



Contents lists available at ScienceDirect

e-SPEN, the European e-Journal of Clinical Nutrition and Metabolism

journal homepage: <http://www.elsevier.com/locate/clnu>

Original Article

Peri-operative fluid and electrolyte management: Undergraduate preparation and awareness

A. Chari^a, J.S. Cooke^a, S. Singh^b, J.M. Findlay^{c,*}^a University of Oxford Medical School, John Radcliffe Hospital, Headley Way, Oxford OX3 9DU, UK^b University of Cambridge Medical School, Addenbrooke's Hospital, Hills Road, Cambridge CB2 0QQ, UK^c Department of General Surgery, Royal Berkshire Hospital, Reading RG1 5AN, UK

ARTICLE INFO

Article history:

Received 11 April 2011

Accepted 23 June 2011

Keywords:

Surgery

Fluid prescription

0.9% saline

Hartmann's solution

Education

Medical students

SUMMARY

Background & aims: Peri-operative fluid and electrolyte mismanagement remains a crucial variable in surgical outcome. Junior doctors are the primary prescribers, yet their knowledge has been shown to be inadequate. No studies have quantified the knowledge, teaching and attitudes of medical students, prior to taking on this role; this study aimed to do so.

Methods: A paper questionnaire was distributed to 600 final and penultimate year medical students during lectures at two UK universities in January 2011. 100 responses were received. 18 questions assessed undergraduate teaching experiences, physiological and clinical knowledge. All students had completed junior medical and surgical attachments.

Results: Students received a mean of 2.7 h teaching on management. Just 58.9%, 19.8% and 16.0% correctly identified the composition of 0.9% saline, Hartmann's solution and Gelofusine respectively. 53.1% would prescribe Hartmann's solution as their primary post-operative crystalloid, 45.9% would prescribe 0.9% saline. Confidence of the former group was significantly greater than the latter (5.88 vs 5.00, $p = 0.017$); furthermore, 34.6% of the former thought choice of crystalloid was irrelevant, compared with 57.7% of the latter ($p = 0.00016$).

Conclusion: Students continue to receive inadequate training on peri-operative fluid and electrolyte management. There are simple interventions available to remedy this prior to qualification.

© 2011 European Society for Clinical Nutrition and Metabolism. Published by Elsevier Ltd. All rights reserved.

1. Introduction

Intravenous fluid prescription is almost ubiquitous in peri-operative care and is increasingly recognised as crucial in patient outcome. Although the importance of the surgical stress response has long been understood, patients remain vulnerable to inappropriate fluid and electrolyte management, accruing daily excesses of up to 4 L of fluid and 600 mMol sodium.¹ Such excesses may be detrimental, causing hyperchloraemic metabolic acidosis, reduced splanchnic perfusion, increased gastric mucosal acidity and coagulopathy.² The extent of the problem was highlighted by the 1999 UK National Confidential Enquiry into Perioperative Deaths (NCEPOD)³ as a major cause of iatrogenic perioperative morbidity and mortality; the enquiry advocated improving both undergraduate and postgraduate education.

Immediately thereafter, a number of studies identified inadequacies in knowledge and practice amongst junior doctors and consultant

surgeons.^{4,5} These found that whilst 89% of Foundation Year 1 doctors believed they were the primary prescribers,⁴ only 54% of consultants thought this was the case.⁵ Junior doctors were found to lack basic knowledge despite considerable confidence in their roles.⁴ Postgraduate instruction was uncommon, yet only 15% of consultants thought that their juniors had received adequate training.⁵

In 2008 the British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients (GIFTASUP)⁶ were published, in particular advocating a paradigm shift from routine use of unbalanced (e.g. 0.9% saline) to balanced crystalloid (e.g. Hartmann's solution).

Almost a decade on from the NCEPOD enquiry, this study aimed to assess whether recent postgraduate advances are currently reflected in undergraduate education in the UK, quantifying current undergraduate teaching on the prescription of intravenous fluids, and qualifying student's confidence and attitudes in this regard.

