

Emergency Epinephrine Use for Food Allergy Reactions in Chicago Public Schools

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Background: Given the increase in childhood food allergy, national and local policies have been developed to encourage schools to stock undesignated epinephrine auto-injectors in case of an anaphylactic emergency.

Purpose: To describe the use of epinephrine auto-injectors in Chicago Public Schools during the 2012–2013 school year, specifically for food-induced allergic reactions.

Methods: District-issued epinephrine auto-injectors were distributed to all public and charter schools in Chicago prior to the start of the 2012–2013 school year. Data on their use were collected, and frequencies were computed in the autumn of 2013.

Results: Thirty-eight district-issued epinephrine auto-injectors were administered during the inaugural year of the Chicago Public Schools initiative. Epinephrine auto-injectors were administered to students (92.1%) and school staff (7.9%). Most district-issued epinephrine auto-injectors were administered in elementary schools (63.2%) and on Chicago's North–Northwest Side (36.8%). More than half (55.0%) of all district-issued epinephrine auto-injectors were administered for first-time anaphylactic events. Food-induced reactions accounted for more than half (55.3%) of all reactions requiring epinephrine auto-injector use, whereas the trigger of more than one third (34.2%) of all reactions requiring the use of an epinephrine auto-injector remained unknown.

Conclusions: Chicago Public Schools is the first large, urban school district in the U.S. to develop and implement the District-Issued Emergency Epinephrine Initiative, which helped 38 students and staff avoid potential morbidity and mortality. The impact of this initiative during its first year underscores the need for stocking undesignated epinephrine in schools across the country.

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Introduction

Impacting 8% of children nationally, pediatric food allergy is a major public health concern in the U.S.¹ Food allergy is different from food intolerance, as it is immune mediated and can cause a severe life-threatening reaction quickly after allergen ingestion. This reaction, called anaphylaxis, may consist of respiratory symptoms such as trouble breathing, wheezing, and

throat closure. Additionally, anaphylaxis may cause a rapid drop in blood pressure, sometimes resulting in death. As children spend the majority of their time in school, and food is an integral part of the school day, districts need to be prepared for an anaphylactic emergency in food-allergic students. Reports of U.S. school-children losing their lives to anaphylactic episodes are well documented.^{2–4}

Currently, there is no treatment or cure for food allergy. Timely administration of an epinephrine auto-injector (EAI) is a child's first and primary line of defense in the event of an anaphylactic reaction.^{5–7} Prior research indicates that 20%–25% of children experience their first allergic reaction in school, potentially because it is their first exposure to the food-allergen trigger.⁷ Of children with a known food allergy, only 25%–28% have access to their EAI at school.^{8–10} Additionally, 30% of school nurses have reported using one student's prescribed medication

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to rescue another student in distress.¹¹ Therefore, it is critical to have undesignated epinephrine available in all schools. It is equally important for teachers, staff, and administrators to be trained in anaphylaxis identification and proper epinephrine administration.

To be prepared in the event of a food-induced emergency, school districts nationwide have been encouraged to stock undesignated epinephrine.^{3,11,12} Undesignated EAI's are prescribed to the school or district by standing physician order, as opposed to an individual student, for the purpose of use in an anaphylactic emergency.^{11,12} Chicago Public Schools (CPS) implemented the District-Issued Emergency Epinephrine Initiative to stock undesignated EAI's in all of its schools—the first initiative of its kind in a large, urban school district. The brief report describes the cases in which undesignated EAI's were administered in CPS during the 2012–2013 school year, specifically for food-induced allergic reactions.

Methods

Administration of a district-issued EAI was required to be reported to the CPS Office of Student Health and Wellness (OSHW) within 24 hours. Notification was initially done via the Report of District-Issued Epinephrine Administration form, submitted directly to OSHW by school nurses. This form collected information including, but not limited to, the variables displayed in Table 1. However, this process was altered in March 2013 to track both district-issued and student-prescribed EAI administration electronically. The data reported for the 2012–2013 school year were compiled, and frequencies were computed in autumn 2013.

