Is reattaching an open intravenous fluid bag ever justified?

In terms of a universal practice, especially in anaesthesia and critical care, there is none more obvious than administration of intravenous fluids. What may not be universal is the practice around reattaching previously opened intravenous fluid bags. A common example during general anaesthesia is the disconnection of an intravenous fluid bag and clamping to prevent leakage, to allow administration of analgesia or antibiotics, before reattaching the same bag. This scenario is commonly encountered by many anaesthetists, but goes against the manufacturers' advice. This article discusses the arguments for and against this widespread practice, highlighting the main concerns and benefits.

An intravenous fluid bag can be reattached

The primary argument for reattaching intravenous fluid bags is cost. In the current climate of health-care spending cuts and NHS deficits, any additional cost burden must not be taken lightly. In 2013, a 1 litre bag of Hartmann's solution cost 85 p and a 500 ml bag cost 70 p (Royal College of Physicians, 2013). Although intravenous fluids are relatively inexpensive, given the scale of use, discarding unused or partly used fluid bags would likely have a significant cost, potentially doubling the number of intravenous bags required. Using smaller volume bags to allow regular changeovers would incur a similar cost, because of the proportionally higher cost of the smaller bags.

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The second reason is convenience. Being able to stop fluids to administer another medication is convenient and may be important if a drug is required urgently and there is only one point of venous access. Reattaching a previously used bag is quick, removing the need to wait for a fresh intravenous bag to be retrieved and checked.

An intravenous fluid bag should not be reattached

The most significant argument against this practice is the risk of air embolism, a potentially lethal complication. Case studies have directly linked air embolism to reattachment of a previously used intravenous fluid bag, allowing the entrainment of air into the intravenous system, which is then delivered parenterally. While there is no literature on the rates of air embolism specifically resulting from this practice, there are case studies (Bakan et al, 2012; Office of the State Coroner, 2014) from various countries, with the majority occuring when reattached intravenous bags are placed into pressurised devices. Reviews suggest that as little as 200 ml of air needs be entrained to cause lethal air embolism and potentially less for clinically significant air embolism (Toung et al, 2001).

A further argument against is the risk of infection. Evidence linked to intravenous guidelines suggests this is a significant risk. Although evidence in this exact circumstance is limited, there is extensive evidence around pools of infection in theatre environments (Loftus et al, 2011). So, even with strict non-touch technique a sterile environment has been re-opened to contamination, becoming a potential source of morbidity and mortality.

An alternative is using Y-connectors giving two points of access for one cannula; these are already used in total intravenous anaesthesia, and in ward and critical care areas where multiple infusions are required. These are an available and familiar alternative that will solve the issue at hand, but at an additional cost.

Discussion

If patient safety is the primary motivator, the 'for' arguments become much less convincing. Cost is an important factor, but there are few if any modern examples where practices with potential risk are condoned because of cost. It may be argued that the risks are vague and unquantified, but with multiple case studies demonstrating the act of reattached intravenous bags as the cause of lethal air embolus, there is little doubt as to the potential for harm. Most case reports demonstrate that clinician vigilance alone is not enough of a safety measure, as reattached intravenous bags being used for pressurised administration of fluids caused many of the air embolus' described. Thus this practice will always hold potential for harm compared to existing available alternatives. There is never a justification for reattaching open intravenous bags, but the more difficult issue is how to change practice effectively. **BJHM**

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