243 kPa (2·4 atmospheres absolute) 100% oxygen for 90 minutes three times daily for the first day and twice daily thereafter.[5] In cases of surgical delay for any reason and in cases in which the decision is taken not to operate, hyperbaric oxygen should be used immediately if it is available; this may also assist in distinguishing viable from non-viable tissue at subsequent surgery.

The availability of hyperbaric oxygen facilities in Britain can be checked with the hyperbaric unit at Whipps Cross Hospital, London E11 1NR (tel 0181 539 5522, extension 5150).

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Overdosage during patient controlled analgesia

Mount syringes vertically . . .

EDITOR,—D A Southern and M S Read report on a patient who received an overdosage of opiate while using patient controlled analgesia.[1] Such an overdosage is not, however, a specific consequence of this technique but can occur with any infusion syringe, so it is not only anaesthetists who need to be aware of this risk. Infusion of insulin, for example, could be equally dangerous and might similarly be given in relatively low dependency areas.

Such events must be rare, but the fact that they may happen with a damaged syringe has been unequivocally shown.[2] In this latest case the syringe was "normal on close examination." When I duplicated the administration set used I found that perforating the 50 ml syringe plunger with a 20 gauge cannula resulted in virtually free flow, given a gravitational advantage of as little as 5 cm. Such a small leak might not be apparent on visual inspection, but ideally the syringe that was used should also be tested under pressure and the remainder of that batch looked at by the manufacturers. Failure to examine formally the relevant equipment means that the one reported lethal case of overdosage with patient controlled analgesia remains unexplained.[3]

Infusion syringes are frequently mounted horizontally and at some height above the patient. In such an orientation an airlock should develop before the syringe is competely emptied. The outcome would probably have been far worse if the syringe had been mounted pointing downwards. This situation is often exacerbated by the omission of antisyphon valves.

The solution is always to mount syringes vertically with the outlet uppermost at or even below the level of the heart, but despite such precautions an apparently fail safe system can still fail. Perhaps we should consider reverting to one of the early precepts of patient controlled analgesia—namely, that the syringe should contain only a "survivable dose."[2] In Nottingham, for example, when using morphine we use 60 mg in 60 ml, though more frequent changes of syringe then carry their own potential for operator error.

Patient controlled analgesia (and, by implication, other infusion techniques) has a good safety record,[4] but current practice is far from ideal. We should recognise that syphoning is a practical as well as a theoretical risk with any infusion syringe. Despite these problems, if the measures suggested above are used we can still hope to see this technique proved to be more effective than, or at least as safe as, the alternatives.

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. . . and below the level of the patient

EDITOR,—It is helpful to be reminded of the dangers of siphonage from patient controlled analgesia devices[1] or, indeed, from any raised fluid reservoir in continuity with a patient's venous system. The valve that D A Southern and M S Read describe, however, is a one way valve. It would not prevent siphonage from a syringe raised any great height above a patient. If the syringe is placed at or slightly below the level of the patient, as in the lower drawing in the figure in the paper, the valve would prevent the back flow of blood in the event of the syringe leaking—that is, it would prevent back siphonage but not forward siphonage. This seems a practical and safe arrangement as the other suggestion of placing the syringe with its outlet at the top is often difficult. We commonly use syringe pumps to deliver opioid infusions in our children's wards; these pumps usually do not have locked controls. If the syringe pump is at a low level some form of "antihandling" device should be incorporated to prevent toddlers amusing themselves.

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1 Southern DA, Read MS. Overdosage of opiate from patient controlled analgesia devices. *BMJ* 1994;309:1002. (15 October.)

Follow manufacturers' instructions

EDITOR,—Siphoning from the syringe of a patient controlled analgesia device into the patient, reported by D A Southern and M S Read,[1] is a well known potential problem and was first clearly described by Thomas and Owen.[2] Southern and Read quote this reference but do not give due explanation.

I was surprised to find that this "lesson" emanated from my department as we do not undertake orthopaedics or use the Graseby PCAS machine in our hospital; it is therefore misleading of the authors to give the impression that this problem occurred in the University Hospital of Wales. The acute pain service at the University Hospital of Wales treats between 2000 and 2500 patients with patient controlled analgesia each year, and we always use both antisiphon and unidirectional valves on our infusion lines for patient controlled analgesia. This has been our policy since the formation of the acute pain service in 1990. It is unfortunate that colleagues working in another unit in Cardiff were not aware of this problem.

This lesson is well known to those who regularly provide patient controlled analgesia, and most, if not all, manufacturers of patient controlled analgesia machines supply suitable infusion sets with protective valves included. If the correct equipment is used the authors' proposal that the outlet of the syringe should be positioned uppermost is unnecessary and, indeed, encourages others to ignore the safety measure of including an antisiphon valve.

Surely in this case the lesson should be: if you are going to use a piece of equipment it is wise to read the instructions and understand what you are doing.

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Authors' reply

EDITOR,—The incident that we reported did indeed occur at a different unit in Cardiff, and not at the University Hospital of Wales. Siphoning is well known to acute pain specialists but is unfamiliar to others—hence the need for a Lesson of the Week. An informal survey that we performed in 1993 showed that only a minority of hospitals in which patient controlled analgesia is used use antisiphon devices. Most use cheaper "minimal volume" infusion lines instead. We agree with Michael Harmer that those who use any item of equipment should read the instructions and know what they are doing, but as patient controlled analgesia equipment has proliferated to many low dependency areas it is being used by staff who are less familiar with this technology. It is therefore more important than ever that the equipment itself should incorporate the highest standards of safety. We believe that antisiphon valves are mandatory and should be complemented by other safety features, including having the syringe with its outlet uppermost. Our report was of a malfunction in a mechanical device: it is not impossible that some future case report will describe a malfunction in an antisiphon valve.

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Circadian variation in deliberate self poisoning

EDITOR,—Roberto Manfredini and colleagues present data showing circadian variation in the incidence of deliberate self poisoning as determined by assessment of admissions to an Italian accident and emergency department.[1] I am concerned, however, by their conclusion that "treatment of depressive disorders might therefore be improved by aiming for peak drug concentrations at vulnerable times."

A large proportion of their patients would not have been suffering from a depressive disorder and would therefore have been unlikely to benefit