

Administration of the adrenaline auto-injector at the nursery/kindergarten/school in Western Japan

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Background: In view of the increasing prevalence of food allergies, there has been an associated increase in frequency of situations requiring an emergency response for anaphylaxis at the home, childcare facilities and educational institutions.

Objective: To clarify the situation of adrenaline auto-injector administration in nursery/kindergarten/school, we carried out a questionnaire survey on pediatric physicians in Western Japan.

Methods: In 2015, self-reported questionnaires were mailed to 421 physicians who are members of the West Japan Research Society Pediatric Clinical Allergy and Shikoku Research Society Pediatric Clinical Allergy.

Results: The response rate was 44% (185 physicians) where 160 physicians had a prescription registration for the adrenaline auto-injector. In the past year, 1,330 patients were prescribed the adrenaline auto-injector where 83 patients (6% of the prescribed patients) actually administered the adrenaline auto-injector, of which 14 patients (17% of the administered patients) self-administered the adrenaline auto-injector. "Guardians" at the nursery/kindergarten and elementary school were found to have administered the adrenaline auto-injector the most. Among 117 adrenaline auto-injector prescription-registered physicians, 79% had experienced nonadministration of adrenaline auto-injector at nursery/kindergarten/school when anaphylaxis has occurred. The most frequent reason cited for not administering the adrenaline auto-injector was "hesitation about the timing of administration."

Conclusion: If the adrenaline auto-injector was administered after the guardian arrived at the nursery/kindergarten/school, it may lead to delayed treatment of anaphylaxis in which symptoms develop in minutes. Education and cooperation among physicians and nursery/kindergarten/school staff will reduce the number of children suffering unfortunate outcomes due to anaphylaxis.

Key words: Adrenaline auto-injector; Anaphylaxis; Nurseries; Kindergarten; Schools

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INTRODUCTION

In association with the increase in number of patients with food allergies and anaphylaxis [1], the frequency of occasions requiring emergency care at the home, nursery, kindergarten, and school has also increased [2]. In order to minimize accidental exposure to foods to which a child could be allergic, many schools in the United States have a “no sharing” policy for food [3]. There has been an increasing need to provide allergy countermeasures during school lunches [4, 5].

In Japan, after a fatal case of food allergy-induced anaphylaxis occurred during a school lunch in 2012, “Basic Rules Regarding Measures Against Allergic Diseases” were established and the Ministry of Education, Culture, Sports, Science and Technology announced “Guidelines for Allergic Diseases in Schools” in 2008 and “Correspondence Guidelines for Food Allergies during School Lunches” in 2015, recommending food allergy countermeasures and the use of the adrenaline auto-injector (AAI) should anaphylaxis occur. “Japanese Guidelines for Food Allergy” were also published by the Japanese Society of Pediatric Allergy and Clinical Immunology [6]. However, it is unclear whether the AAI is appropriately administered in patients with anaphylaxis at nursery/kindergarten/school.

In this study, to clarify the actual situation of AAI administration in nursery/kindergarten/school, we carried out a field survey on AAI with members of the West Japan Research Society Pediatric Clinical Allergy and Shikoku Research Society Pediatric Clinical Allergy. All members were clinicians who have been engaged in the Department of Pediatrics and/or Pediatric Allergy in Western Japan.

MATERIALS AND METHODS

During the period from January to March 2015, self-reported questionnaires (Table 1) were mailed to 421 physicians who were members of the West Japan Research Society Pediatric Clinical Allergy and the Shikoku Research Society Pediatric Clinical Allergy. The physicians were requested to send one answer sheet per facility by Fax/E-mail. We obtained informed consent from all physicians for publication of this study.

Table 1. Questionnaire

1. Are you registered as an AAI prescribing physician?
2. Currently, how many patients with food allergies do you regularly examine?
3. How many patients did you prescribe AAI in the past 1 year?
4. Of the above, how many patients actually administered the AAI?
5. Of the above, how many patients self-administered the AAI?
6. Where did the AAI injection take place?
Check all that apply. (home, nursery/kindergarten/school, outside, and others)
7. Who administered the AAI at a nursery/kindergarten/school? Check all that apply. (themselves, guardians, homeroom teachers, nursing teachers/nurses, principals/assistant principals, and others)
8. What is the primary reason for the non-administration of AAI at the nursery/kindergarten/school? Check all that apply. (hesitation about the timing of administration, fears regarding the procedure, fear of adverse reactions, forgot to carry AAI, and others)
9. What is the criteria for you to prescribe administration of AAI. Check all that apply. (history of anaphylaxis, history of immediate allergic response, serum levels of specific IgE, possibility of repeated accidental ingestion, living distant from the emergency department, the guardians' request, and others)
10. How do you cooperate with the nursery/kindergarten/school? Check all that apply. (communication in writing, provide medical certificate, direct meeting, instruct at training workshops, and others)

AAI, adrenaline auto-injector.