Results

Thirty-eight district-issued EAI's were administered during the inaugural year of the initiative (Table 1). The majority of EAI's were used for CPS students (92.1%), with the remainder administered to CPS school staff (7.9%). School nurses administered 29 of 38 district-issued EAI's (76.3%), and 911 was notified in the majority of incidents (81.6%). Most district-issued EAI's were administered in elementary schools (63.2%) and on Chicago's North–Northwest Side (36.8%) (Figure 1). More than half (55.0%) of all district-issued EAI's were given for first-time anaphylactic events, in which there was no prior knowledge or documentation of the recipient's allergy.

Food-induced reactions accounted for more than half (55.3%) of all reactions requiring EAI use. Among food-induced reactions, peanut was the most common inciting allergen (18.4%), followed by fin fish (13.2%). The trigger

Table 1. Characteristics and triggers of district-issued epinephrine auto-injector use—2012–2013 school year (n=38)

Variable	Frequency, % (n)
Person with allergic reaction	
Chicago public school student	92.1 (35)
Chicago public school staff	7.9 (3)
School type	
Elementary school	63.2 (24)
High school	36.8 (14)
Geographic collaborative	
Far South Side	26.3 (10)
North-Northwest	36.8 (14)
South Side	13.2 (5)
Southwest Side	10.5 (4)
West Side	13.2 (5)
First-time incident	
Yes	55.0 (21)
No	45.0 (17)
Administered by	
School nurse	76.3 (29)
Other school staff	18.4 (7)
Self-administered	5.3 (2)
Epinephrine dose	
Adult	57.9 (22)
Junior	23.7 (9)
Missing	18.4 (7)
911 Called	
Yes	81.6 (31)
No	2.6 (1)
Missing	15.8 (6)
Allergic trigger—food	
Peanut	18.4 (7)
Tree nut	2.6 (1)
Shellfish	2.6 (1)
Fin fish	13.2 (5)
Food—other	13.2 (5)
Food—unknown	5.3 (2)
Allergic trigger—other	
Insect venom	5.3 (2)
Animals	2.6 (1)
Grass	2.6 (1)
Allergic trigger—unknown	
	34.2 (13)

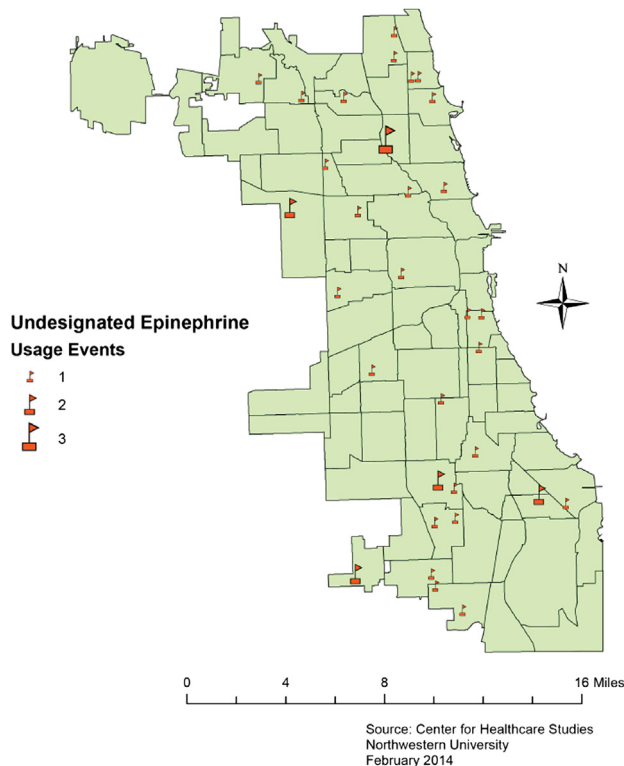


Figure 1. Geographic distribution of Chicago Public Schools' district-issued epinephrine auto-injector use—2012–2013 school year.

of more than one third (34.2%) of all reactions requiring the use of an EAI, food-induced or otherwise, remained unknown.

