

Abstract:

BACKGROUND: Epinephrine auto-injectors are expected to deliver the drug intramuscularly.

OBJECTIVE: To study whether injection through clothing influences the frequency of subcutaneous and intraosseous/periosteal deposition of epinephrine.

METHODS: Skin to muscle and skin to bone distances were measured for 303 children and adolescents and 99 adults. Distance was determined by ultrasound, with high or low pressure on the ultrasound probe. The risk/percentage of subcutaneous and intraosseous/periosteal injections was calculated using the lower and upper limits for the authority-approved length of EAI needles as provided by two high pressure EAI manufacturers and one low pressure EAI manufacturer. The addition winter clothing on the delivery of epinephrine was illustrated by comparing drug delivery tissue depth with no clothes. Furthermore, the risk of non-intramuscular delivery for the shortest and longest approved needle length was calculated.

RESULTS: When using EpipenJr® in children < 15 kg the risk of intraosseous/periosteal injection was reduced from 1% and 59% for the shortest and longest approved needle length to 0 and 15% with winter clothes. The Auvi-Q® 0.1 mg had no risk of intraosseous/periosteal injection. However, the subcutaneous deposition risk increased from 94% and 28% to 100% and 99% with winter clothes. The risk of subcutaneous injection using EpipenJr® in the youngest children increased from 13% and 0% to 81% and 1% with winter clothes, and with Epipen® in adults from 45% and 17% to 60% and 38%. Emerade®, had a risk of subcutaneous injection in adults increasing from 14% and 10% to 28% and 21% adding winter clothes.

CONCLUSION: The risk of intraosseous/periosteal injections decreases and the risk of subcutaneous injection increases when injecting through winter clothes for all EAIs.

Reference:

Dreborg, S., Tsai, G. and Kim, H. (2020) Epinephrine auto-injector needle length: The impact of winter clothing. *Allergy, Asthma, and Clinical Immunology*. April 15th. doi: 10.1186/s13223-020-00422-4. eCollection 2020.