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Management of Food Allergens by Hospital Food Services in Barcelona City

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Introduction

In hospitals, food hygiene is considered an essential factor for preventing co-morbidity and reducing the length of the hospital stay, considering the vulnerability of the consumers [1, 2]. The current legal framework establishes that hospital facilities are responsible for guaranteeing the safety of the food they produce and/or serve, and to implement all preventive measures necessary to minimize the risk of exacerbating illness or spreading a food-borne disease [3]. In this sense, food allergens must be managed in a way that avoids the unintended presence of particular allergens, or clearly states on the label or informs the consumer of their presence, where necessary.

For this reason, hospital facilities are required to implement food safety plans based on the principles of Hazard Analysis and Critical Control Points (HACCP), and to integrate into these controls the management of the potential hazards associated with allergens [[4, 5].

Implementation of an allergen control plan based on HACCP principles is the easiest way to promote good practices and preventive measures among food handlers. This plan should consider all aspects of the handling process, storage and identification of ingredients, production and service of the menus, and must be evaluated and updated continuously, as for other food hygiene control plans.

A previous study carried out in Barcelona to evaluate the risk associated with managing allergens in school food services showed that schools who declared that they operated an Allergen Control Plan (ACP), an standardized recipe book and a training plan, had more preventive measures implemented to minimize this hazard [6].

Currently, there is a paucity of data on adhesion to the HACCP system in hospitals in Barcelona and on the management measures implemented to control allergens in food. Studies in other countries also illustrate limited implementation of the HACCP system in hospital food services due to the extended periods of time required to develop these programs and the high labour costs involved [7-10]. It has also been found that many food handlers lack training or have low capabilities, and that poor hygiene practices among staff is positively correlated with low implementation rates of HACCP in hospitals [7].

Official food hygiene inspectors from Barcelona Public Health Agency (Agencia de Salud Pública de Barcelona, ASPB) are responsible for monitoring food hygiene plans implemented by providers at Barcelona hospitals, and conduct regular inspections at hospital food services. However, the data collected during these inspections have not yet been analyzed to evaluate the specific preventive measures available for allergen control in these hospitals.

Thus, the main objective of this study is to describe the current situation of allergen management by food services in hospitals in Barcelona, and to illustrate the features of the production and/or service system of ready-to-eat food in these facilities.

Methods

Implementation of the Questionnaire

Previously, we carried out a cross-sectional descriptive study during four months (March to June 2015) using an ad hoc questionnaire based on a previous study conducted to evaluate food services at schools in Barcelona [6]. Now, all hospitals serving ready-to-eat food and registered within ASPB's Food Control Information System (n=42) were included in the survey. The questionnaire was administered during scheduled interviews with the operational managers of the cooking premises and/or the dieticians responsible for hospital food services at each facility.

The first part of the questionnaire gathered data about the characteristics of the hospital and the attended population, the number and type of diets served, and aspects of how the diet and food service was managed. Hospital food services were designated as having internal management where the food handler was employed directly by the hospital and external management where personnel were contracted through an external food company. Consequently, food was designated

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as having been produced by an internal service when it was produced on the hospital's own premises (onsite), and by an external service when they were produced at the premises of a food catering company (also known as centralized foodservice system). Similarly, ready-to-eat food could have been produced by a so-called Ready-Prepared Foodservice System, menu items are produced and held for service packed in bulk, in individual portions or combination containers its distinct feature is the separation between time of preparation and service food is not for immediate use foods are prepared on site, however place of preparation is not place of service, where food is produced onsite, held chilled or frozen, and reheated and served onsite; or a Conventional Foodservice System, traditionally used menu items are prepared in kitchen and held for short time until serving time earlier, where ingredients are assembled and food is produced onsite, held either heated (> 65ºC) or chilled, and served.

The second part of our questionnaire gathered data on the design of special diets and labelling features, the reception, production and service of special diets, and the use of HACCP systems.

Only 8 of the 14 closed questions (yes/no) from this second part were applicable to hospitals with external service (catering), as these did not produce or cook any meals. Therefore, only results obtained from hospitals with internal service (n=35) were used to construct a good practice index by assigning one point for each affirmative answer, and zero for each negative answer.

