

Anaphylaxis out in the cold- are epinephrine autoinjectors safe in freezing temperatures?

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Epinephrine autoinjectors (EAI) should be stored at 20–25°C, with excursions permitted to 15–30°C according to the manufacturer's guidelines. However, such temperatures are difficult to maintain in real-life setting and strict adherence to them may be potentially very limiting for the patient.

We acquired 4 identical, internationally available 0.3 mg epinephrine autoinjectors and brought them to a skiing resort in Norway, making sure to avoid any extreme temperature deviations. On the day of the study, we brought 3 EAI out to a day of snowboarding, keeping one in the jacket, one in skiing pants and one in a backpack. The last autoinjector was left in a room with stable temperature of 20°C as control. After 6 uninterrupted hours outside, we took all injectors out of their containers and injected their contents into separate test tubes for measurement.

On the day of experiment, the ambient temperature ranged from –22.1°C to –16.5°C, as reported by local weather monitoring services. After taking the EAI out, no abnormalities were observed on visual inspection. All 4 device mechanisms appeared to work correctly upon injection. However, the EAI kept in the backpack fired the needle, but none of the solution was evacuated into the tube. The devices kept in jacket and pant pockets, as well as the control, all expelled precise volumes of 0.3 ml.

While studies report that undergoing freeze-thaw cycles is not detrimental to epinephrine autoinjector mechanism, ensuring prompt accessibility to epinephrine for all patients at risk of anaphylaxis might sometimes require it's availability in cold weather. Our observations suggest that 6 h in freezing temperature can cause the autoinjector to malfunction and result in lack of drug administration.

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