2. Methods

A paper questionnaire with 18 questions (Fig. 1) was designed and piloted to 5 medical students. Following feedback, it was amended and distributed to all 600 final and penultimate year

* Corresponding author. Tel.: +44 (0)118 3225111.

E-mail addresses: aswin.chari@medschool.ox.ac.uk (A. Chari), Joanna.cooke@medschool.ox.ac.uk (J.S. Cooke), ss690@cam.ac.uk (S. Singh), johnfindlay@doctors.org.uk (J.M. Findlay).

Prescription of IV Fluids

As FY1s in the very near future, you will be in charge of prescribing 100s of litres of fluid every week. This short survey is to find out how much teaching you receive on fluids and how confident you would be at choosing the appropriate fluids in a few simple situations.

We thank you in advance for taking the time to answer this. As a token of our appreciation, we will send you some details on the new prescribing guidelines in a few days' time (if you provide an e-mail address). Should you have any questions, please do not hesitate to e-mail aswin.chari@medschool.ox.ac.uk.

Name & e-mail address (optional): _____

Year of medical school: Final Penultimate Other

How many hours of teaching have you received about the prescribing of fluids? _____

Would you like to receive more teaching on fluids? If so, how many hours? _____

Have you heard about the **British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients** (Powell-Tuck, 2008)
Yes No

Fluid Compositions

What is the normal composition of serum electrolytes? (All values in mmol/l)

- Na⁺ 125-135 / K⁺ 3.0-5.0 / Cl⁻ 100-110 / HCO₃⁻ 24-28 / pH 7.20-7.40
- Na⁺ 135-145 / K⁺ 3.5-5.5 / Cl⁻ 95-105 / HCO₃⁻ 28-32 / pH 7.35-7.45
- Na⁺ 125-135 / K⁺ 3.5-5.5 / Cl⁻ 95-105 / HCO₃⁻ 24-32 / pH 7.25-7.35
- Na⁺ 130-140 / K⁺ 2.5-4.5 / Cl⁻ 100-110 / HCO₃⁻ 22-30 / pH 7.15-7.25
- Na⁺ 125-135 / K⁺ 3.0-5.0 / Cl⁻ 95-105 / HCO₃⁻ 26-34 / pH 7.25-7.35

What is the composition of normal saline? (All values in mmol/l)

- Na⁺ 154 / Cl⁻ 154
- Na⁺ 134 / Cl⁻ 134
- Na⁺ 124 / Cl⁻ 124
- Na⁺ 134 / Cl⁻ 104
- Na⁺ 124 / Cl⁻ 104

What is the composition of Hartmann's solution? (All values in mmol/l)

- Na⁺ 126 / K⁺ 5.0 / Cl⁻ 105 / HCO₃⁻ 27
- Na⁺ 134 / K⁺ 4.0 / Cl⁻ 96 / HCO₃⁻ 24
- Na⁺ 130 / K⁺ 4.5 / Cl⁻ 100 / HCO₃⁻ 30
- Na⁺ 129 / K⁺ 3.0 / Cl⁻ 103 / HCO₃⁻ 28
- Na⁺ 131 / K⁺ 5.0 / Cl⁻ 111 / HCO₃⁻ 29

What is the composition of Gelofusine (colloid) solution? (All values in mmol/l)

- Na⁺ 154 / Cl⁻ 154 / Protein 40g/l
- Na⁺ 130 / Cl⁻ 100 / Protein 30g/l
- Na⁺ 0 / Cl⁻ 0 / Protein 40g/l
- Na⁺ 154 / Cl⁻ 120 / Protein 40g/l
- Na⁺ 154 / Cl⁻ 120 / Protein 30g/l

Fluid Prescribing

What are the approximate 24h fluid requirements of a normal 70kg patient?

