



The effect of a rapid rehydration guideline on Emergency Department management of gastroenteritis in children



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ABSTRACT

This study evaluated the use and effect of a rapid rehydration guideline for the management of gastroenteritis in children 6 months to 4 years of age in an Emergency Department (ED). The guideline aims to facilitate rehydration within 4 h of arrival to the ED, using oral or nasogastric fluids. Primary outcome measures were ED Length of Stay (LOS) and hospital admission rates. Documentation of physiological recovery and consistency of re-hydration regimes used were examined as secondary outcomes.

Methods: A quasi-experimental design using the medical records of 235 children pre and post intervention was used. Descriptive statistics (frequencies, medians, interquartile ranges) were used to summarize the data. The pre and post-test groups were compared using Chi Square and the Mann Whitney *U* Test. **Results:** There was an increase in the ED LOS and in hospital admission rates post implementation of the rapid rehydration guideline in the ED. However, the time frame for initiation of rehydration therapy using oral or nasogastric routes improved post guideline implementation.

Conclusion: The need for improvements in the ED management of dehydration secondary to gastroenteritis has been highlighted providing potential benefits to patient care and outcomes.

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Introduction

This study evaluated the use and effect of a rapid rehydration guideline for the Emergency Department (ED) management of gastroenteritis in children 6 months to 4 years of age. The study was conducted to determine whether the use of a rapid rehydration guideline led to a reduction in the ED LOS for children presenting with gastroenteritis related dehydration. A formal guideline for rapid rehydration of children was developed and implemented. Primary measurement outcomes of this project were the ED Length of Stay (LOS) and rates of hospital admission. Documentation of physiological recovery and consistency of rehydration regimes used were also reviewed.

The ED rapid rehydration guideline was developed based on the clinical practice guidelines from the Royal Children's Hospital, Melbourne and the Southern Health. Gastroenteritis Clinical Path for Children (South and Young, 2002; Southern Health, 2005). The guideline aimed to facilitate rehydration within 4 h of arrival to the ED using oral or nasogastric fluids and to reduce variations

in care during initial patient assessment. Earlier detection of dehydration and rapid initiation of rehydration for children suffering from gastroenteritis has the potential to improve the provision of a consistent and systematic approach to the initial and ongoing care of paediatric patients with gastroenteritis. Additionally, the potential benefits to the organisation of early identification and treatment of dehydration in children include reduction in clinical risk that occurs with variations in practice and a reduction in adverse events.

Background and literature

Dehydration secondary to gastroenteritis in children is a common reason for parents to seek emergency care (Connors et al., 2000). The most common consequence of gastroenteritis is dehydration induced hypovolaemia, primarily due to loss of fluids from vomiting and diarrhea. Children with gastroenteritis are at greater risk for developing dehydration as they have an increased surface area to body volume ratio, resulting in increased insensible fluid losses. Volume depletion (hypovolaemia) reduces the effective circulating volume and, if severe, compromises tissue and organ perfusion (Endom and Kim, 2006). If severe hypovolaemia is not treated in an effective and timely fashion, ischaemic end-organ

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damage may occur, leading to increased morbidity and mortality (Neville et al., 2006; Endom and Kim, 2006; Beck et al., 2013).

Many children with gastroenteritis have mild to moderate dehydration and are discharged following rehydration and a period of observation (Powell et al., 2011). The options available to clinicians when treating volume depletion secondary to gastroenteritis include oral, nasogastric or intravenous fluid administration. Studies comparing nasogastric and intravenous fluid administration have shown that nasogastric rehydration is as effective as intravenous rehydration for children with mild to moderate dehydration (Nager and Wang, 2002; Piescik-Lech et al., 2013). Intravenous fluid replacement to treat paediatric gastroenteritis is expensive, increases need for hospital admission, subjects children to a painful procedure, and places children at risk of associated complications such as electrolyte imbalance, particularly hyponatremia (high sodium levels), and infection (Piescik-Lech et al., 2013).

Several researchers suggest early Oral Rehydration Therapy for children with gastroenteritis may reduce severity of dehydration and decrease the use of intravenous fluids (Phin et al., 2003; Westwood, 2011). Fonseca et al. (2004) identified that early intervention for dehydration in infants and children using Oral Rehydration Therapy (ORT) reduced morbidity rates and reduced LOS compared with the use of IV fluid.