Analysis

We performed a descriptive analysis of the characteristics of hospital food services, and a bivariate analysis to compare the means of the index for hospitals with internal service (n=35) in terms of three independent variables: hospital ownership, type of kitchen management, and number of diets offered.

The quantitative variable, "number of diets offered", was divided into two categories according to the median of the variable (112.5 diets/day).

All 14 questions on allergen preventive measures showed acceptable internal consistency (Cronbach's alpha, $\alpha \geq 0,70$) [11]. Statistical analysis was carried using SPSS (v.18).

Results

Response rate of the questionnaire was 100%. The main characteristics of the 42 hospital food services surveyed are shown in Table 1, stratified by the site of food production (internal or external service).

9 hospitals (21.4%) were publicly owned, and 33 (78.6%) privately owned. 17 (40.5%) hospitals offered medical attention to all age groups, 2 (4.8%) attended only infants, and 11 (26.2%) attended elderly or disabled people. In 5 (71.4%) of hospitals with an external service (caterer), the food service personnel was also managed by an external food company (external management), 22 (62.9%) of all hospitals had internal service and external management.

Preventive Measures

Table 2 shows the percentage of hospitals that responded affirmatively to the 14 questions used to create the good practice index, stratified by production location. Some questions were not applicable to hospitals with an external service (caterers).

Results showed that 92.9% of hospitals with an internal service had designed special allergen-free diets for people with food allergies or intolerances. All hospitals succeeded in avoiding cross-contamination during kitchen operations. 83.3% of hospitals with an internal service specifically mentioned allergen management in their personnel training manuals.

Similarly, 83.9% of hospitals had cookbooks or technical sheets on the allergen-free menus.

The use of clean oils and clean deep fryers were highlighted as other risks to be kept under control (data not shown). 69.4% of hospital kitchens declared that these were monitored regularly, although 24.8% indicated that none of their special diets included deep-fried food.

Index of Allergen-Prevention Measures and HACCP Controls in Hospitals with Internal Service

Table 3 shows the results for the index of allergen-prevention measures according to hospital characteristics, and divided into two categories (internal service and external service) according to the value of the index.

53.3% of hospitals with internal management and 77.8% of hospitals with external management showed a higher index of preventive measures.

The mean of the allergen preventive measures index at 35 hospitals with an internal food service was 9.5 ± 2.5 out of 14 Table 4. The comparison of means illustrated that more preventive measures were available in public hospitals and from food services that served fewer diets and were from external and private management, although the differences were not statistically significant.

57.1% of hospitals had no specific Allergen Control Plan (ACP); Figure 1 shows the geographical distribution these non-ACP hospitals in Barcelona's territory according to type of ownership

Discussion

The results of this study show a relatively high rate of implementation of HACCP-based plans: only 26.2% of hospitals declared that they did not have any specific documentation for allergen control. 42.9% had an active ACP, and the remainder had other documentation, such as technical sheets (45.2%) or an action protocol (11.9%). A significant number of hospitals with no active HACCP plan had some hygiene procedures. In general, this is a high rate compared to the percentage hospitals with HACCP plans in other countries and the percentage of schools in Barcelona with an ACP6 [2, 4, 7, 8]. These results were consistent with the low reported rates in Spanish hospitals of anaphylaxis due to food poisoning or food-borne disease in patients during

Table 1: Hospital characteristics and type of food service

Variable	Site of food production			
	External	**Internal**	**Total**	***p- value***
	N (%)	N (%)	N (%)	
Ownership				
Private	7 (100)	26 (74.3)	33 (78.6)	
Public	0	9 (25.7)	9 (21.4)	0.782
Type of hospital according to population attended				
Adult population	2 (28.6)	10 (28.6)	12 (28.6)	
Maternal and child population	0	2 (5.7)	2 (4.8)	0.663
Social-sanitary sector	3 (42.9)	8 (22.9)	11 (26.2)	
General	2 (28.6)	15 (42.9)	17 (40.5)	
Kitchen/office management				
Internal	2 (28.6)	13 (37.1)	15 (35.7)	
External	5 (71.4)	22 (62.9)	27 (64.3)	0.666
Number of diets served				
≤112.5[a]	4 (57.1)	17 (48.6)	21 (50.0)	0.782
>112.5	3 (42.9)	18 (51.4)	21 (50.0)	
Food service production system				
Ready-prepared	5 (71.4)	2 (5.7)	7 (16.7)	
Conventional	1 (14.3)	31 (88.6)	32 (76.2)	0.000
Mixed	1 (14.3)	2 (5.7)	3 (7.1)	
Total	7 (16.7)	35 (83.3)	42 (100)	
[a] Median number of menus served				
Significant differences ($p \leq 0,05$), Chi-square t				

