	
Patient 5	Medium 1	Medium 1	Medium 1	Discharged		
Patient 6	Low 0	Discharged				

Figure 3 . Waterlow scores for 6 pilot patients taken during GULP pilot

	Waterlow 1	Waterlow 2	Waterlow 3	
Patient 1	15	14	11	Discharged
Patient 2	15	14	11	Discharged
Patient 3	5	3	Discharged	
Patient 4	7	6	9	Discharged
Patient 5	16	15	16	Discharged
Patient 6	5	Discharged		

THE PILOT

For the pilot, 6 patients in one bay were selected and had their GULP score reviewed on Tuesdays and Saturdays for the duration of their stay (*Figure 2*). There were 6 patients chosen. This allowed for a variety of GI conditions to be observed within the selected bay, on a randomised basis, while still allowing concise monitoring conditions to ensure high levels of compliance with the tool and associated identified care plan. A pilot study is defined by Porta (2008) as:

> *"A small scale test of the methods and procedures to be used on a larger scale."*

Informed consent was obtained from all patients in this pilot study for non-patient identifiable data to be collected, recorded, and compared and for the appropriate care plan to be implemented. As this data was collected on tools and assessments already recognised and in use within the Trust such as fluid balance charts (FBC) and the Waterlow risk assessment tool it was not necessary to gain ethical approval to add this data to the GULP tool. The tool did not replace routine blood tests during the trial.

RESULTS

It was noted that 5 of the 6 patients in the pilot study were dehydrated on admission to hospital as indicated by their GULP risk assessment score. On discharge 3 of these 5 patients had a lower GULP risk score than on admission suggesting an improved hydration level. There were 2 patients who remained at the same risk level. Throughout the study, no patients had a decline in their dehydration status or developed AKI.

Although the pilot was only conducted on 6 patients, it indicated that it is possible to identify patients who are dehydrated or at risk of dehydration earlier on in their admission and monitor them easily throughout their stay. Furthermore, through the early implementation of a basic hydration-specific care plan, none of those at risk of dehydration within the pilot group developed AKI during their admission.

In 50% of the sample group, as the patient's GULP score went down so did their Waterlow (*Figure 3*). This limited pilot was therefore considered successful, as a positive correlation was shown in half the sample group. Pilot studies when designed and conducted well may give an indication of the likely outcome of a larger trial (van Teijlingen and Hundley, 2002).

Next steps

On the basis of the successful pilot, the initiative is moving forward to an extended although still limited patient group to ascertain whether the

tentative results from the pilot are replicated in a larger patient group over an extended period.

The tool was to be used on all suitable admissions to the GI ward over a 6-month period between 1 July 2021 and 31 December 2021. This data will then be collated to identify whether the reduced Waterlow scores seen in the initial pilot are replicated on a larger scale. The incidence of PUs on the ward during this 6-month period will also be compared with the incidence of PU during the same 6-month period for the previous three years (2020, 2019 and 2018), as well as to those of a control ward, also GI in speciality for the 6-month trial period. Following this, the tool will potentially be used in other specialities to extend the pilot further.

Limitations

The initial pilot was incredibly limited and was carried out as such to test the efficiency and usability of the tool before a larger pilot took place over an extended period. The tool has only been used in GI medicine and so it is not clear whether the same results will be obtained in different acute specialities throughout the Trust. The tool was initially met with some resistance from ward staff and, due to the Trust operating a paperless system, the tool was occasionally missed during regular patient assessment. WUK

Declaration of interest

There are no conflicts of interest.

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