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Management of food allergens: time to prevent food allergic reactions at school.

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Table: 1

To the Editor:

The observed increase of food allergy in the population, especially in children in recent decades, highlights the need for progress in improving all factors related to the prevention of food allergic reactions at school¹⁻². In Spain there are 15,646 school centres with canteen service where they feed daily almost two million children (1,916,621 according to data from the Ministry of Education)³. We conducted a survey that included 27 Hortaleza district schools in Madrid, all of them with own kitchen, where allergen-free diets for children with a diagnosis of food allergy (specialist report), were served. We developed a specific checklist that included preventive measures implemented in relation to the consideration of food allergens as a potential hazard, the existence of a specific written program for the cooking of these menus, the identification of the menu/kitchen utensils, scheduled processing, the existence of specific tables in the dining room for these children and health and support staff.

Information was requested on whether they had had an episode of food allergic reaction at the centre during the previous year. The information campaign was carried out in 2014 with the participation of school staff, catering services, families and students. The campaign included:

- Five workshops about food safety for school staff, families and students (endorsed by scientific societies).
- Two monitored students' gymkhanas in supermarkets to become familiar with food labelling: "El alérgeno enmascarado" ("The masked allergen").
- Two editions of an ad hoc online training course on food allergy (endorsed by scientific societies) for the food industry managers, food suppliers for schools, service workers and monitors at school canteens.
- Two in-situ food allergy management inspections in the kitchens at the beginning and at the end of the campaign (2014 – 2017).

- Two letters (the last one as a reminder) were sent to all families by the school principals insisting on the importance of drawing up an action plan (AP) for children with food allergies from the specialist.

- Distribution of posters and information brochures of preventive measures and monthly monographic newsletters.

The level of food allergen control at school after the information campaign activity was re-evaluated with the same checklist in 2017 (Action Plan and checklist in the case of a food allergy reaction, Annex I). Allergic reactions included mild / local reactions, as well as anaphylaxis. The number of them was based on an administered checklist. The reactions validated by the researchers (one of them being an allergist), were based on Annex I registry.

We found that the percentage of compliant items on the checklist improved after the information campaign (Table 1). We are highlighting that 63%/88% schools considered food allergens as a risk, 51%/81% had a written prevention program, 63%/90% had a description of food allergen-free diet cooking and thirteen and three food allergic reactions were recorded in 2014 and 2017, respectively (P-value <0.05, Table 1).

We could see that there was in some cases, lack of knowledge about this aspect of food allergen management, as well as lack in training for the management of these allergen-free diets at school.

We consider that this kind of activities, could contribute to having a lower number of adverse food allergy reactions observed in 2017. We share the inspection checklist and the action plan and checklist in the case of a food allergy reaction for their consultation in the online supporting information.

The Regulation 1169/2011 of the U.E. on food information on food labelling packaged foods in relation to allergens, has increased the level of awareness in this regard its application, but it is necessary to insist on it. In the collective catering, such school canteens, food safety control policies have traditionally been oriented preferentially to microbiological hazards. We consider that it is time for including the control of allergen-free diets as an important hazard at school that should be monitored among the implicated professionals. Also, it is necessary to include a food allergic reactions registry at schools.

This school district has developed and implemented food allergy activities, which has helped, among others, 185 schoolchildren and school personnel to avoid morbidity and mortality due to

episodes of anaphylaxis⁴⁻⁷. Of the 20,653 children served meals, 1,182 (5.7%) were served an allergen-free diet. Of these, 251 (21.2%) had a food allergy action plan (AP) and 185 (72.1% of all those with an AP and 15.6% of those with a reported food allergy) had a prescription for epinephrine use⁵. Nine of the children with an auto-injector were under 3 years old, 60 were between 3 and 5 years old, 104 were aged between 6 and 14 years, and 12 were 15 years or older. These 185 students accounted for about 0.8% of all children served meals⁵. 2/3 epinephrine administration were observed in children with allergies to shellfish, fish, egg, peanuts, milk, and nuts. The differences, however, with respect to the population of all children with food allergies were not statistically significant ($P>.05$). No association was detected between food allergy groups and proportion of epinephrine use. There was a low proportion of APs drawn up by specialists in this school population. The proportion of auto-injector prescription (15.6%) was lower than that described by Múgica-García et al. (21.53%)⁸. The low proportion of children under 3 years old with epinephrine injectors can be explained by the fact that only 5.29% of the schools surveyed had children in this age group; the most common food allergies in this group are egg and milk (55.67% and 40.21%, respectively)⁴.