their hospital stay [12].

More than 50% of hospitals declared that preventive measures other than ACPs were active. In relation to implementing specific allergen preventive measures, fewer hospitals declared that they had designed allergen free diets (33.3%), made specific kitchenware available to food handlers (17.1%), or had issued operational instructions to organize service in patient rooms (16.7%).

While written menus containing information on food allergies or intolerances are not legally required, this is known to reduce the risk of mistakes where patients with allergies are admitted to the hospital [19]. While there are no reported data on the percentage of allergic patients as a fraction of the number of patients admitted to hospitals, considering that the usual percentage of allergies among adults is just 2.3% it seems likely that hospitals will not produce allergen-free diets in a daily basis [14, 15]. Moreover, it is also not compulsory to have exclusive kitchenware, as good cleaning and disinfection practices are considered sufficient to prevent cross-contamination [17].

Previous studies suggest that food handlers in charge of food service in patient rooms commonly have poor hygiene knowledge [8, 9]. In Barcelona hospitals, these food handlers are usually nurses, although this task can also be carried out by therapists or waiters, and these staff should receive some training in food hygiene and allergen management [13]. However, this risk is low in Barcelona, as all of the hospitals surveyed keep special diets isolated once produced and also before service Table 2.

Currently, food regulations used in official controls do not regulate the content of the food hygiene training programs, and it is also not compulsory to have specific training in allergen management. However, official food hygiene inspectors in Barcelona require that the allergen content of foods served in

Table 2: Percentage of hospitals that had implemented allergen preventive measures, according to site of food production (n=42)

	Site of food production		
	Internal service	**External service**	**Total**
	N (%)	N (%)	N (%)
Design of special diets and labelling			
Diet catalogue includes a specific section on allergen-free diets	19 (86.4)	3 (13.6)	22 (100)
Allergen-free menus are available to customers	13 (92.9)	1 (7.1)	14 (100)
Operational checks are applied to monitor ingredients declared on labels of raw foods	20 (80.0)	NA	25 (100)
Raw food technical sheets are available	33 (100)	NA	33 (100)
Reception, production and service of special diets			
Operational controls ensure that allergen-free foods are received and/or protected from other foods	29 (100)	NA	29 (100)
Operational controls ensure that allergen-free foods are stored separately and/or protected from other foods	33 (100)	NA	33 (100)
Cross-contamination during production is avoided	26 (100)	NA	26 (100)
Exclusive kitchenware is used for special diets	28 (100)	NA	28 (100)
Once prepared, specific diets are stored separately and protected	6 (100)	NA	6 (100)
Special diets are stored separately and protected before service	35 (83.3)	7 (16.7)	42 (100)
Food hygiene plans			
The training plan for food handlers includes allergen management	35 (83.3)	7 (16.7)	42 (100)
Specific documentation is available for allergen- control	27 (84.4)	5 (15.6)	32 (100)
A cookbook or technical sheets are available for ready-to-eat foods free from allergens	26 (83.9)	5 (16.1)	31 (100)
Specific instructions or a protocol are available for serving special diets in patient rooms	5 (71.4)	2 (28.6)	7 (100)
NA: not applicable. Cronbach's alpha = 0.725			

restaurants and by other ready-to-eat food services must be available to consumers, in accordance with Regulation (EU) No 1169/2011 of the European Parliament and Council on the provision of food information to consumers. Additionally, in line with other countries, the Catalan administration has published guidelines and recommendations that are not compulsory but can be freely adopted by business operators [19].