- 1.0 litre
- 2.0 litres
- 3.0 litres
- 4.0 litres
- 5.0 litres

What are the 24h electrolyte requirements of a normal 70kg patient? (All values in mmol)

Na⁺ _____ Cl⁻ _____ K⁺ _____

In the post-operative patient, which crystalloid fluid would you usually prescribe?

Normal Saline Hartmann's Solution

How confident are you about your decision? (0 = no confidence, 10 = fully confident)

0 1 2 3 4 5 6 7 8 9 10

In general, do you think it matters whether you prescribe normal saline or a balanced crystalloid?

Yes No

How confident are you about your decision? (0 = no confidence, 10 = fully confident)

0 1 2 3 4 5 6 7 8 9 10

What 2 aspects of the patient's notes or drug charts would you check before routine fluid prescription?

What 2 reliable clinical observations would you check before routine fluid prescription?

What 2 reliable clinical signs would you assess before routine fluid prescription?

Complications of fluids

Are there any complications of normal saline? If so, can you name any? Yes No

Are there any complications of balanced crystalloids? If so, can you name any? Yes No

Thank you for taking the time to fill in this questionnaire!!

Fig. 1. The questionnaire.

students at two major UK universities in January 2011. All had completed their junior medical and surgical attachments. Students received the questionnaire during lectures, which was completed without conferring or accessing any educational resources. 100 responses were received (16.7%).

2.1. Statistical analysis

Statistical analysis was performed using Microsoft[®] Excel 2010 (Microsoft Corporation, Redmond, WA, USA), using two-tailed independent t and Chi square tests as appropriate.

3. Results

The 100 responses were equally split between both universities, 53 (53.0%) and 47 (47.0%). Thirty-five (35%) were final year students and 65 (65.0%) were penultimate year students. Students had received a mean of 2.7 (SD 1.5) hours of teaching on fluids. There was no significant difference between universities ($p = 0.11$). Eighty four (84.0%) felt this inadequate, and would welcome a mean additional 3.6 (SD 2.1) hours of teaching. Just 16.0% were aware of the GIFTASUP Guidelines.

Eighty six (86.0%) accurately identified serum electrolyte reference ranges. However, fewer students correctly identified the composition of normal saline (53, 58.9%), Hartmann's solution (19, 19.8%) and Gelofusine[®], a commonly used colloid solution in UK hospitals (15, 16.0%).

Eighty nine (89.0%) correctly approximated the 24 h fluid requirements of a 70 kg patient (Fig. 3). However, fewer could estimate 24h electrolyte requirements for sodium (31, 39.7%), potassium (55, 67.9%) and chloride (33, 45.2%) (Fig. 2A–C).

Overall confidence (Likert scale 0–10) prescribing fluids was 5.5 (SD 1.8). Fifty two (55.9%) would prescribe Hartmann's solution as their primary post-operative crystalloid, 45 (48.3%) 0.9% saline. There was a significant difference in confidence between those prescribing Hartmann's (5.88, SD 1.67) and saline (5.00, SD 1.87) ($p = 0.017$). Of those preferring 0.9% saline, 57.7% thought choice of crystalloid was irrelevant, compared with 34.6% of those preferring Hartmann's solution. This was a significant difference (chi-squared, $p = 0.00016$). Eighty (80.0%) believed there to be complications of 0.9% saline, predominantly fluid overload (29, 36.3%), oedema (15, 18.8%), and hypernatraemia (21, 26.3%). Seventy three (73.0%) believed Hartmann's to be associated with complications, predominantly anaphylaxis (28, 38.4%) (Fig. 3).

Significant minorities were unable to name more than one reliable aspect of the patients' notes/charts, bedside observations and clinical signs they would check prior to prescribing fluids (30.0%, 13.0% and 30.0% respectively) (Fig. 4A–C).

4. Discussion

The study has highlighted inadequacies in medical student knowledge at two large UK universities on a background of moderate confidence, a disadvantageous combination.

Download English Version:

<https://daneshyari.com/en/article/2690922>

Download Persian Version:

<https://daneshyari.com/article/2690922>

[Daneshyari.com](https://daneshyari.com)