

Uptake of EpiPen and Allerject (Auvi-Q) epinephrine auto-injectors in Manitoba children



Anaphylaxis guidelines^{1,2} recommend that all individuals at increased risk of anaphylaxis in the community carry epinephrine auto-injectors (EAI) to facilitate timely injection of epinephrine during anaphylaxis and decrease the risk of hospitalization and death.^{3,4}

From 2011 to 2015, the principal EAI formulations available in Canada were EpiPen (marketed by Mylan Specialty LP, Canonsburg, Pennsylvania) and Allerject (marketed as Auvi-Q by Sanofi-Aventis LLC, Bridgewater, New Jersey). EpiPen and Allerject (Auvi-Q) differ in size, shape, ease of carrying, ease of use, and safety features.^{5,6} The 2 EAI types contain epinephrine in fixed doses of 0.15 mg (recommended for children weighing <25–30 kg) and 0.3 mg (recommended for children and teenagers weighing >25–30 kg). During the years studied, the cost was approximately \$100 per EAI for all devices and doses and all types of insurance coverage.

The Drug Programs Information Network is an online prescription drug database generated at the time of dispensing by computer links with all Manitoba community pharmacies. The database is maintained by Manitoba Health and Healthy Living and reports all dispensed medications for all Manitoba residents. Information obtained from the database has been shown to be complete and valid for clinical studies and outcome studies.

Among Manitoba children 0 to 16 years old who had injectable epinephrine dispensed at least once from 2011 through 2015 inclusively, we determined the following variables: the EAI device and dose, the child's age at EAI dispensing, whether another EAI had been dispensed for the child within the previous year, and whether at least 1 asthma medication had been dispensed within 6 months of the child's EAI. From the Manitoba Health Registry, we determined the child's sex, region of residence, and family income quintile.

We determined the proportions of EpiPen and Allerject (Auvi-Q) dispensed among all children with an EAI and among children with no EAI dispensed within the previous year (new dispensing). We used multivariable logistic regression models to evaluate the choice of EAI, adjusted for asthma medications, sex, region, family income quintile, and year. The human research ethics board and health information privacy committee of the University of Manitoba (Winnipeg, Manitoba, Canada) approved this project.

EpiPen and Allerject (Auvi-Q) together accounted for 98.6% of the injectable epinephrine formulations dispensed. Of these 2 EAI, 11,891 (37%) were EpiPen, 14,114 (44%) were EpiPen Jr, 3,068 (10%) were Allerject 0.3 mg, and 2,883 (9%) were Allerject 0.15 mg. The EpiPen was available throughout the 5 years studied, from January 2011 through December 2015. The Allerject was available for 2 years 4 months, from February 2013 through May 2015.

Allerject (Auvi-Q) accounted for increasing proportions of EAI dispensed in 2013, 2014, and 2015 (17%, 38%, and 45% of 0.3-mg doses and 13%, 30%, and 40% of 0.15-mg doses, respectively; $P < .0001$). When considering only EAI dispensed for children who had not had an EAI dispensed within the previous year, Allerject accounted for increasing proportions of EAI dispensed in 2013, 2014, and 2015 (18%, 36%, and 52% of 0.3-mg doses and 15%, 35%, and 45% of 0.15-mg doses, respectively; $P < .0001$). In 2015, Allerject (Auvi-Q) 0.3 mg was the most frequently dispensed EAI (52% of 0.3-mg doses) for those who had not had an EAI dispensed in the previous year.

After adjustments for age, asthma medication dispensing within 6 months, income, and nonurban residence, more Allerject (Auvi-Q) devices were dispensed in 2015 than in 2013 (adjusted odds ratio [OR] 4.45, 95% confidence interval [CI] 4.02–4.94). The 0.15-mg EAI dispensed were more likely to be Allerjects (Auvi-Qs) if the child had an asthma medication dispensed within the previous 6 months (adjusted OR 1.12, 95% CI 1.01–1.24). Boys were more likely than girls to have the 0.3-mg Allerject dispensed (adjusted OR 1.18; 95% CI 1.06–1.31; [Table 1](#)). Fewer children with nonurban residence and fewer in lower income quintiles were dispensed Allerjects ([Table 1](#)).