In the 35 hospitals that produced foods, the mean of the good practice index was 9.5 out of 14. This mean did not vary significantly according ownership type, the number of menus served per day, or how hospital food services were managed, although externally managed food services scored 1.89 points more than internally managed services, on average.

Studies conducted in schools show that those with externally managed food services are more likely to have a general food hygiene plan and a specific ACP[6]. In contrast, hospitals seem to be more homogeneous, showing no significant differences for these variables [20-22].

As a limitation, we must highlight the possibility of bias due to the fact that the data were self-reported by the hospital. Nonetheless, this study provides new data on food allergen management in a sensitive population, which is a problem with the few published studies on this topic.

In conclusion, there is a clear lack of regulations on the implementation of ACPs to empower food service companies and avoid cases of anaphylaxis caused by food allergies. Although there appears to be widespread implementation of specific plans to manage food allergens, these are not implemented uniformly, and are not covered by any regulation.

The results of the study highlight that the implementation of ACPs and an updated food hygiene training program provide good hygiene practices by food handlers. Nonetheless, we found low rates of implementation of ACPs by food services at hospitals in Barcelona. Official control services should develop a specific program for allergen risk management, which should also include actions to improve training of food handlers. In addition, greater implementation of ACPs in hospitals will improve their allergens management and it will allow us to obtain more indicators to evaluate allergen risk in hospitals facilities.

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Abbreviations

ACP - Allergen Control Plan; HACCP - Hazard Analysis and Critical Control Points

Table 3: Allergen prevention measures in hospital food services according to hospital characteristics

	Internal service		External service		
Variable	**Index**		**Index: not applicable**		
	0-7 N (%)	**8-14 N (%)**		**Total N (%)**	***p-value***
Ownership					
Private	6 (18.2)	20 (60.6)	7 (21.2)	33 (100)	0.077
Public	0	9 (25.7)	0	9 (100)	
Type of hospital according attended population					
Adult population	2 (16.7)	8 (66.7)	2 (16.7)	12 (100)	
Maternal and child health	0	2 (100)	0	2 (100)	
Social-sanitary sector	0	8 (72.7)	3 (27.3)	11 (100)	0.596
General	4 (23.5)	11 (64.7)	2 (11.8)	17 (100)	
Kitchen/office management					
Internal	5 (33.3)	8 (53.3)	2 (13.3)	15 (100)	
External	1 (3.7)	21 (77.8)	5 (18.5)	27 (100)	0.031[a]
Number of menus					
≤112.5	3 (13.6)	15 (68.2)	4 (18.2)	22 (100)	
>112.5	3 (15.0)	14 (70.0)	3 (15.0)	20 (100)	0.960
Type of food production					
Ready-prepared	0	2 (28.6)	5 (71.4)	7 (100)	
Conventional	6 (18.8)	25 (78.1)	1 (3.1)	32 (100)	
Mixed	0	2 (66.7)	1 (33.3)	3 (100)	0.000[a]

[a] Significant differences ($p \leq 0,05$), chi-square test

Questionnaire is not applicable in hospitals with external service, therefore an index cannot be obtained

Table 4: Mean index of allergen preventive measures at hospitals with internal food service (N = 35)

	Mean Index ± S	**N**	***p-value***
Type of management			
Internal management	8.3 ± 2.8	13	0.025[a]
External management	10.2 ± 2.0	22	
Ownership			
Private	9.1 ± 2.4	26	[b]
Public	10.7 ± 2.2	9	
Number of menus served			
≤1125	9.7 ± 2.3	18	0.616
>1125	9.3 ± 2.6	17	
Total	9.5 ± 2.5	35	