Discussion

Thirty-eight CPS students and staff avoided potential morbidity and mortality associated with anaphylaxis due to the administration of district-issued EAIs during the 2012–2013 school year. Interestingly, 21 district-issued EAIs were used to treat food-induced allergic reactions, while only 4 reactions involved other triggers. Unfortunately, the triggers for 13 of 38 allergic reactions requiring the use of a district-issued EAI were never identified. Furthermore, more than half of all district-issued EAIs were administered to people with no history or documentation of allergic reaction or anaphylaxis, and many were administered in neighborhoods with low rates of food-allergy documentation. This underscores the importance of undesignated EAI access in all schools.

The fact that food was the inciting trigger in more than half of all events requiring the use of a district-issued EAI is consistent with the literature.¹³ Peanut, the allergen impacting nearly 25% of all food-allergic children,¹ led to more than 18% of the undesignated EAI administrations reported here. With the prevalence of food allergy rapidly

on the rise,^{14–16} school districts must be prepared to administer life-saving medication in an environment where contact with food is unavoidable.^{6,17,18}

Previous research suggests that the cause of an anaphylactic event often goes unrecognized.¹³ Similarly, the trigger in more than one third of all events requiring administration of district-issued EAIs was unidentified. In the absence of an identifiable trigger, a formal diagnosis cannot be made and precludes avoidance of the offending agent. Availability of district-issued EAIs is particularly important in these scenarios in which students and staff may inadvertently come into contact with an unidentified and unknown allergen.

More than half of all district-issued EAIs were administered to individuals without a history of life-threatening allergy or anaphylaxis. This finding suggests that more research regarding the rate of first-time anaphylactic events in school is needed, as this rate has been previously reported at 20%–25%.⁷ The frequency of first-time anaphylactic events among people with no history further supports the need for district-issued EAIs. Students and staff who otherwise would not have access to life-saving medication can access district-issued EAIs.

The geographic distribution of district-issued EAI administration is also of interest. Although nearly 37% of district-issued EAIs were administered on Chicago's North–Northwest Side, more than 26% were used on the city's far South Side. This is important because nearly half (47%) of the CPS students with physician-documented food allergy resided on the North–Northwest Side, and only 8% lived on the Far South Side.¹⁹ This underscores the need for access to district-issued EAIs citywide, as children on the Far South Side may not have access to food-allergy diagnosis and could experience their first allergic reaction at school.

This study is not without limitations. First, inconsistent reporting practices made it nearly impossible to obtain complete and accurate data for the 38 cases of district-issued epinephrine administration. Reporting detail and accuracy were impacted when the physical Report of District-Issued Epinephrine Administration form was abandoned in favor of electronic documentation mid-school year. The physical form required populating discrete information fields, ensuring the report of all relevant variables. Electronic documentation consisted of free-form text entry, which led certain variables of interest to be missed during reporting. Furthermore, the small sample size makes it difficult to estimate the distribution of district-issued EAI usage in CPS. Moving forward, the district must determine a streamlined yet comprehensive way to track and report district-issued epinephrine administration.

Conclusions

CPS is the first large, urban school district in the U.S. to implement the District-Issued Emergency Epinephrine Initiative. During its inaugural year, 38 CPS students and staff avoided potential morbidity and mortality associated with anaphylaxis due to the administration of district-issued EAIs. Although 21 district-issued EAIs were used to treat food-induced allergic reactions, the triggers in 13 of 38 reactions were never identified. Additionally, 55% of the district-issued EAIs were administered to those with no history of severe allergy or anaphylaxis. The impact of this initiative during only 1 year underscores the need for stocking undesignated epinephrine in schools across the country. CPS continues to stock district-issued EAIs in all its schools.

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