Dehydration impacts negatively on patient health and can have a fatal outcome. A check of the oral mucosa can give nurses an indication of whether a patient is at risk.

Using oral mucosa to assess for dehydration

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A small, three-week trial involving 68 beds in three hospital wards was carried out to determine the effectiveness of a newly developed nursing escalation tool, the Patient Oral Mucosa chart, which is designed to detect early stages of dehydration in patients.

Method Patients’ oral mucosa was examined during routine observations. Each examination gave a rating of 1-4; patients with ratings of 1 or 2 did not need escalating above nurse-led action and hydration monitoring, whereas 3 and 4 were escalated to the doctor or acute response team. Evidence of the chart’s effectiveness was collated from patients’ hospital notes.

Findings Of 155 returned charts, 41 (23.2%) had scores 3 or 4 recorded. However, only 31 incidences (16.7%) could be included due to a lack of documented evidence. Of these, the chart was shown to be 85% accurate in determining moderate to severe dehydration.

Dehydration, as well as being high on the government’s list of targets, is a difficult and continuous issue for health workers on all wards in all hospitals. It can have a profound and lasting effect on patients and can cause malnutrition, renal failure, liver failure and deep vein thrombosis, and can also be fatal (Iggulden, 1999).

This inspired me to develop a nursing escalation tool to help health professionals detect dehydration at an early stage and provide swift and effective assessment and treatment for patients.

The chart was developed following observations of several patients at various stages of dehydration (Fig 1).

Background Despite the risks associated with dehydration, there is little research into which assessment tool is best for identifying its risk or presence.

While there is no absolute definition of dehydration, its cause is generally considered to be a decreased fluid intake or increased fluid loss (Levi, 2005); this is not always linked to the ability to drink. To prevent dehydration, there must be an equal intake and output of water. To process normal metabolism and its waste products, the human body has a total fluid loss of approximately 1,500ml a day. Generally, a daily intake of around 1,700ml is considered acceptable (Faes et al, 2007).

Although dehydration is almost always avoidable (Jevon, 2010) it is not always identified quickly enough in the hospital environment. While patients who are able to manage their own fluid intake are still considered to be at risk (Armstrong-Esther et al, 1996), older patients are often the most vulnerable, often due to reduced renal function, decreased thirst sensation and increased susceptibility to long-term conditions such as diabetes (Holman et al, 2005).

Current methods of detecting dehydration

Admission assessment

This provides a history of patients’ dehydration risk on admission, including...
mental status, mobility, normal hydration practice, preferences, reason for admission and expected procedure (Iggulden, 1999). It identifies those at risk on admission but does not monitor changes in risk status.

Fluid charts
These are generally the first port of call when a patient’s fluid status is questioned. It should consist of:

- **Output**: urine, vomit, aspirate from nasogastric tubes and losses from drains, wounds and diarrhoea;
- **Input**: drinks, liquid foods, soup and porridge, liquid medicines, infusions and tube feeding (Holman et al, 2005).

According to the National Confidential Inquiry into Patient Outcome and Death (2002), charts are often completed with entries such as “sips”, “wet bed” and “OTT” (on the toilet), which can be misleading and are of little use. Charts are often incomplete, with patients’ fluid status poorly documented and calculated at the end of each 24-hour period.

Blood tests
Blood tests are effective and accurate but require skilled interpretation and are invasive. There is no universally recognised baseline knowledge requirement for blood results within nursing, so the level of skill in interpreting results varies, and skills in recognising the effects of dehydration vary between trusts and wards.

Hypernatraemia and raised serum urea or creatinine are often used as indicators of dehydration. Hypernatraemia indicates dehydration as the increased concentration of the serum blood level is a result of fluid loss causing a reduction in volume, while urea and creatinine can accumulate in the blood due to reduced renal function.

There may be a time lag of over 24 hours between the onset of dehydration and bloods being taken and interpreted.

Daily weighing
Weighing patients daily requires appropriate scales, staff and hoists (Ferenczi et al, 2007). This can be time consuming and difficult to manage, and it could take up to a day to obtain information on weight change as weighing occurs at the same time each day.

Dehydration trigger points are rapid weight loss of more than 3%. However, this may not be picked up for 48 hours once a baseline weight has been established (Hodgkinson et al, 2003).
**Urine specific gravity**
For this to be effective, urine must be collected daily for testing. The concentration of solutes within the urine is then measured. If the patient is dehydrated, urine specific gravity is expected to be raised and the urine to appear concentrated. Urine specific gravity may be difficult to obtain in more independent patients.

**Axillary moisture**
This is the measurement of axillary moisture in order to determine a person’s hydration status. Hodgkinson et al (2003) suggested that this is only accurate 50% of the time and could be unpleasant for staff and patients, making it less likely to be carried out at all.

**Mucous membrane assessment**
This involves checking the oral mucosa for a dry appearance and laterally furrowed tongue. In a study of 38 signs and symptoms commonly attributed to dehydration in emergency ward patients, researchers found indicators for severity of dehydration (unrelated to patient age) included: tongue dryness, longitudinal tongue furrows and dryness of the mucous membranes of the mouth (Gross et al, 1992). This is a relatively simple check and can alert health professionals to potential problems.