School canteens are a first-line source of information regarding food allergy trends. Revaluing the role of the school canteen is basic to avoid fatalities due to anaphylaxis in children. We think that it is very important to address those checklist items without improvement in this research to encourage the Administration and Educational authorities to designate resources for food allergy management control and to implement a school allergic food reactions registry, as both are not contemplated in the current regulation.

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Table 1: Post Vs Pre-Campaign results (27 schools involved. STATA program ratio test).

Checklist items	2014 Pre-Campaign (n/%)	2017 Post-Campaign (n/%)	P-value*
Considered food allergens as a risk	17/63	24/88	0.026*
Written prevention program	14/51	22/81	0.021*
Description of food allergen-free diets' preparation	17/63	24/90	0.026*
Specific area for food processing	9/33	9/33	1
Identified utensils/equipment for preparation	8/30	8/30	1
Compliant storage of raw materials which guarantee the non-occurrence of cross contamination	14/52	14/52	1
Cooked the food allergen-free diets before other meals	10/37	10/37	1
Sealed containers	16/59	18/67	0.573
Identified places in the dining room for these children	14/51	18/67	0.268
Specific monitor	20/74	18/67	0.551
Health staff	10/37	11/41	0.78
Food allergy reactions (n)	13	3	0.003*

* The confidence level is 95%.

Supplementary file: Allergen-free diet management in school canteens. Inspection Template Checklist.

Name of School:

Name of Kindergarten:

Date: School year:

Allergen-free diets				
Number of children with school meals				
Number of children with allergen-free diets				
Number of dining shifts				
Number of children per shift				
First shift schedule				
Second shift schedule				
Third shift schedule				
	YES	NO	N/A	OBSERVATIONS
CATERING SERVICE				
Meal identification				
The identification includes:				
Student initials				
Type of meal				
Colour code				
Characters/numbers code				
Figures code				
Other				
Own kitchen	YES	NO	N/A	OBSERVATIONS
Cooking of allergen-free meal				
Before the other meals				
During the other meals				
After the other meals				
Production area				
There is a specific area				
Processing staff				
There are specific personnel				
Gloves are used to handle food				
Machinery and utensils				
Specific				
The area, utensils, machinery used to prepare allergen-free diets are identified with colour codes				
A dedicated microwave is available to heat the meals				
Separate oil and fryer are used to prepare allergen-free diets				
There are signs or pictograms in the areas where allergen-free diets are handled related to good production practices				
Packaging and meal identification				
Airtight containers are available to hold cooked meals				
The meal is identified with:				
Student initial name				
Type of meal				
Colour code				
Characters/numbers code				
Figures code				
Other				
SUPPLIERS AND RAW MATERIAL STORAGE	YES	NO	N/A	OBSERVATIONS
Foods containing allergens are correctly labelled				
There is a specific place within the storage area				
The place is identified in some way				
The foods are correctly identified, indicating that they are for allergen-free diets, in addition to their corresponding labelling				
They are in their original packaging				
The storage is correct and prevents cross contamination				
DESIGN OF MEALS	YES	NO	N/A	OBSERVATIONS
Special meals are designed for food allergies and intolerances				
Allergenic foods are replaced from the menu				
The preparation of allergen-free diet is planned				
The preparation process of an allergen-free diet is described in a plan				
SELF-CONTROL	YES	NO	N/A	OBSERVATIONS
Allergens are considered as DANGER in the self-control plan				
An allergen control plan is in place				
In the accreditation and control of suppliers there are specifications related to allergens				