[a]Significant differences ($p \leq 0.05$), t-Student test

[b]Invalid contrast: more than 20% of the frequencies for contrast are < 5

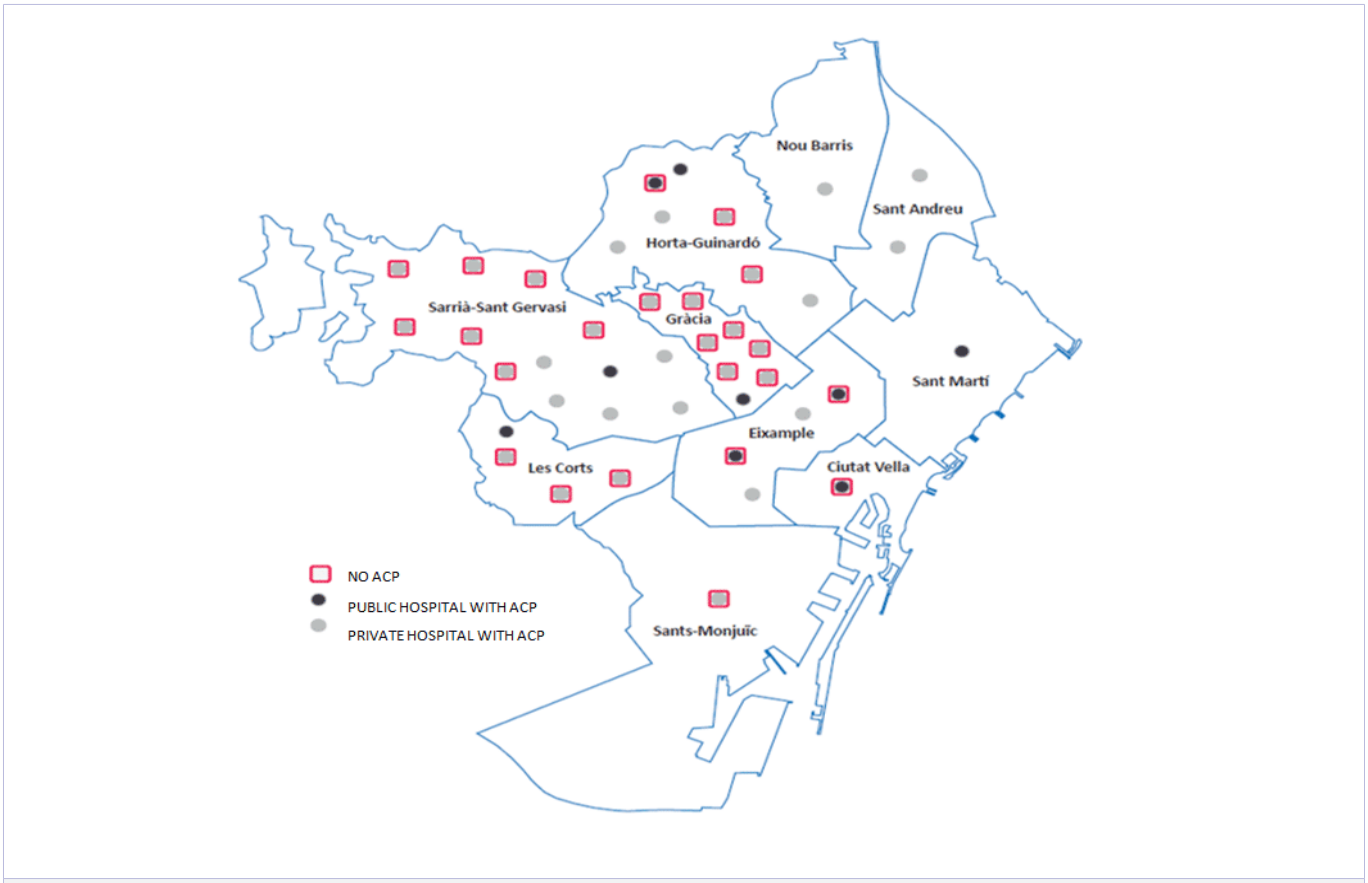

Figure 1: Implementation of allergen control plans (ACP) according to the distribution of hospital food services in Barcelona city districts

