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Correspondence

Fatal epidural infusion—call for a system-wide change

In the U.K. this year, deaths of patients have been reported following inadvertent administration of intravenous (IV) medications into the intrathecal space[1] and inadvertent administration of an epidural solution into the intravenous compartment[2]. A patient in an Australian hospital receiving an epidural infusion which was confused with an intravenous one, has been reported as leading to yet another fatality[3,4]. In our own institution we have recently experienced an incident where a woman, post caesarean section, received an epidural injection of cephalothin that was intended for IV administration. Training, experience, protocols and being careful when administering medications all help, but despite our best efforts, humans are fallible and error is inevitable[5]. The common coupling of intravenous, epidural and spinal equipment allows the possibility of administering drugs, intended for the IV route, into epidural or intrathecal access ports and vice versa. This common coupling conforms to the luer design, consisting of a 6% conical taper in both a slip fit and a lockable-screw-thread configuration as described in the Australian Standards (AS 1600.1 1998). The simplicity in use and construction of this system is attested to by its adoption on a global scale. An important patient safety problem is now being increasingly recognised[5,6] and calls for a luer incompatible system for some aspects of regional equipment are coming from a variety of sources[5-7].

If confronted today with epidural and spinal anaesthesia as completely new techniques, it is hard to imagine that any regulatory or professional body would countenance their introduction using compatible equipment. We would envisage that an alternative coupling/tubing to the luer system should constitute the interface between all components associated with regional drug administration. This should include epidural/spinal needle hubs, filters, drawing-up cannulas, minimum volume extension tubing and syringes.

Our proposed solution—the Adelaide Regional Connector (ARC)—is currently under prototype development and is shown in Figure 1. Figure 1(a) shows the current luer system with the 6% taper and a male component of 3.967 mm external diameter and corresponding female connection. Figure 1(b) demonstrates the ARC with a smaller 3.5 mm male component that retains the 6% taper. It should be noted that an essential feature of this design is the presence of an encircling collar around the male element. The figure demonstrates a screw thread for locking but this may be considered optional. The incompatibility of the ARC with the current luer

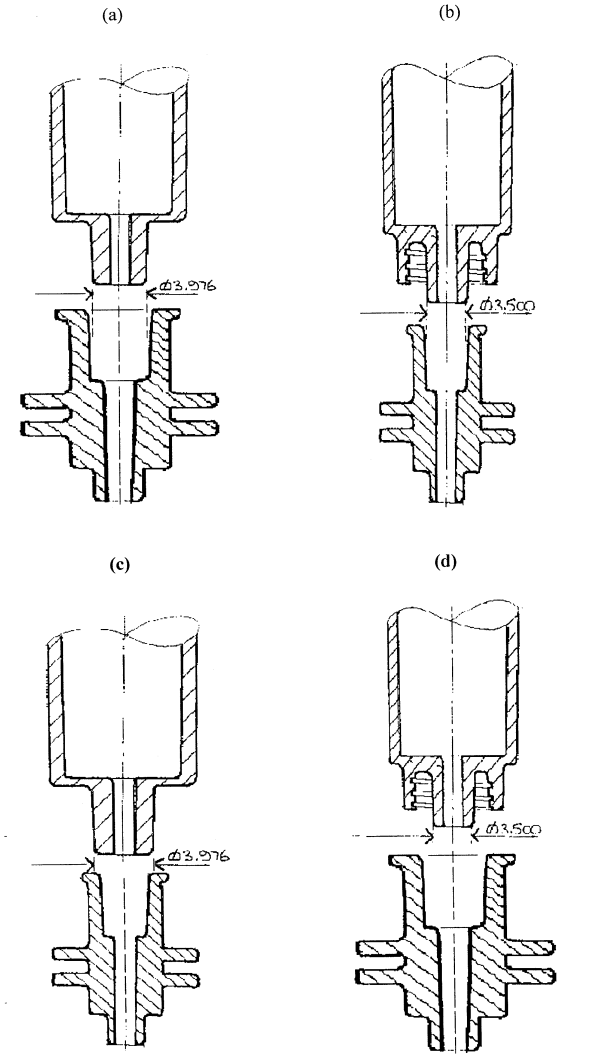

FIGURE 1: (a) The current luer system with the 6% taper and a male component of 3.967 mm external diameter and corresponding female connection. (b) ARC with a 3.500 mm male component and which retains the 6% taper. Note presence of an encircling collar around the male element. (c) Standard male luer connection is too large to engage the female element of ARC. (d) The male ARC component is unable to engage the standard female luer connection because of the presence of the collar around the smaller male element.

system is demonstrated in Figure 1(c) and 1(d). Figure 1(c) shows a standard luer connection being too large to engage the female element of the ARC. Figure 1(d) demonstrates that the male ARC component is unable to engage the standard luer female connection because of the presence of the collar around the smaller male element. The plunger of the ARC syringe is colour-coded to readily distinguish it from the current standard hypodermic syringe. In addition, the ARC syringe barrel is clearly labelled "Not for IV use".

Specific infusion pumps for regional anaesthesia tubing are currently available. It should not be difficult to ensure that these cannot be interfaced, or used at rates associated, with intravenous equipment. We would also propose that, in line with this development, drugs for regional use might be packaged in such a way that only regional coupling systems could access them.

Although anaesthetists represent the largest specialty using regional equipment, this safety issue is relevant to all practitioners administering medications into the intrathecal or epidural space, such as interventional radiologists, critical care personnel and haematologists. Implementation of the required modifications to current regional equipment on the scale required will necessarily involve many stakeholders, including national and international regulatory bodies and the medical supplies industry[7]. This process will present numerous challenges, the most important of which will be a commitment to change.

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Vasopressin and Shock

I read with interest the review article "Vasopressin and Shock"[1].

Forrest notes that patients in shock are sensitive to low doses of vasopressin, but does not elaborate on the reasons for this, of which there are several.

As plasma concentrations of vasopressin are noted to be low in the shock state, it is likely there is increased receptor availability for the exogenously administered hormone. Also, sepsis is known to impair function of the sympathetic nervous system[2], which would subsequently reduce effectiveness of the baroreceptor reflex. Concomitantly, patients with autonomic nervous system disease are exquisitely sensitive to the effects of vasopressin[3], and in cirrhotic patients, infusion of low-dose vasopressin results in a sustained pressor response, manifested as a persistently high systemic vascular resistance 30 minutes after infusion[4]. This may be explained by impaired sympathetic nervous system control of vascular tone in the cirrhotic state.

Finally, I would like to draw attention to the fact that vasopressin has also been used with considerable success to optimize circulatory stability in the management of potential organ donors.

Brain death is accompanied by falls in the levels of essential hormones, particularly vasopressin[5]. A regimen containing vasopressin for the replacement of depleted hormones in brain dead donors restores normal cardiovascular function, and can even transform previously unsuitable organ donors into acceptable ones[6].

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