Japan Council for Quality Health Care

Project to Collect Medical Near-Miss/ Adverse Event Information

Medical Safety Information

No.131, October 2017

Misunderstanding of Insulin Units (1st Follow-up Report)

Medical Safety Information No.6 “Misconception of Insulin Unit” (May 2007) highlighted events in which a 100-fold overdose resulted from the perception that 1 unit of insulin is 1mL. As 3 similar events have been reported since then, information about this issue is provided here again (information collection period: from January 1, 2012 to August 31, 2017).

Insulin vial preparations are standardized at a concentration of 100 units/mL, so 1 unit is 0.01mL.

Administration Method	Correct Dose	Dose Administered in Error
Subcutaneous injection	4 units (0.04mL)	4mL (400 units)
Intravenous bolus	2.6 units (0.026mL)	2.6mL (260 units)
Continuous intravenous infusion	0.5 units (0.5mL of the preparation)/h	0.5mL undiluted (50 units)/h

What 4 units actually looks like

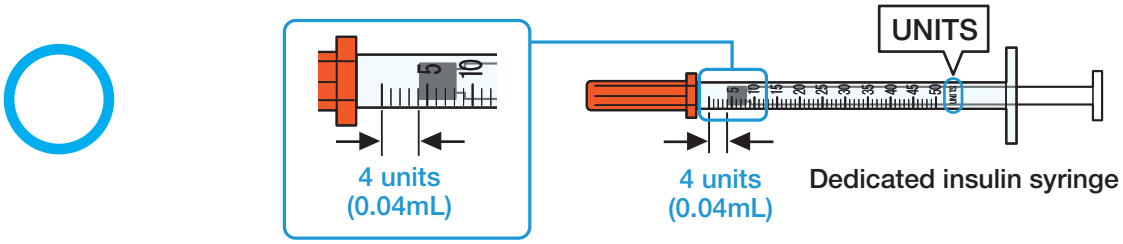
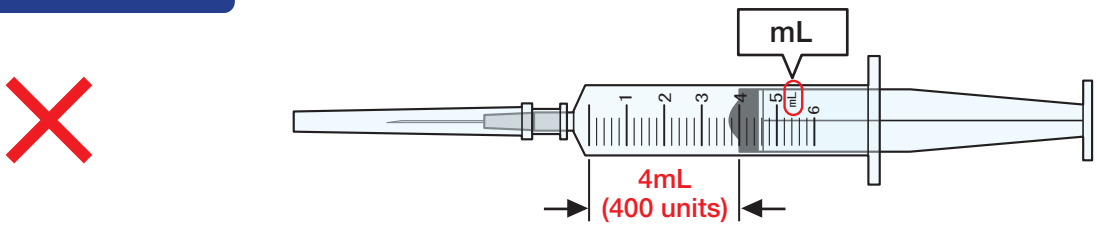


Image of case 1



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Case 1

The nurse ascertained from the sliding scale order that the patient was to receive Humulin R 100 units/mL 4 units as a subcutaneous injection. The nurse knew that there was a dedicated insulin syringe, but thought that 4 units of insulin was 4mL. Accordingly, the nurse prepared Humulin R 4mL (400 units) in a 5mL syringe and administered it as a subcutaneous injection. When reporting to the lead nurse 10 minutes later, the nurse realized that a 100-fold overdose had been administered.

Case 2

When administering Humulin R 100 units/mL at 0.5 unit/hour, the senior resident thought that 1 unit was 1mL and therefore issued an order for Humulin R continuous intravenous infusion 0.5mL/h. The nurse who received the order wondered whether it should be undiluted, but the order screen showed that only Humulin R had been prescribed. Thinking that it must therefore be fine to administer the drug undiluted, the nurse did not check with anybody else. The nurse drew up undiluted Humulin R into a 20mL syringe, placed it in a syringe pump, and began administering 0.5mL (50 units)/h. About four hours later, the patient's blood glucose level fell to 30mg/dL and staff realized that an insulin overdose had been administered.

Preventive measures taken at the medical institutions in which the events occurred

- **Staff will adhere thoroughly to the practice of using a dedicated syringe when using insulin vial preparations.**
- **Dedicated syringes will be placed beside insulin vial preparations.**

Complementary comment by the Comprehensive Evaluation Panel

- **Ensure that staff are thoroughly educated about the fact that in insulin vial preparations, 1 unit is 0.01mL.**

* As part of the Project to Collect Medical Near-Miss/Adverse Event Information (a Ministry of Health, Labour and Welfare grant project), this medical safety information was prepared based on the cases collected in the Project as well as on opinions of the "Comprehensive Evaluation Panel" to prevent the occurrence and recurrence of medical adverse events. See the Project website for details.
http://www.med-safe.jp/

* Accuracy of information was ensured at the time of preparation but cannot be guaranteed in the future.

* This information is intended neither to limit the discretion of healthcare providers nor to impose certain obligations or responsibilities on them.

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