During the time Allerject (Auvi-Q) was available in 2013, 2014, and 2015, it accounted for increasing proportions of EAI dispensed for the 0.15-mg and 0.3-mg doses, even after adjustment for factors that might have influenced choice of device. Variables associated specifically with increased dispensing of Allerject (Auvi-Q) included asthma medications dispensed within 6 months of a 0.15-mg EAI, which might have reflected concern about concomitant asthma being associated with severe anaphylaxis or awareness of Allerject availability. Boys were more likely to be dispensed Allerject (Auvi-Q) 0.3 mg, possibly because of preference for its compact size and ease of fitting into a pocket. Children of families in the lower income quintiles had lower odds of Allerject (Auvi-Q) dispensing, possibly because of lack of awareness about availability of the device and the absence of financial barriers to obtaining it.

Although EAI are recommended to facilitate timely epinephrine injection in community settings,^{1,2} they might not be prescribed when indicated, carried consistently, used correctly, or used by all patients experiencing anaphylactic episodes, even for severe symptoms.^{6,7} Injuries such as unintentional injections into digits and lacerations, mostly from pen-type EAI, have been reported.^{8–10}

Any and all features of EAI that decrease physician reluctance to prescribe them and patient or caregiver reluctance to use them for timely epinephrine injection in anaphylaxis can contribute to improved survival. Adults and children at risk of anaphylaxis and caregivers of children at risk are reported to be able to use the Allerject (Auvi-Q) correctly on the first try, whether or not they have any training or experience with this EAI or with any other EAI device.^{5,6} Awareness of a compact, rectangular EAI to improve portability, visual prompts and voice instructions to improve usability, and a self-retracting needle to improve safety during use might have contributed to the significant increase in Allerject (Auvi-Q) dispensing during the years studied^{5,6}; however, these associations require further investigation.

In conclusion, throughout 2013, 2014, and 2015, dispensing of Allerjects increased steadily. Preferences for different product designs might have influenced EAI selection.

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Table 1Multivariable Associations Comparing Allerject (Auvi-Q) vs EpiPen Epinephrine Auto-injectors^a

	0.15-mg dose (any dispensing)	0.15-mg dose (first dispensing)	0.3-mg dose (any dispensing)	0.3-mg dose (first dispensing)
Age	0.93 (0.91–0.95)	0.91 (0.88–0.95)	0.97 (0.95–0.98)	0.90 (0.86–0.94)
Boys vs girls	1.03 (0.93–1.14)	1.02 (0.84–1.24)	1.18 (1.06–1.31)	1.25 (0.95–1.65)
Asthma medication	1.12 (1.01–1.24)	1.06 (0.87–1.29)	0.91 (0.82–1.01)	1.08 (0.82–1.43)
Income quintile				
Lowest income	0.57 (0.48–0.67)	0.65 (0.48–0.88)	0.51 (0.43–0.61)	0.42 (0.27–0.63)
Quintile 2	0.72 (0.62–0.84)	0.77 (0.57–1.04)	0.62 (0.52–0.73)	0.98 (0.64–1.51)
Quintile 3	0.65 (0.56–0.76)	0.91 (0.68–1.21)	0.73 (0.63–0.85)	0.91 (0.60–1.38)
Quintile 4	0.78 (0.68–0.90)	0.85 (0.64–1.13)	0.82 (0.71–0.95)	1.06 (0.72–1.56)
Highest income	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Nonurban vs urban residence	0.76 (0.67–0.85)	0.59 (0.48–0.74)	0.79 (0.70–0.88)	0.79 (0.60–1.05)
Year				
2015 vs 2013	4.54 (3.79–5.44)	4.30 (3.09–5.99)	4.48 (3.74–5.36)	5.49 (3.36–8.96)
2015 vs 2014	1.56 (1.33–1.82)	1.45 (1.08–1.95)	1.49 (1.27–1.75)	2.12 (1.35–3.34)

^aData are presented as adjusted odds ratio (95% confidence interval). Odds ratios were adjusted for age, sex, asthma medication dispensing, income quintile, region of residence, and year.

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