NIVAS
National Infusion and Vascular Access Society

NIVAS Gravity infusion and Bolus IV drug administration guidance

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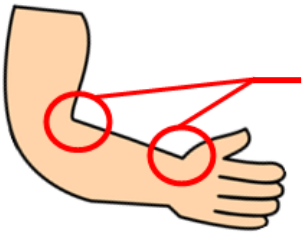
NIVAS Gravity infusion IV drug administration guidance.

In some circumstances, intravenous therapy can be administered as a gravity infusion without the use of an infusion pump.

Peripheral cannula inserted in points of flexion such as the ante cubical fossa or wrist should be avoided if possible. Administering gravity infusions at these points of flexion via a peripheral cannula can lead to complications such as phlebitis or infiltration (Bitmead and Oliver 2018). If a cannula must be placed in a point of flexion its use should be closely.



Peripheral Cannula in points of flexion can cause complications and make gravity infusions difficult as occlusion is common (Barton et al 2017).

Administration of vesicants should be avoided in peripheral cannula placed over points of flexion (Rickard et al 2012).

In the event of an infusion pump not being available.

The NHS Specialist Pharmacy Service have produced the following guidance **Giving intermittent intravenous infusions by gravity in adults** (Published 12 July 2023)

- If your organisation uses the MEDUSA online Injectable Medications Guide you can find information about individual IV medications and recommended methods of administration.
- If an infusion pump is unavailable contact your organisations pharmacy for advice about alternative methods of administration.
- If the IV medication can be given safely as an IV bolus uses this method. N.B. Bolus IV therapy should usually be administered slowly over 3 to 5 minutes.
- For general ward patients all IV infusions of fluids such as Plasmalyte and sodium chloride 0.9% can be administered using a gravity infusion set and the drip rate calculated manually.
- Fillable elastomeric pumps can be considered in some situations.

Calculating drip rates for gravity infusions.

To calculate the intended drip-rate of a gravity infusion you need to divide the total volume of fluid (in millilitres) by the total time required for the delivery (in hours) and then multiply by the drop factor (number of drops per mL). This gives you the total number of drops required per hour. To convert this to drops per minute, you need to divide by 60.

Drop factor = the number of drops it takes to make up one ml of fluid.

Two common sizes/drop factors are:

- 20 drops per ml (typically for clear fluids)
- 15 drops per ml (typically for thicker substances, such as blood)

The equation is as follows.

Drops per minute = Total Volume (ml) / Total time in hours = Hourly flow rate Hourly flow rate / 60mins = Rate per min Rate per min × Drops per ml = Drip rate.

Example : For 1 litre of 0.9% Sodium Chloride over 8 hours:

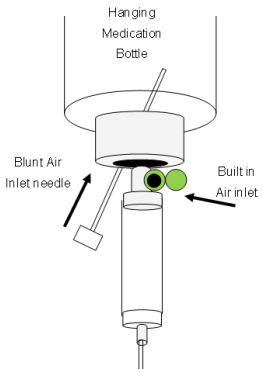
$$\frac{125ml}{60\,\text{min}\ s} = 2.08ml/\text{min} \qquad \frac{1000ml}{8hrs} = 125ml/hr$$

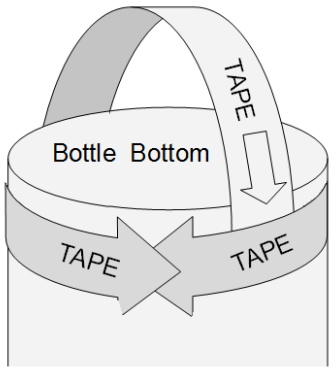
2.08ml/min x 20 drops/ml = 41.6 drops per minute

This is closest to **42 drops per minute** so you would run the infusion at a 42 drops per minute rate

Apple and Android apps are available to help calculate drip rates,
The following link gives access to a paper on app usage.
http://scholar.google.com/scholar_url?url=https%3A%2F%2Fpdfs.semanticscholar.org%2F7089%2Feeb455c043d70f00886f665b760706edccae.pdf&hl=en&sa=T&oi=ggp&ct=res&cd=4&d=6521289304384468432&ei=c6WAXpKHMc-ZywSJ5anADA&scisig=AAGBfm0U8-wgnx1_c6amouradSXmjQsbbQ&nossl=1&ws=1113x585&at=Managing%20Gravity%20Infusion%20Using%20a%20Mobile%20App&bn=1

Some IV therapy which is reconstituted in larger glass bottles such as IV Paracetamol and other medication can be administer using a gravity infusion set over 20 to 60 mins, if the giving set has a built in air inlet this should be used or a blunt air inlet needle may be required. If the bottle does not have a hanging feature, clinical tape can be used to fashion a hanging device over the bottom of the bottle. (see diagram below)





- Most IV antibiotics can be given as a bolus and this information will be available on the Medusa online Injectable Medicines Guide which gives information on individual medicines and how to administer them. If you do not have access to this resource contact your local chief pharmacist https://www.medusaimg.nhs.uk/ . Some antibiotics can be given as bolus 'off licence' and pharmacy can advise about this.
- Vesicants should be administered as an infusion via a pump if possible. If a pump is not available, bolus administration can be used to slowly administer over 5 minutes via a small peripheral cannula sited in a large vein as far down the arm away from points of flexion if possible (Ford 2019), checking for signs of phlebitis constantly during the administration. (McGowan 2014,)
- For vesicants a central venous catheter would be the preferred device for administration although there may be some issues with gravity infusion administration through a PICC due to the small lumen of the catheter (Duwadi et al 2019).
- Infusions with additives running longer than an hour via a gravity set should be checked hourly if possible in the same way as a pumped infusion.
- Parenteral nutrition must be given via an infusion pump (Guenter et al 2019).
- Blood transfusions can be given via a blood gravity infusion set.
- Chemotherapy administration should follow local oncology guidelines.
- Paediatric IV therapy admiration should follow local paediatric department guidelines

For further advice or information please contact: www.NIVAS.org.uk

References

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