RESULTS

Response rates and background of the physicians

As shown in Fig. 1, responses (rate) were received from 185 physicians (44% of the number sent). One hundred sixty of the physicians were “registered as an insurance AAI prescribing physician,” while 25 were “nonregistered physicians.” The responses from registered AAI prescribing physicians are analyzed below.

Number of patients who were prescribed AAI, and patients who administered the AAI.

One hundred sixty AAI prescription-registered physicians, the total number of patients with food allergy was 10,574. One thousand three hundred thirty patients were prescribed AAI during the past one year by 117 AAI prescription-registered physicians. Of the patients who were prescribed AAI, the AAI was actually administered in 83 patients (6% of the prescribed patients). Of the patients who administered AAI, the AAI was self-administered in 14 patients (17% of the administered patients).

The person who administered AAI at the nursery/ kindergarten/school

Forty-five (45) physicians had patients who administered the AAI. Among these physicians, the most common location for AAI administration was “at home” (21 physicians), followed by “at nurseries/kindergartens/schools” (12 physicians), and “others” (5 physicians).

As shown in Table 2, the person who administered the AAI at nursery/kindergarten/school was answered by the physicians as follows, in descending order: “guardians” (10 physicians) and “emergency medical technician” (1 physician) at nursery/kindergarten; “guardians” (12 physicians), “nursing teachers/nurses” (3 physicians), “themselves” (1 physician), “homeroom teachers” (1 physician), and “others” (2 physicians) at elementary school; and “themselves” (5 physicians), “nursing teachers/nurses” (3 physicians), “guardians” (2 physicians), “principals/assistant principals” (1 physician), and “others” (1 physician) at junior-high school.

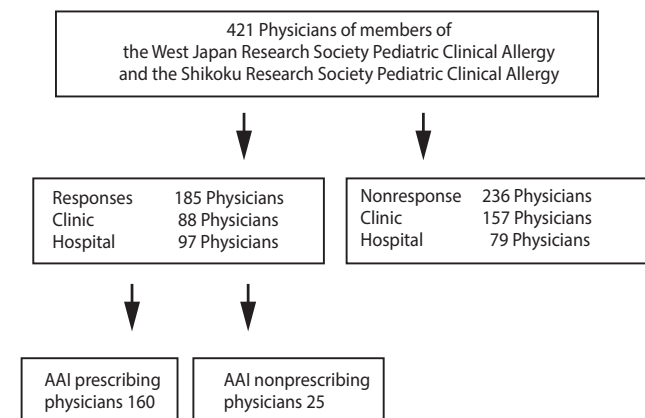


Fig. 1. Response rates and background of the physicians. Responses (rate) were received from 185 physicians (44% of the number sent). One hundred sixty of the physicians were “registered as an insurance adrenaline auto-injector (AAI) prescribing physician,” while 25 were “nonregistered physicians.” The responses from registered AAI prescribing physicians are analyzed below.

Table 2. The person who administered adrenaline auto-injector at the nursery/kindergarten/school

Institution	Themselves	Guardians	Homeroom teachers	Nursing teachers/nurses	Principals/assistant principals	Others
Nursery/kindergarten	0	10	0	0	0	1
Elementary school	1	12	1	3	0	2
Junior-high school	5	2	0	3	1	1

Values are presented as the number of physician who answered (n = 12).

Reasons for nonadministration of AAI at nursery/ kindergarten/school

Among 117 AAI prescription-registered physicians, 92 (79%) had experienced nonadministration of AAI at nursery/kindergarten/school when anaphylaxis has occurred. As shown in Table 3, the most frequently cited reason for nonadministration of AAI at nursery/kindergarten/school was “hesitation about the timing of administration” (31 physicians); and others including “forgot to carry AAI” (5 physicians); “fears regarding the procedure” (4 physicians); “fear of adverse reactions” (2 physicians); “improved with other medicines” (2 physicians); “direction from emergency staff to wait until they contacted the personal doctor” (1 physician); and “determined that there was no need for administration” (1 physician).