There are supplier certifications on the absence of allergens in their products				
In the product sheets - raw material - allergens are identified				
The good preparation practices contain a plan and describe how the allergen-free diets and intolerance diets should be prepared				
The cleaning and disinfection plan includes the control and elimination of allergens.				
The cleaning plan includes a system to verify its effectiveness				
Verification includes "in situ" analytical controls for allergens				
The training plan provides specific knowledge for the people who prepare the allergen-free diets				
The training plan provides specific knowledge for the assistants who take care of the children in the dining room.				
	YES	NO	N/A	OBSERVATIONS
DINING ROOM				
There is a plan or sketch with the location of children with allergen-free diets in the dining room				
The plan or sketch is displayed				
The assistants are familiar with the plan				
There are specific tables for children with allergen-free diets				
The places where children with allergen-free diets eat are identified				
Identification is simple or multiple				
Identification by chair				
Different colour				
Student name				
Shape of the chair				
Type of diet				
Another differentiating element				
Identification by table				
Identification on the table by tablecloth or another device attached to it				
Different colour				
Student name				
Type of diet				
Crockery of different colour or type				
Another differentiating element				
Dining assistants				
There are specific assistants for children with allergen-free diets				
For each specific assistant there are				
1 to 3 children with allergen-free diets				
4 to 6 children with allergen-free diets				
7 to 10 children with allergen-free diets				
If there are no specific assistants for children with allergen-free diets, how many children does each dining room assistant attend to?				
PROTOCOL OF ACTION IN ADVERSE EVENTS	YES	NO	N/A	OBSERVATIONS
The school has described preventive measures and recommendations to follow for an adverse event control.				
If so, they contemplate communication circuits of the adverse events				
There is an action protocol in case of a food allergy adverse event				
Does the school principal know the school's action protocol for a food allergy adverse event?				
Last school year was there an episode of food allergy adverse event?				
COMMUNICATION PARENTS-SCHOOL	YES	NO	N/A	OBSERVATIONS
There is a declaration by the parents in the enrolment of the children, whether they eat or not at school				
The school requires a food allergy medical certificate for students.				
There is coordination between teachers and school principal regarding food allergy adverse events				
There is a registry of adverse events related to food allergy at school				
Have any parents delivered the allergist action protocol for a food allergy adverse event?				

Allergen-free diets at school canteens audit checklist (N/A: does not apply)

Supplementary file: Action plan and checklist in the case of a food allergic reaction

The school will notify the Department of Health of the Municipal Board of Hortaleza District the appearance of a food allergy reaction by means of the *Communication Form of Food Allergy Reaction Episode in School Centres (Annex I)*; including the data of the centre, data of the student (preserving anonymity), data related to the episode, specifying the place where it occurred, the activity of the student, the approximate time, and the symptoms that the student presents, and also the measures taken and suspected cause. This form will be archived. Once the form is received, the health technicians will contact the centre and arrange an appointment to carry out an investigation and determine the cause. The procedures to follow to complete the *Food Allergy Reaction Episode Checklist (Annex II)* are:

- **Interview with the school Principal or the school health personnel** to gather more information about the student, such as previous episodes, need for medication, etc.

When the episode occurred before lunchtime, when the student did not use the dining room, or when the episode occurred 2 hours after ingestion, carrying out an activity in the centre or outside it, the questions "IN THE CLASSROOM" or "IN THE SCHOOL RECESS" will be used to clarify the cause of the episode. In this case, the rest of the questionnaire does not need to be completed. However, the procedure to follow in this case will be:

- **Interview with the teacher responsible** when the episode occurred.

- **Interview with the teacher or assistant** present when the allergic episode occurred.

If the student had used the dining room service on the day the allergic episode occurred, the following actions would be carried out:

- **Interview with the kitchen and dining room staff** about their management.

- **Visual inspection of the labels of the foods used** in the preparation of the different menus on the day of the allergic episode.

Finally, if an allergic episode occurring in the dining room is suspected, analysis of the allergen/s and/or traces in raw material and in the final prepared meal, and on utensils and surfaces where it was cooked should be carried out.

ANNEX I:
FOOD ALLERGIC REACTION EPISODE COMMUNICATION FORM IN SCHOOL
CENTERS IN HORTALEZA DISTRICT

☐ SCHOOL

☐ KINDERGARTEN

CENTRE:

PHONE:

SCHOOL PRINCIPAL:

EMAIL:

STUDENT DATA

☐ BOY

☐ GIRL

AGE:

DIAGNOSED FOOD ALLERGY:

EPISODE DATA

EPISODE DATE:

PLACE:

☐ DINING ROOM

TIME:

☐ CLASSROOM

ACTIVITY:

☐ SCHOOLYARD

☐ EXTRACURRICULAR
ACTIVITIES

OTHERS:

SYMPTOMS: Mark with an "X" affected area/s.

