'No nuts please': Food allergen management in takeaways

Abstract

There is an increasing number of food allergic reactions occurring in food services including takeaways. This study investigated the food allergy knowledge, attitude and practices of staff in takeaways. Although more than half of the takeaways' staff (n=28) demonstrated good food allergy knowledge, there still exists some misunderstanding among the respondents. There were confusion about lactose intolerance and milk allergy, a third of the takeaways' staff were uncertain that hands could transfer allergens. Almost half of the respondents were not aware of the danger of offering water to dilute a food allergen to stop the reaction Experienced staff and managers / owners reported more positive attitude and higher frequency of good food allergen management practices. Respondents also strongly agreed that customers should inform staff if they have food allergies. However, takeaways' staff would enquire customers if they need allergen information when taking orders over the telephone. Clear communication between front service staff, customers and kitchen crew are important and should be established and meals verified with cooks to ensure safe meals are prepared. Managers or owners should also strongly encourage their staff to participate in food allergy training. Food Standards Agency has set up a free food allergy online training that would be a valuable addition to food businesses.

Keywords: attitude; food allergy; food handlers; knowledge; practices

Highlights

- 43% (12) of takeaways' staff would mistakenly offer water to dilute a food allergen to stop the reaction
- Takeaways' staff unanimously agreed it is customers' responsibility to inform them of their food allergies
- Managers and owners were confident they can handle a food allergy emergency in the takeaways compared to kitchen crew

Introduction

Food allergy is an adverse immune reaction that occurs upon exposure to specific food and the reactions are reproducible (Moore, Stewart, & deShazo, 2017). The prevalence of food allergy is on the rise globally and affects up to 4% adults and 6% children worldwide (Boye, 2012). Peanuts are one of the top 10 foods responsible for the majority of food allergies in the United Kingdom (UK). In fact, peanut allergy among children in the UK has doubled in the last 10 years and is approximately 1.5% (Immune Tolerance Network, 2017). Food allergy symptoms can range from mild (e.g. resulting in hives and itching) to severe symptoms (e.g. vomiting, diarrhoea, wheezing) or even cause life-threatening anaphylactic reactions. Each year in the UK, 10 patients die from food-induced

anaphylaxis due to undeclared allergenic ingredients (Food Standards Agency [FSA], n.d.). EU Food Information for Consumers Regulation No. 1169/2011 (2014) requires food services (including takeaways) to inform customers if the food contains any of the 14 major food allergens. The 14 food allergens include cereals containing gluten, crustaceans, eggs, fish, peanuts, soybeans, milk, tree nuts, celery, mustard, sesame seed, sulphur dioxide and sulphites (more than 10 ppm), lupin and molluscs. The information can be provided on the menu, noticeboard, communicated verbally by member of staff or in other formats that are made available to the customers. If communicated verbally, this must be made clear to customers on how they can access the information.

The only current method to prevent food allergy is to avoid the trigger food. This requires strict and careful food avoidance of the specific food allergen. When purchasing food from outlets, consumers should have access to food allergen information via the menu, recipe matrix, notice or upon enquiry from staff. Takeaways are food outlets where hot food is ordered and paid for at the till; with limited or no sit-in option; usually open after 5pm; outlets that are part of a chain and offers phone ordering (Centre for Diet and Activity Research [CEDAR], 2014). There are now more than 50,000 takeaways in England (Butler, 2017) and about one-fifth of adults and children in the UK consume one takeaway meal at home weekly (Adams *et al.,* 2015). Factors such as limited kitchen space, shared cooking equipment, utensils and requirements to complete a food order in minutes created additional challenges in takeaways. Takeaways had been reported to cause a number of fatalities, (Evans, 2016; Greenfield, 2017; O'Hare, 2013; Thorp, 2014) although the exact cases remain unknown.