References

1. Askarian M, Kabir G, Aminbaig M, Memish ZA, Jafari P. Knowledge, Attitudes, and Practices of Food Service Staff Regarding Food Hygiene in Shiraz, Iran. Infect Control Hosp Epidemiol. 2004;25(1):16-20.
2. Bas M, Temel MA, Ersun AS, Kivanç G. Prerequisite programs and food hygiene in hospitals: food safety knowledge and practices of food service staff in Ankara, Turkey. Infect Control Hosp Epidemiol. 2005;26(4):420-424.
3. Regulation No 852/2004 of the European Parliament and of the Council (29 April 2004) on the hygiene of foodstuffs .Official Journal of the European Union, 852/2004 April 30, 2004.
4. Richards J, Parr E, Riseborough P. Hospital food hygiene: The application of hazard analysis critical control points to conventional hospital catering. J Hosp Infect. 1993;24(4):273-282.
5. Regulation (EU) No 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the provision of food information to consumers. 2011 p. OJ L 304, 22.11.2011, p. 18-63.
6. Caballé-Gavaldà L, García-Cid E, Fontcuberta-Famadas M, Balfagón-Marzal P, Durán-Neira J. Management of the risks associated with allergens in school canteens in Barcelona. Gac Sanit. 2014;28(6):450-455.
7. Angelillo IF, Viggiani NM, Greco RM, Rito D. HACCP and food hygiene in hospitals: knowledge, attitudes, and practices of food-services staff in Calabria, Italy. Collaborative Group. Infect Control Hosp Epidemiol. 2001;22(6):363-369.
8. Amany Mokhtar Abdelhafez. Knowledge, attitudes, and practices of food service staff about food hygiene in hospitals in Makkah area, Saudi Arabia. Life Sci J. 2013;10(3):1079-1085.
9. Buccheri C, Casuccio A, Giammanco S, Giammanco M, La Guardia M, Mammina C. Food safety in hospital: knowledge, attitudes and practices of nursing staff of two hospitals in Sicily, Italy. BMC Health Serv Res. 2007;7:45. doi: 10.1186/1472-6963-7-45
10. Baş M, Yüksel M, Çavuşoğlu T. Difficulties and barriers for the implementing of HACCP and food safety systems in food businesses in Turkey. Food Control. 2007;18(2):124-130.
11. George D, Mallery P. SPSS/PC+ step by step: a simple guide and reference. Belmont, Calif: Wadsworth Pub. Co; 1995. 320 p.
12. Tejedor Alonso MA, Moro MM, Hernández JE, et al. Incidence of Anaphylaxis in Hospitalized Patients. Int Arch Allergy Immunol. 2011;156(2):212-220. doi: 10.1159/000322997
13. Barrie D. The provision of food and catering services in hospital. J Hosp Infect. 1996;33(1):13-33.
14. Europrevall WP. 1.1 Birth Cohort Update. En: 3 rd Quarter 2008. Berlin, Germany: Charité University Medical Centre; 2008.
15. Fernández RM. Food allergy in Alergologica - 2005. J Investig Allergol Clin Immunol. 2009;19 (Suppl 2):37–44.
16. Ahuja R, Sicherer SH. Food-allergy management from the perspective of restaurant and food establishment personnel. Ann Allergy Asthma Immunol. 2007;98(4):344-348.

17. Jackson LS, Al-Taher FM, Moorman M et al. Cleaning and other control and validation strategies to prevent allergen cross-contact in food-processing operations. J Food Prot. 2008;71(2):445-458.

18. Sergeant P, Kanny G, Morisset M, et al. Food safety of allergic patients in hospitals: Implementation of a quality strategy to ensure correct management. Eur Ann Allergy Clin Immunol. 2003;35(4):120-123.

19. Taylor SL, Baumert JL. Cross-contamination of foods and implications for food allergic patients. Curr Allergy Asthma Rep. 2010;10(4):265-270. doi: 10.1007/s11882-010-0112-4

20. Young MC, Muñoz-Furlong A, Sicherer SH. Management of food allergies in schools: a perspective for allergists. J Allergy Clin Immunol. 2009;124(2):175–182. doi: 10.1016/j.jaci.2009.04.004

21. Youn S, Sneed J. Implementation of HACCP and prerequisite programs in school foodservice. J Am Diet Assoc. 2003;103(1):55–60.

22. Liz Martins M, Rocha A. Evaluation of prerequisite programs implementation at schools foodservice. Food Control. 2014;39:30-33.