

TECHNIQUE FOR DETERMINING THE DELIVERY PATTERN OF INTRAVENOUS FLUIDS FROM VARIOUS TYPES OF CONTAINER

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Variability in the volume of fluid delivered intravenously from semi-rigid containers has caused concern (Millard, 1976). Whilst venous pressure and posture of the patient influence flow rate (Flack & Whyte, 1974), external factors are also significant, including the inclusion of in-line filters (Collin & others, 1973), the type of administration set and variability in performance of air filters (Department of Health and Social Security, 1976).

An in-vitro technique was developed to investigate the influence of container type on the volume of fluid delivered and the pattern of flow rate during the delivery period.

A balance was constructed by cementing a strain gauge to a brass strip, and connecting it to a potentiometric recorder, according to the general arrangement described by Gold & others (1966). Variable resistors were included to facilitate zero adjustment and calibration of the recorder. A linear relationship was established between the recorder reading and the load applied to the brass strip.

Containers of intravenous fluid of nominal 500 ml capacity were selected and weighed. A shortened Baxter type FRC 2055 was inserted, primed and adjusted to deliver the contents at an initial rate of 40 drops per minute. The container and set were suspended from the brass strip of the strain gauge balance and the contents allowed to drain. The change in weight of the container and residual content was recorded. When the flow of fluid ceased, the container was removed from the balance, any fluid remaining in the upper chamber of the administration set was drained back into the container and residual content reweighed.

Glass bottles with an air-vent and three types of collapsible polyvinyl chloride bags tested delivered almost all the contents, the total fluid delivered being greater than the nominal content. The initial flow rate was well maintained during the early part of the infusion, but fell rapidly as completion of the delivery approached. With the vented glass bottles, flow ceased abruptly as the container emptied.

The semi-rigid containers, used without an airway, delivered significantly less than the initial volume of fluid and, in most cases, significantly less than the nominal volume. The initial flow rate fell quickly in most cases.

Content of demonstration

Equipment (in use)
Circuit diagram (display)
Typical recorder traces and performance data
Samples of containers used
Flow rate regulator devices/infusion pumps.

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