In fact, more than a decade ago, Pratten and Towers (2003) reported that small food service providers might not be able to respond adequately to allergen-free meal request. Multiple food safety studies had been conducted in the service sector (Seaman & Eves, 2006), micro food operations (Green & Kane, 2014) and among food handlers (Samapundo, Cam Thanh, Xhaferi, & Devlieghere, 2016; Moreb, Priyadarshini, & Jaiswal, 2017). Food allergen management remains a crucial part of food safety management systems. Complaints had been recorded in the dairy food processing sectors (Aguiar *et al.*, 2018) and assessment of food allergen management in small food facilities and processing plants were proposed (Dzwolak, 2017) and should be incorporated as part of the food safety management systems (Cusato *et al.*, 2014; Njage, Opiyo, Wangoh, & Wambui 2018). A number of studies on food allergy knowledge and management have been conducted among restaurants (Ajala *et al.,* 2010; Dupuis *et al.*, 2016; Lee & Sozen, 2016), college and university catering services (Choi & Rajagopal, 2013; Verstappen, Mirosa, & Thomson, 2018). A recent study by Royal Society of Public Health (RSPH) (2015) conducted among 65 takeaways found that 70% of the takeaways did not provide allergen information in the correct way and 54% did not know if one of the major allergens were in their food. FSA (2016) revealed that food allergic reactions occurred in 25% of restaurants or café and 9% from takeaway food. Even fewer studies have looked at food allergen management practices among takeaways. Overall, there is little research conducted among

takeaways in the UK. Hence, this study aims to investigate the food allergy knowledge, attitudes and practices of staff in takeaways.

Materials and Methods

Questionnaire development

The questionnaire was developed based on Ahuja and Sicherer (2001), Ajala *et al.* (2010), Bailey, Albardiaz, Frew, & Smith (2011) and FSA (n.d.; 2015). The questions were divided into four sections: (i) demographics (8 questions); (ii) knowledge (12 questions); (iii) attitudes towards food allergen management (20 questions); and (iv) practices (20 questions). In the food allergen knowledge section, participants were given the choices of 'yes', 'no' or 'uncertain'. Each correct answer was given 1 point, whilst incorrect or uncertain answer was given 0 point. Respondents that select all 4 correct food allergens in Question K1 (select the food allergens which are required to be labelled or notified in the UK) received 1 point. If tomatoes or chicken were selected, 0 point was given. Maximum food allergy knowledge score is 12 points. Within the attitude section, participants were asked to indicate using a 5-point Likert scale of strongly disagree (1) to strongly agree (5) and never (1) to always (5) in the practices section. The questionnaire was pilot-tested face-to-face with three takeaway owners based in Preston, UK to identify any ambiguities. Two of the takeaways' owners suggested that a text box should be provided at the end of the questionnaire to allow respondents to provide further comments or suggestions. The text box was included in the final revised questionnaire.

Data collection

Three hundred and twenty takeaways based in north-west of England were contacted using the FSA's food hygiene ratings advanced search options. 'Takeaway' under business type and cities or large towns based in local authorities of the five counties (Cheshire, Cumbria, Merseyside, Greater Manchester and Lancashire) were selected. Systematic sampling using the FSA hygiene rating list was carried out to ensure takeaways with hygiene ratings of 0 – 5 stars were selected. The breakdown of takeaways according to hygiene ratings were as follow: 5 stars (n=110), 4 stars (n=70), 3 stars (n=50), 2 stars (n=50), 1 star (n=30), 0 (n=10). The takeaways were sent a postal survey containing the study information sheet, consent form, questionnaire and a postage paid return envelope. Takeaways' staff were invited to participate in the study and were asked to return their signed consent form and the questionnaire. Descriptive statistics and independent t-tests were carried out using SPSS 24.0 and significance was set at $p < 0.05$. T-tests were used to identify if there were any significant differences between years of experience (less or more than 5 years) and employee working position (kitchen crew or manager / supervisor) in their knowledge, attitude and practices towards food allergen management.

