

Overconsumption of fluids by athletes

Advice to overdrink may cause fatal hyponatraemic encephalopathy

A recent report that a female participant in the 2002 Boston marathon died from hyponatraemic encephalopathy because she ingested excessive volumes of a sports drink before and during the race,¹ exposes an emotive debate that has raged for more than a decade.² At issue is how much should athletes drink during exercise.³

From antiquity to the late 1960s, athletes were advised not to drink during exercise since it was believed that fluid ingestion impaired athletic performance.² The publication in 1969 of an incorrectly titled article, "The danger of an inadequate water intake during marathon running,"⁴ provided the impetus for change, even though the study neither examined a 42 km marathon race nor did it identify any dangers.² Rather, the most dehydrated athletes won those 32 km races, as is usually the case.² This article's incorrect title provided the intellectual incentive for numerous studies, many funded by a fledgling sports drinks industry, culminating in specific guidelines for ingestion of fluids during exercise.^{3, 5}

These guidelines make four assumptions. Firstly, that all the weight lost during exercise must be replaced if health is to be protected and performance is to be optimised, since, as the guidelines state, the greatest threat to health and wellbeing during prolonged exercise, especially when performed in the heat, is dehydration.⁶ Secondly, that the sensations of thirst underestimate the real fluid requirements during exercise. Thus athletes must be told how much to drink during exercise. Thirdly, that the fluid requirements of all athletes are always similar so that a universal guideline is possible. Fourthly, high rates of fluid intake can do no harm. Thus athletes are now advised to replace all the water lost through sweating (that is, loss of body weight), or consume the maximal amount that can be tolerated or drink 600-1200 ml per hour.⁵

But none of these ideas is evidence based.^{2, 3} In particular, there is no evidence that athletes must drink "the maximal amount that is tolerable" to optimise performance and prevent medical consequences. Thus the hyperbolic statement, "If strenuous exercise is undertaken by hypohydrated subjects, the medical consequences can be devastating," has no factual basis.⁷ Nor is it proved that all the weight lost during exercise must be replaced immediately, since the resting human may carry a fluid reserve of about 2 litres.^{2, 3} Nor were prospective trials undertaken to ensure that these guidelines are always safe. Thus it was not then appreciated that unrestrained drinking, either at rest⁸ or during exercise⁹ can have fatal consequences.^{1, 2, 8-12}

The first reports of hyponatraemic encephalopathy in athletes, army personnel, and hikers appeared shortly after the change to this new "drink the maximal amount that can be tolerated" dictum.^{2, 3, 9, 10} To date at least seven fatalities and more than 250 cases of this condition have been described in the medical literature.⁹⁻¹² Presumably reported cases represent a small proportion of all such cases.

Aside from military personnel, the athlete most likely to develop hyponatraemic encephalopathy is a female marathon runner, who runs those 42 km races at speeds slower than 8-9 km/h (about 5 mph). She gains weight during exercise because she drinks excessively both before and during exercise, sometimes in excess of 100 cups of fluid during the race (about 15 litres of fluid during 5-6 hours of exercise).¹² She does not develop a marked sodium deficit, nor does she have evidence of inappropriate secretion of antidiuretic hormone, although antidiuretic agents are clearly active.¹⁰ Since the cause of the condition is now known, prevention is possible. Thus Gardner has concluded that further deaths from hyponatraemic encephalopathy in the United States army will reflect the failure of the system to protect adequately its personnel through policy, procedures, and implementation.⁹

To protect all exercisers from this preventable condition, rational and evidence based advice must be provided.³ In particular, exercisers must be warned that the overconsumption of fluid (either water or sports drinks) before, during, or after exercise is unnecessary and can have a potentially fatal outcome. Perhaps the best advice is that drinking according to the personal dictates of thirst seems to be safe and effective.^{2, 3} Such fluid intake typically ranges between 400 ml and 800 ml per hour in most forms of recreational and competitive exercise; less for slower, smaller athletes exercising in mild environmental conditions, more for superior athletes competing at higher intensities in warmer environments.³

The recent adoption of these guidelines by USA Track and Field (www.usatf.org) provides the hope that this sad scientific aberration has finally run its tragic course.³

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Sharing patient information electronically throughout the NHS

Time for all clinicians to get involved

The UK government's NHS modernisation process is driven by highly visible promises to improve the standards and equity of health care in the United Kingdom.¹ The government hopes that the systematisation of health care can bring about revolutionary and cost effective changes in the ways we deliver care and has promised new electronic systems to enable us to monitor the quality, effectiveness, and equity of health interventions, in more open, evidence based, and person centred ways. In particular, the NHS in England has £2.3bn (\$3.75bn; €3.31bn) to spend between now and 2005 on an integrated care record service. At the heart of this service is a health information spine, where patient summary information will be published for use by all NHS staff involved in the care of individuals.² Yet few clinicians have played any part in planning the spine. Populating it with appropriate and accurate clinical data will not be straightforward.

So what advantages will the information spine bring? Ready access to all information about medical and surgical history, allergies and sensitivities, current medication, and recent investigations would undoubtedly be a valuable clinical resource, preventing errors,³ eliminating unnecessary investigations, and potentially speeding up the patient journey. But the disadvantages also need considering. These include risks to both patient and clinician if confidential identifiable data fall into the hands of people with no right to see it, and problems resulting from inaccuracy, misinterpretation, and omission of information. In a single general practice or hospital responsibility for identifiable patient data can be defined and managed—and clinicians take these responsibilities seriously. But when information moves beyond one organisation to a wider "shared health space," who is responsible for its integrity, veracity, attribution, and distribution? Can readers understand the provenance of the information: where was the reportedly abnormal blood test done? Was the result sent to the information service automatically or rekeyed in (erroneously?) by a receptionist? Was a diagnosis the result of a considered named doctor's opinion or a (possibly misreported) diagnosis by hearsay?

Populating the spine with information has two stages. The first is to create a new information resource. The most likely source is the general practice record. But a recent qualitative study of patients in English general practice found that up to 40% of the summary information derived from current computer records was inaccurate.⁴ The only way patient information can be acceptable in a shared NHS information resource will be if summarised records have attested accuracy, agreed by patient and general practitioner together.⁵ The second stage is to keep it up to date. To maintain a patient's information the designers have sensibly proposed that events (such as attendance at a surgery or outpatient appointment, a prescription, or an investigation or procedure) should automatically trigger transactions to update the information spine. This will be a major step forward in the effective use of information systems in the NHS, as it will provide clinicians with more information without the penalty of entering information duplicated elsewhere.

Many studies have been done of patients' views about sharing health data, but the findings have been confusing. Some patients already expect the NHS to keep readily available information about medication and diagnosis; but others want to be asked for their consent whenever new health information is to be shared⁶; and patients are unhappy to divulge lifestyle information to their general practitioners.⁷ Designing effective mechanisms for patients to exercise their rights to withhold elements of their health record will be challenging, but trust in the new NHS information service is fundamental to success. Access to shared information should, except in emergencies, be available only to clinicians concerned in the care of that patient.⁵ Without trust the whole investment will be underused and therefore a failure. A long awaited consultation process on confidentiality by the NHS Information Authority is due to report this summer.⁸

Despite some early discussions,⁹ many general practitioners and consultants have not heard of the integrated care record service or the information spine.¹⁰ General practitioners have well established electronic records but have not collected data with

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