The criteria to prescribe administration of AAI

As shown in Table 4, the criteria for the physicians to prescribe AAI were, in descending order, a “history of anaphylaxis” (160 physicians); “living distant from emergency department” (77 physicians); “the guardians’ request” (72 physicians); and “possibility of repeated accidental ingestion” (70 physicians).

Cooperation between physicians and the nursery/ kindergarten/school

Cooperation between physicians and the nursery/kindergarten/school was put into practice, in descending order, by “communication in writing” (132 physicians); “direct meeting” (82 physicians); “instruct at training workshops” (75 physicians); “provide certification” (76 physicians).

DISCUSSION

According to the Ministry of Education, Culture, Sports, Science and Technology in Japan, the proportion of patients with food allergies in Japan is 4.5% in elementary school children, 4.8% in

Table 3. Reasons for nonadministration of AAI at nursery/kindergarten/school

Reasons for nonadministration of AAI	No. (%)
Hesitation about the timing of administration	31 (33)
Forgot to carry AAI	5 (5)
Fears regarding the procedure	4 (4)
Fear of adverse reactions	2 (2)
Improved with other medicines	2 (2)
Direction from emergency staff to wait until they contacted the personal doctor	1 (1)
Determined that there was no need for administration	1 (1)
Unknown	4 (4)

Values are presented as the number of physician who answered (n = 92). AAI, adrenaline auto-injector.

Table 4. The criteria to prescribe administration of adrenaline auto-injector

History of anaphylaxis	No. (%)
Living distant from Emergency Department	77 (48)
The guardians' request	72 (45)
Possibility of repeated accidental ingestion	70 (44)
History of immediately allergic response	24 (15)
Serum levels of specific ige	4 (3)
Others	14 (9)

Values are presented as the number of physician who answered (n = 160).

junior-high school children, and 4.0% in high school children, with those having experienced anaphylaxis being 0.6%, 0.4%, and 0.3%, respectively. In Japan, the number of deaths due to food anaphylaxis has increased from 15 patients during the period from 1996 through 2001 to 27 patients from 2006 through 2011, and with the occurrence of a recent fatal case during a school lunch, there is clearly an urgent need for countermeasures. The use of AAI is central to these countermeasures and the Japan Society of Pediatric Allergy and Clinical Immunology is promoting clarification of the symptoms and timing of administration [6, 7].

In the present investigation, the actual rate of AAI administration was 6% of the prescribed patients and the rate of self-administered AAI was 17% of the administered patients. Surprisingly, most AAI administrators at nurseries/kindergartens, and elementary schools were the guardians. If AAI was administered after the guardians arrived at nurseries/kindergartens/elementary schools, it sometimes led to delayed

treatment for anaphylaxis in which symptoms develop in minutes.

Moreover, 79% physicians had experienced nonadministration of AAI at nursery/kindergarten/school when anaphylaxis has occurred. The most frequently cited reason for not administering the AAI at nursery/kindergarten/school was "hesitation about the timing of administration". Fleming et al. [8] reported that administration at an early stage can reduce the risk of hospitalization and administration at the proper timing is required. Delayed administration of AAI has been reported in yet another large series of anaphylaxis-related fatalities [4]. Many guidelines recommend that all staff engaged in a nursery/kindergarten/school receive AAI training [4, 9].

These problems of AAI at the nursery/kindergarten/school is not only an issue in Japan. Caffarelli et al. [10] reported that only 2.8% of school children with food allergy were prescribed AAI, and Fleischer et al. [11] reported that AAI was administered to only 30% of patients even when anaphylaxis had occurred. Moreover, Ben-Shoshan et al. [12] described that among 4- to 19-year-old patients prescribed with AAI, 48% do not bring the AAI to school. In the current study, unfortunately, the method of cooperation between physicians and nurseries/kindergartens/schools is limited to "communication in writing."

There are some limitations associated with the present report. Firstly, because this questionnaire was retrospectively completed by physicians, there could be a recall bias. Secondly, the response rate was low at 44%. Thirdly, the pediatric population of these areas is approximately 3,000,000 patients with food allergies estimated at 120,000. Therefore, 10,574 patients with food allergies whom the physicians treat comprise only approximately 10% of these areas. Fourthly, we requested physicians to send back one answer sheet per facility. However, physicians who completed the questionnaire were not able to confirm if the response was representative of the entire facility. Additionally, some question results only reflected the number of physicians who answered instead of the number of patients, etc.

However, the actual situation of AAI prescription and administration has become apparent, leading to the identification of challenges involved. Education and cooperation among physicians and nursery/kindergarten/school staffs will reduce the number of children suffering unfortunate outcomes due to anaphylaxis.

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