Skin symptoms:

- ☐ Itching
- ☐ Flushing
- ☐ Hives
- ☐ Tingle
- ☐ Inflammation
- ☐ Angioedema
(oedema of the
lips and eyelids)

**Digestive
symptoms**

- ☐ Abdominal pain
- ☐ Bowel
movements
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Nausea



**Throat, rhinopharynx and respiratory
symptoms:**

- ☐ Itchy throat
- ☐ Difficulty swallowing or
speaking
- ☐ Hoarseness
- ☐ Cough
- ☐ Severe itching in the ears
- ☐ Sneezing
- ☐ Nasal congestion
- ☐ Runny nose
- ☐ Fatigue
- ☐ Anxiety
- ☐ Cyanosis (bluish colour of the
skin)

Circulatory symptoms

- ☐ Dizziness
- ☐ Hypotension
- ☐ Tachycardia
- ☐ Weak pulse
- ☐ Fainting

Other symptoms:

CALL TO PARENTS:

☐ YES

☐ NO

EMERGENCY CALL (112):

☐ YES

☐ NO

MEDICATION ADMINISTRATION:

☐ YES

☐ NO

SUSPECTED CAUSE:

ANNEX II: FOOD ALLERGIC REACTION EPISODE CHECKLIST

CENTRE

☐ SCHOOL

☐ KINDERGARTEN

Date:

Time:

Inspection team:

Dining shift time:

Time of onset of first symptoms:

Suspected cause (school):

Suspected cause (inspection team):

DATA ON THE STUDENT CONCERNED

Food allergy to:

Activity performed when episode occurred:

Did affected student exercise after eating and before the occurrence of the episode?

☐

YES

☐

NO

Did the student take an anti-inflammatory before the onset of the reaction?

☐

YES

☐

NO

Has the student had a previous episode?

☐

YES

☐

NO

Has the student previously needed epinephrine management?

☐

YES

☐

NO

Has the student been hospitalized because of a previous episode?

☐

YES

☐

NO

Does the student eat at the centre?

☐

YES

☐

NO

Comments:

IN THE CLASSROOM

¿Did the episode happen during or after a classroom activity with food?

☐

YES

☐

NO

☐

NA

¿Did the episode occur by performing or after performing an activity with materials containing traces of food or latex?

☐

YES

☐

NO

☐

NA

¿Was the teacher in the classroom at the time of the episode aware of the student's allergy?

☐

YES

☐

NO

☐

NA

Comments:

AT RECESS

During recess, did the student have access to food from other classmates?

☐

YES

☐

NO

☐

NA

Does the student's circle of friends know about food that the affected student cannot take?

☐

YES

☐

NO

☐

NA

Did the staff who were supervising the recess know about the student's allergy?

☐

YES

☐

NO

☐

NA

Comments:

HANDLING AND COOKING OF THE FOOD☐ OWN KITCHEN☐ CATERING☐ EXTERNAL COMPANY WITH KITCHEN IN THE CENTER☐ SPECIAL DIET CATERING

Does the student bring own food from home?

☐ YES ☐ NO ☐ NA

If the student brings own food from home, is the school microwave used?

☐ YES ☐ NO ☐ NA

Did the kitchen staff read the labels before preparing the dishes the student received?

☐ YES ☐ NO ☐ NA

Is there a specific place for the preparation of special diets?

☐ YES ☐ NO ☐ NA

Was the menu of the affected student prepared by a specific person, who is responsible exclusively for preparing the meals for allergy sufferers?

☐ YES ☐ NO ☐ NA

Does the person responsible for preparing this menu have specific allergen training?

☐ YES ☐ NO ☐ NA

Do they use gloves to prepare this special diet?

☐ YES ☐ NO ☐ NA

Are the utensils used in the preparation of the food by the school used exclusively for cooking this type of diet?