**The Patient Oral Mucosa (POM) chart**
The Patient Oral Mucosa (POM) chart helps health professionals to categorise patients in one of four stages of dehydration (Fig 2).

**Stage 1**
As this is a nursing escalation tool rather than a medical diagnostic tool, stage 1 was designed as a baseline stage for a normally hydrated person.

**Stage 2**
This stage was developed as a result of observations of several patients’ oral mucosa when they were not considered clinically dehydrated but were not receiving the recognised minimum daily fluid input of 1,500ml (Faes et al, 2007). Indentations were noted along the lateral edges of the tongue and the inner aspect of the teeth left impressions on the tongue. This stage requires ward-based nurse-led management of fluid intake.

**Stage 3**
This stage is based on observations of several patients’ oral mucosa when considered to have a fluid deficit of 2-3L. At stage 3, patients may need intravenous (IV) infusion, but it is important to rehydrate by natural, non-invasive means wherever possible.

**Stage 4**
Patients at this stage are in a state of severe dehydration with a considered fluid deficit of over 3L. This is an emergency situation requiring immediate intervention.

**The trial**
A three-week trial was carried out across three wards with a combined total of 68 beds to determine the effectiveness of the POM chart in identifying dehydration and advising staff on the best course of action.

With full disclosure before the trials started, ethical approval was not required by the trust’s ethics department. All patients involved in the trial were made aware on admission that they were being invited to participate in a trial for research purposes. They gave consent verbally and by complying with each intervention. Participants were able to opt out of the trial at any stage.

**Method**
Key members of nursing staff from each ward were taught how to use the charts and asked to teach their colleagues to use it. This training was reinforced throughout the trial, and implementation of the tool was supervised to ensure reliability, validity and consistent use.

Patients were excluded from the trial if they were already dehydrated with a treatment plan in place, had conditions that cause dry mouth such as Sjögren’s syndrome, were receiving particular chemotherapy or radiotherapy, scored 1 or 2 on the POM chart, or if documentation was inadequate.

Patients included in the trial were given a POM chart either on admission or on the start date of the trial. Nursing staff were instructed to examine the oral mucosa with each set of observations and document the score on the back of the chart. Any actions taken and treatment given were documented in the patient’s notes.

A score of 1 or 2 was designated for management by ward staff.

A score of 3 or 4 was designated for escalation and immediate review to either the acute response team, who review all patients with early warning scores of 4 and above (National Institute for Health and Clinical Excellence, 2007; Subbe et al, 2001), or the appropriate doctor.

At the end of the three weeks, all charts were returned and scores of 3-4 were investigated. Where available, the information collected consisted of records of observations including patient at risk (PAR) scores, blood pressures, TPR (temperature, pulse and respiratory rate), oxygen saturation (SATS) and oxygen requirements, fluid charts, blood results, clinical examination findings and information supplied by the patient at the time of assessment. The PAR score is an early warning tool used by the trust, which works similarly to the medical early warning score (Subbe et al, 2001).

**Findings**
A total of 155 patients’ charts were returned. Of these, 45 (26.4%) scored 3 or 4 but only 31 (75.6%) were usable based on the criteria above. Of these patients, 26 were found to be dehydrated; 19 (73.1%) were treated with an IV infusion, three (11.5%) were encouraged to take fluids, one (3.8%) had been deliberately fluid restricted and three (11.5%) had no plans documented.

The trial was generally well received and in some areas staff were able to expand the charts’ use to find other problems such as oral thrush and a previously undiagnosed developing chest sepsis.

**Discussion**
Of the 155 returned POM charts, 26 (16.7%) incidences of moderate to severe dehydration were found. If that percentage were applied to a 500-bed general hospital, there would be 83 potentially severely dehydrated patients, which would carry significant human and financial cost.

Nurses play a key role in the prevention, detection and treatment of dehydration. They are integral to identifying it and vital in its escalation for action and treatment. While it could be argued that maintaining hydration is the responsibility of all disciplines, it tends to fall to nurses to coordinate and monitor patients’ treatment pathways.

The POM chart was designed as a nursing escalation tool only. Its sole purpose is to ensure patients receive appropriate, timely treatment of dehydration. While the examination of the oral mucosa has its place within clinical examination, it is not a standalone indicator. For this reason, it is vital that ward nurses escalate...
their findings so a definitive diagnosis can be made. Certain variables may affect the appearance of the oral mucosa, such as oral cancer, oral thrush or poor oral hygiene. Specialist treatment, such as chemotherapy or radiotherapy, and some drug therapies may cause a dry mouth and affect the oral mucosa.

**Limitations**
The POM chart may not always be effective; for example, oncology or ENT patients may have treatment or surgery that affects their oral mucosa, which will reduce the accuracy of assessment. The increased workload for the practitioner will also affect how quickly patients scoring a 3 or 4 are escalated for hydration assessment.

**Conclusion**
While this trial appeared to be effective in determining dehydration in vulnerable hospital inpatients, the group size and length of trial were limited. Larger and wider-scale investigations into the tool's effectiveness need to be carried out before its reliability can be proven. However, the results from this trial are promising and highlight a need for more research in this area.

**References**