However, there is a lack of consensus regarding the timing of rehydration. According to Bender and Ozuah (2004) best evidence and expert opinion recommends rapid rehydration using ORT over a 4 h period for children less than 5 years of age with dehydration secondary to gastroenteritis. Bruzzese et al. (2013) recommended a somewhat different approach and suggest rehydration should occur over 2–4 h with either oral and nasogastric fluids. Powell et al. (2011) compared the efficacy of rehydration over 4 and 24 h in children with gastroenteritis and found no differences between the two regimes.

According to South and Young (2002) fluid replacement for mild, moderate and severe dehydration in children using oral, nasogastric or Intravenous routes is most commonly given at a rate of 10 ml/kg/h. However, Phin et al. (2003) suggested a rehydration at a rate of 20 ml/kg/h has been shown to decrease the need for admission and ED Length of Stay in children with moderate dehydration secondary to gastroenteritis.

The rationale for selection of fluid administration used in children is often unclear with variability in the management of mild to moderate dehydration, Spandorfer et al. (2005) recommended fluids such as gastrolyte™ (an electrolyte rehydration formula – www.gastrolyte.com.au) as first line therapy for mild to moderate dehydration in children.

Inconsistency in the management of children with gastroenteritis results in unnecessary delays in definitive management specifically related to rehydration (Phin et al., 2003). This leads to prolonged waiting time to treatment, contributes to ED overcrowding, increased resource use and unnecessary admissions to hospital.

Gastroenteritis induced dehydration in children is a common reason for presentation to Emergency Departments. Timely intervention with rapid rehydration, to correct dehydration, has the potential to reduce the incidence of more severe consequences of dehydration such as severe hypovolemia, and reduce ED Length of Stay and hospital admission rates (Atherly-John et al., 2002; Elliot and Dalby-Payne, 2004; Webb and Starr, 2005; Frith and Elliot, 2007; Lee and Haden, 2007; Putnam et al., 2007).

Ethics

Ethics approval was sought from the health service and RMIT University Human Research and Ethics Committee (HREC).

Formal written informed consent was not sought from the patients as the Emergency Department and the Children's Unit including the Paediatric Short Stay Unit (PSSU) nursing observation charts were only examined and no direct patient contact was necessary.

Method

A quasi-experimental design using two groups: a pre test retrospective audit, followed by a period of 3 months to implement the protocol and then post collection of data for 6 months after the implementation of the rehydration guideline. The same audit tool was used with both the pre and post-test groups to collect data in ED at time intervals (on arrival, 1, 2 and 4 hourly).

Sample

The ED used in this study manages approximately 1000 children with gastroenteritis per year. Of these, 19.5% require hospital admission for ongoing rehydration. The target population was a convenience sample of two hundred and thirty-five ($N = 235$) children aged 6 months to 4 years who presented to the ED within the data collection periods. The pre-test group included all children presenting to the ED with gastroenteritis in the six month period prior to the implementation of the guideline. The post-test group included all children presenting to the ED with gastroenteritis in six months following implementation of the guideline. Children aged 6 months to 4 years were targeted as they have a high prevalence of gastroenteritis and are the most easily managed using oral/nasogastric fluids.

Intervention

The guideline was introduced to all ED nursing staff through nursing in-service education. The ED nurses were provided with a step-by-step approach to the use of the guideline in the treatment of varying degrees of mild, moderate and severe dehydration in children. Increased knowledge and awareness in the treatment of dehydration in children was also highlighted and further discussed to ensure that these patients were receiving the appropriate triage categories and interventions in a timely manner. Education of the guideline was also given to the ED medical staff.

Following the retrospective audit, a three month period was allowed prior to post-test data collection for nursing staff to receive in service education and become familiar with the use of the guideline in clinical practice.

Data collection

Data was collected from a review of medical records prior to and following the implementation of the guideline. A data collection tool was developed to ensure consistency of data collection. Data collected included the Australasian triage scale (ATS) category and clinical data including physiological status, heart rate, respiratory rate, blood pressure, mucous membranes status (dry or moist), capillary refill (seconds), and fluid regimes used. Data related to the re-hydration regimes used included the type, volume, rate and route of fluid, and if the fluid regime was prescribed. These data were measured on arrival to ED and at 1, 2 and 4 hourly intervals during the ED stay.

Demographic data collected included age, gender, time of arrival, time of discharge, discharge destination, waiting times, the ED LOS and the number of hospital admissions.

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