

CONCEPTS

# Novel Technique for Epinephrine Removal in New Generation Autoinjectors



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Anaphylaxis is a severe, life-threatening, multisystem hypersensitivity reaction that can rapidly progress to hypotension and airway compromise. Successful management of anaphylaxis has been documented with the use of prescription intramuscular epinephrine pens that require only minimal training for safe use. The prior generations of these commercially available autoinjectors were produced for single use; however, safe removal of multiple doses has been demonstrated for use in dire situations. We aim to show a novel technique for removal and administration of additional doses of epinephrine from the new generation autoinjector, the Auvi-Q. There was a voluntary manufacturer recall of this product as of October 30, 2015, because of concerns about inaccurate dosing. However, an uncertain number of devices remain in public hands.

*Key words:* epinephrine, anaphylaxis, autoinjector, Auvi-Q

## Introduction

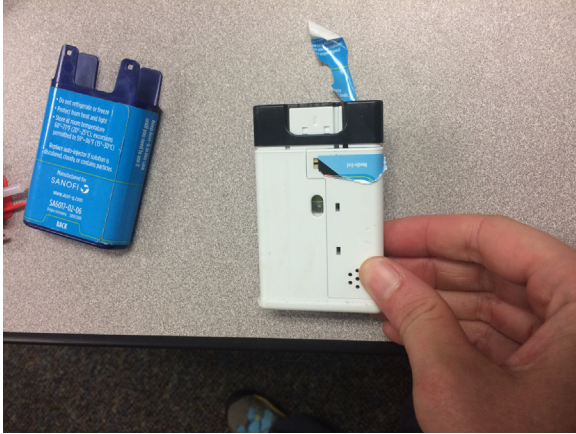
Anaphylaxis is a severe, life-threatening, multisystem hypersensitivity reaction that can rapidly progress to hypotension and airway compromise.<sup>1</sup> This process is one of the most variable, rapidly progressing, and critical illnesses that one may encounter in the wilderness or austere environments.<sup>2</sup> It can affect persons without a known history of allergic reactions or anaphylaxis. Anaphylaxis is often only responsive to epinephrine. Successful management of anaphylaxis has been documented with the use of prescription epinephrine pens that require minimal training for safe use. Depending on body habitus, these pens may deliver intramuscular or subcutaneous epinephrine. These commercially available autoinjectors are produced for single use, but have been found to contain multiple additional doses within the device. Although the autoinjectors were intended for a single use for stabilization, in an austere setting where access to hospitals or emergency medical services is often limited, a patient with anaphylaxis may require additional doses of epinephrine before reaching definitive care. People often do not carry extra

autoinjectors. Previous publications have demonstrated successful techniques to safely remove the additional epinephrine from the frequently used EpiPen.<sup>2</sup> However, automated electronic autoinjectors are now becoming more widely available, and it is the intention of this report to demonstrate a safe and effective way to remove additional doses from this new product.

The Auvi-Q is a battery-powered, automated epinephrine-delivery device manufactured by Sanofi-Aventis US. When the device is removed from its plastic case, it turns on and automatically provides audio instructions to the user to direct its use. When pressed against the patient's anterolateral thigh, a compressed CO<sub>2</sub> mechanism extends the needle for 5 seconds. This is the time required to deliver the full dose of epinephrine, after which the device automatically retracts the needle safely into the device. Although these devices are sold in a two-pack, patients frequently only have one in their possession. The Auvi-Q, along with previously produced autoinjectors, contains additional doses of epinephrine and, if disassembled properly, contains materials necessary to deliver the remaining epinephrine. This represents off-label use and is not recommended or sanctioned by the manufacturers of these devices. It should only be attempted in situations in which there are no other options for epinephrine delivery.

This article describes one stepwise approach to accessing the additional doses of epinephrine from the

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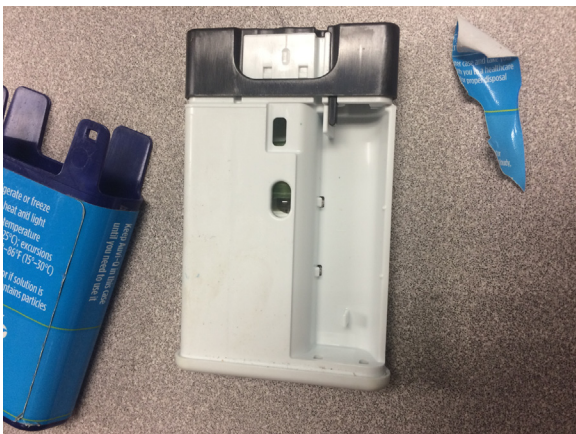
**Figure 1.** Removing the sticker surrounding the device.

Auvi-Q device. It is imperative that any provider attempting to gain access to the additional epinephrine within the device recognize that there is now a used needle within the autoinjector. This needle will be reused, so the device cannot be used for multiple patients. Efforts should be made to observe safe handling techniques as well as to wear protective gloves and eyewear.

## Methods

**Step 1:** After correctly deploying the initial dose of epinephrine according to the automated directions provided by the Auvi-Q, begin removing the sticker surrounding the device. Hold the side with the speaker and back hatch facing up (Figure 1).

**Step 2 (optional):** Using a flathead screwdriver (or similar tool), open the battery hatch. This will allow you to remove the batteries, and the device will stop talking (Figure 2).



**Figure 2.** Open the battery hatch to remove the battery.



**Figure 3.** Remove the bottom of the casing.

**Step 3:** Using a screwdriver, gently wedge, tap, and pry the bottom edge of the device apart from the main body (bottom edge is the side opposite of the needle). Save the bottom of the casing, as you will need this later. The spent CO<sub>2</sub> cartridge can then be removed (Figure 3).

**Step 4:** In the middle of the casing there is a rubber sealant, which must be removed from the device to release the syringe (Figure 4).

**Step 5:** When the sealant is removed, a green plastic piece surrounding the glass vial can be seen (Figure 5). Chip away the extra white plastic until it easily slides out.

**Step 6:** Carefully slide the green apparatus from the outer casing. Be careful as there is a used needle attached.

**Step 7:** After sliding the syringe and green encasement out of the device, gently bend the green plastic away from the vial as it serves as the stopper to prevent additional dosing of epinephrine while in the autoinjector (Figure 6).



**Figure 4.** Remove the rubber seal.

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