☐ YES ☐ NO ☐ NA

If so, are the specific utensils stored in such a way as to avoid any cross-contamination?

☐ YES ☐ NO ☐ NA

Is different equipment (refrigerator or hot table) used for the preservation of allergen-free menus?

☐ YES ☐ NO ☐ NA

Is the allergen-free menu for the student who has suffered the allergic reaction stored, until it reaches the student, in hermetic containers to prevent contamination after its preparation?

☐ YES ☐ NO ☐ NA

Was the meal that the student received identified in any way?

☐ YES ☐ NO ☐ NA

Did the student who suffered the reaction, use specific tableware for this type of diet?

☐ YES ☐ NO ☐ NA

Comments:

IN THE DINING ROOM:

Is there a specific dining room in the school?

☐ YES ☐ NO ☐ NA

Is the site identified in any way?

☐ YES ☐ NO ☐ NA

Does the student eat at the same table as his peers (allergic and non-allergic)?

☐ YES ☐ NO ☐ NA

Is there a specific table for children with the same allergy as the affected student?

☐ YES ☐ NO ☐ NA

If the above are negative, is there a specific table for children with any type of allergy?

☐ YES ☐ NO ☐ NA

Is there a specific dining assistant to care for children with food hypersensitivity?

☐ YES ☐ NO ☐ NA

Comments:

ANALYTICAL DETERMINATION OF ALLERGENS AND/OR TRACES OF ALLERGENS.			
Indicate which raw materials, prepared foods, utensils, and surfaces are analyzed.			
RAW MATERIAL:			
	Detection of:	Method used to:	Results:
1.			
2.			
3.			
4.			
5.			
PREPARED FINAL DISH/ WITNESS OF THE DAY OF THE EPISODE:			
	Detection of:	Method used to:	Results:
1.			
2.			
3.			
UTENSILS AND SURFACES:			
	Detection of:	Method used to:	Results:
1.			
2.			
3.			
4.			
5.			
Comments:			
INFORMATION ON POSSIBLE CAUSAL DISHES			
On the day of the event, was there any alternative menu (not taken by the affected student) which had the allergen suspected of causing the reaction?		☐ YES	☐ NO
What? _____		☐ NA	

DISH:						
The dish is included in the menu:	☐	BASAL	☐	SPECIFIC STUDENT	☐	OTHER ALLERGIES
Are there guidelines for preparation?	☐	YES	☐	NO	☐	NA
Are these guidelines followed during at the time of preparation?	☐	YES	☐	NO	☐	NA
Was a witness sample kept on the day of the event (from this dish)?	☐	YES	☐	NO	☐	NA
INGREDIENT 1						
In the ingredient list, are allergens highlighted?	☐	YES	☐	NO	☐	NA
Do they have preventive labelling?	☐	YES	☐	NO	☐	NA
Is the allergen to which the student presents hypersensitivity on the list of ingredients?	☐	YES	☐	NO	☐	NA
If not, is the allergen to which the student presents hypersensitivity in the preventive labelling?	☐	YES	☐	NO	☐	NA
Does your storage prevent cross-contamination?	☐	YES	☐	NO	☐	NA
INGREDIENT 2						
In the ingredient list, are allergens highlighted?	☐	YES	☐	NO	☐	NA
Do they have preventive labelling?	☐	YES	☐	NO	☐	NA
Is the allergen to which the student presents hypersensitivity on the list of ingredients?	☐	YES	☐	NO	☐	NA
If not, is the allergen to which the student presents hypersensitivity in the preventive labelling?	☐	YES	☐	NO	☐	NA
Does your storage prevent cross-contamination?	☐	YES	☐	NO	☐	NA
INGREDIENT 3						
In the ingredient list, are allergens highlighted?	☐	YES	☐	NO	☐	NA
Do they have preventive labelling?	☐	YES	☐	NO	☐	NA
Is the allergen to which the student presents hypersensitivity on the list of ingredients?	☐	YES	☐	NO	☐	NA
If not, is the allergen to which the student presents hypersensitivity in the preventive labelling?	☐	YES	☐	NO	☐	NA
Does your storage prevent cross-contamination?	☐	YES	☐	NO	☐	NA