Precautions in flow rate programming of infusion pumps

**Key points for safe use**

(Case 1) The order was to give the patient 250 mL of anticancer drug at a flow rate of 125 mL/h (for 2 hours) using an infusion pump. However, the drip infusion was completed after 30 minutes.

**1 Precautions when using an infusion pump**

- Reconfirm the contents of programmed “Flow Rate” and “Total Volume” displayed on the infusion pump and in medication orders.

Make sure to double check the letters and numbers you’ve entered as “Flow Rate” and “Total Volume” after programming. Medication orders may not always be written in the same order as the infusion pump programming.
Medical Safety Information
Pharmaceuticals and Medical Devices Agency
http://www.pmda.go.jp/english/service/medical_info.html

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Built-in Safeguards to prevent misprogramming of flow rates

Separate screen displays
The flow rate and total volume are displayed simultaneously on the two display screens.

Total Volume

Alarm to remind reconfirmation

Beep!
The flow rate value is greater than the total volume’s!

Products equipped with safeguards against medication errors has safety features to remind reconfirmation of the pump programming, such as alarms that go off when the programmed flow rate value is greater than the total volume’s.

Examples of products equipped with built-in safeguards for medication errors

TECTRON CO., INC.

Infusion Pump FP-970

Infusion Pump FP-1200s

JMS Co., Ltd.

JMS Infusion Pump OT-808

Otsuka Infusion Pump OT-707

Med-Tech Inc.

Top Corporation

Top Infusion Pump TOP-2300

Top Infusion Pump TOP-3300

Top Infusion Pump TOP-2200

Top Infusion Pump TOP-7100
Please consider switching to products equipped with built-in safeguards against medication errors such as tubing guide, free flow protection, and battery status indicator in addition to safeguards against misprogramming.

* A list of infusion pumps that meet the criteria for products with built-in safeguards against medication errors is available at the Japan Medical Devices Manufacturers Association website http://www.jmed.jp/jp/ikiko/safety-use/index.php (Japanese only).

**Case 2** 250 mg of cyclosporine injection containing surfactant was mixed into 250 mL of physiological saline solution. It was administered at a flow rate of 10 mL/h. However, some of the drug solution still remained even at the planned time of completion.

2 Precautions when using a drip sensor control type infusion pump

- For some drugs, the size of drop differs because of the influence of excipients such as surfactants, so adjust (correct) the flow rate when using drip sensor control type infusion pumps.

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**How a drip sensor works**

The sensor is able to count the number of drops because the ray of light is blocked each time a drop of the drug falls through the drip chamber.

However, drip sensor cannot sense the size of a drop!
The cause of the underdose

The drops from drug solutions containing surfactant, etc. are small, so, even if the drugs are administered at the ordered flow rate, the actual volume of drip infusion ends up being smaller.

Planned infusion volume          Actual infusion volume

Smaller volume

When using drip sensor control type infusion pump, consult a pharmacist about the characteristics of the drug. Also, please consider using flow rate control type infusion pump.

[Precautions]
4. When using drip sensor control type infusion pumps

When drip sensor control infusion pump is used, the actual infusion volume becomes smaller than the programmed value. To administer the drug accurately, there is a need to correct it to the proper flow rate. (Because of the surfactant effects of polyoxyethylene castor oil that is an excipient of this drug, the size of a drop inside the drip chamber is believed to become smaller.)

* This part is indicated in Japanese.

The Ministry of Health, Labour and Welfare (MHLW) has issued notifications that are related to the issues in this PMDA Medical Safety Information No. 21.

● “Preventive Measures against Medication Errors Related to Infusion Pumps, etc.” PMSB Notification No. 0318001 dated on March 18, 2003

Information on this notification is available at the Pharmaceuticals and Medical Devices Information website (in Japanese)

About this information

* PMDA Medical Safety Information is issued by the Pharmaceuticals and Medical Devices Agency for the purpose of providing healthcare providers with clearer information from the perspective of promoting the safe use of pharmaceuticals and medical devices. The information presented here has been compiled, with the assistance of expert advice, from cases collected as Medical Accident Information Reports by the Japan Council for Quality Health Care, and collected as Adverse Drug Reaction and Malfunction Reports in accordance with the Pharmaceutical Affairs Law.
* We have tried to ensure the accuracy of this information at the time of its compilation but do not guarantee its accuracy in the future.
* This information is not intended to impose constraints on the discretion of healthcare professionals or to impose obligations and responsibility on them, but is provided as a support to promote the safe use of pharmaceuticals and medical devices by healthcare professionals.