Intravenous Infusion Sets (IV Set) In Anesthesia Practice: A Survey On Their Use And A Look Into The Future

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INTRODUCTION
Establishing reliable intravenous infusion is an essential component of anesthesia practice. Infusion of fluids is used to replenish fluid deficit caused by fasting before the surgery, to replace ongoing losses of fluids and as a vehicle to administer intravenous medications and anesthetics. While the advances in technology have brought number of powered infusion devices (infusion pumps), the gravity–driven intravenous infusion sets remain most prevalent in majority of applications, including anesthesia practice. Commonly cited reasons for the infrequent use of infusion pumps in anesthesia practice are the expense-related to acquisition, expense-related to their maintenance, and the continuing cost of specialized infusion cartridges of IV sets. In addition, the old fashioned gravity-driven infusion sets are much easier and quicker to set-up and more cost-effective.

METHODS
In an attempt to better understand the use and choice of intravenous infusion sets by anesthesiologists, a survey of anesthesiologists was conducted at the annual American Society of Anesthesiologists (ASA) Meeting in Orlando, FL October 1998. One hundred and twenty anesthesiologists who attended the scientific exhibits were asked to complete a questionnaire on use of IV infusion sets in their practice as well as their choice of anesthesia sets for several typical clinical scenarios. Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS for Windows), v. 5.02 (Chicago, IL, 1993). Responses were summarized as frequencies and percentages (p-value 0.05 was considered significant).

RESULTS
The overwhelming majority (90%) of the surveyed anesthesiologists reported that the practitioners in their departments routinely use gravity-driven IV sets rather than powered infusion devices (infusion pumps). The overwhelming majority (90%) of the surveyed anesthesiologists reported that the practitioners in their departments routinely use gravity-driven IV sets rather than powered infusion devices (infusion pumps).
power infusion pumps. However, their selection between the MICRO drip IV set or MACRO drip IV set (Figure 3) varied considerably in the presented clinical scenarios, (Figures 4, 5 and 6).

Figure 3

Figure 4

Of note, they also reported that they occasionally use both MICRO drip and MACRO drip in the same patient, (Figure 7). The majority of respondents felt that an alternative IV set design (Dual-Drip IV set, Figure 8) with both the MACRO-drip and MICRO-drip chambers combined together in a single IV set, would prove advantageous (Figures 9, 10 and 11). The perceived advantages over a Dual-Drip IV set are summarized in Figure 12.
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DISCUSSION

The results of this survey suggest that the old-fashioned
gravity-driven infusion IV sets continue to be the most widely used IV sets by anesthesiologists. However, there is a divergence of preferences when it comes to the choice between the MACRO-drip and MICRO-drip sets. While the majority of anesthesiologists use both sets, their choice of one over the other in the presented clinical circumstances varied. This is so because the MACRO-drip and MICRO-drip sets have inherent advantages and disadvantages over one another, (Figure 13).

**CONCLUSIONS**

Reliable and convenient intravenous infusion systems are among the most important aspects of anesthesia care. Anesthesiologists spend considerable time and effort staring IV infusion, regulating infusion rate, administering fluid boluses, monitoring infusion rate and making sure that the medications injected through the ports in the IV sets get reliably “flushed” into the patient’s circulation. With estimated 25 million surgeries per year, 50 million office base intravenous infusions, 40 million emergency room admissions and some 45 million hospital admissions (1), it is almost certain that the use of more flexible IV sets would result in an increased safety with their use and a reduction in labor-intensity related to their use and monitoring. Additionally, in addition to more comfort with their use, more flexible sets could also result in substantial cost savings by saving space and stocking costs through reduction in the need to stock several different IV sets (Figure 14). Additionally, their use would also eliminate the need to switch between sets (e.g., substituting MICRO for MACRO drips and vice versa), as well as eliminate the costs of wasted sets and the need to purchase costly specialty kits.
In summary, the gravity-driven IV infusion sets remain the most commonly used IV sets in anesthesia practice. Our survey clearly indicates that the present design of gravity IV infusion sets have inherent limitations and that anesthesiologists combine various sets even in a single patient in order to meet their infusion needs. Although the power infusion systems could potentially resolve some of the limitations of the currently used MACRO and MICRO drip sets, their use is uncommon, more expensive and labor intensive in anesthesia practice. A new and more flexible design is suggested whose use has a potential to significantly increase the safety and comfort, as suggested by the results in this survey. Dual-Drip IV set design appears to be perceived as a very practical improvement over the existing IV set (Figure 15). The indications for its use are best exemplified in clinical situations in which administration of IV fluids is undesirable or contraindicated, but where the ability to fluid-resuscitate must be immediately available. However, the Dual-Drip design should offer advantages over the existing sets beyond the operating room, such as emergency rooms, cardiac catheterization and pulmonary laboratories, GI endoscopy suites, EMS (ambulances), military (field), MRI suites and CT scans to name a few.

**Figure 15**

Would you consider routinely using Dual-Drip IV sets in your anesthesia practice?

**References**

1. Vloka, J. & Hadzic, A. Do We Need A Better Anesthesia Intravenous Infusion Set?. The Internet Journal of Anesthesiology 1999 Vol3N1: [http://www.icaap.org/iuicode?81.3.1.6](http://www.icaap.org/iuicode?81.3.1.6)
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