Results and Discussion

Demographics

Twenty nine takeaways responded to the survey and 28 completed the questionnaire and returned the signed consent forms. This reflects a response rate of 8.75%. Ninety-three percent (n=26) of the respondents have more than 1 year of working experience in food services whilst 86% (n=24) had been working more than a year in their current takeaways. Twenty respondents have at least post-secondary education. A large majority of the takeaways' staff (n=23) did not observe any food allergic reaction cases in their takeaways in the past 12 months. Eight takeaways' respondents did not receive any training specific to food allergen management in the past 12 months (Table 1). Food businesses are required by law to ensure food handlers receive appropriate food hygiene training in line with their work and they can handle food safely (FSA, 2018a). Food handlers can complete the Level 2 Food Safety course that covers the principles and methods of safe food handling. FSA has also set up a free food allergy online training (FSA, 2018b) which would be a valuable addition to food business operators.

Insert Table 1 here

Food allergen management knowledge

At least 75% (n=21) of the respondents were aware of the food allergens required to be labelled in the UK. More than 85% (n=24) of the respondents s reported that they will get medical help immediately if a guest is experiencing an allergic reaction. Most takeaways' staff (n=27) were aware that consuming even a small amount of food allergen may cause severe reaction in food allergic individuals. They were also aware of the need to use separate cooking oil for food with allergenic ingredients or allergen free ingredients (n=26). However, the respondents were uncertain about the differences between lactose intolerance and milk allergy (n=22). Nor were the takeaways' staff aware of the danger of offering water to dilute a food allergen to stop the reaction (n=12). One third of the staff did not know that allergens can be transferred by hands (Table 2). Two respondents scored full points in the food allergy knowledge section whilst the majority of the takeaways' staff scored 9 or 10 points (Figure 1). In K1, 15 takeaways' staff selected the correct food allergens whilst 3 and 2 of the staff thought chicken or tomatoes were mandatory in food allergen labelling. Independent t-test between kitchen crew (including front service staff) (8.09 ± 1.70; n=11) and owners or managers (9.12 ± 1.87; n=17) showed no significant difference in food allergy knowledge $t(26) = -1.47$, $p > 0.05$. Although staff with more than 5 years of experience in the food service industry scored slight higher (9.31 ± 2.25; n=13) compared to staff with less than 5 years experiences (8.20 ± 1.26; n=15), no significance difference was observed between the two groups, $t(26) = -1.63$, $p > 0.05$.

Insert Table 2 here

According to EU FIC (2014), food businesses are required to inform customers of the 14 main food allergens in UK/EU. This include cereal containing gluten, peanuts, soya, tree nuts, milk, egg, fish, crustacean, mollusc, sesame seeds, celery, mustard, lupin and sulphites (> 10 ppm). Both chicken and tomatoes are not required to be labelled but some respondents thought otherwise. Chicken meat is considered hypoallergenic and avian meat allergy is uncommon (Michelet, Schluckebier, Petit, & Caubet, 2017). Chicken (Kelso, Cockrell, Helm, & Wesley, 1999) and tomatoes (Pravettoni & Primavesi, 2013) have been reported to cause allergic reactions. The only country which recommends that chicken should be labelled as food allergen is Japan (Akiyama, Imai, & Ebisawa, 2011) while tomatoes must be labelled in Korea (Gendel, 2012). Both chicken and tomatoes are not required to be labelled as food allergens in the UK. Geographical location and dietary factors play a significant role in influencing food allergy prevalence (Fiocchi, Dahdah, Fierro, Artesani, & Valluzi, 2018). Slightly less than half of the takeaways' staff mistakenly thought one could offer water to individuals suffering from allergic reaction in the hope of diluting the food allergen. Other studies revealed similar results where 38% of restaurant staff (Bailey *et al.*, 2011) and 60% of Asian-Indian restaurants in UK (Common *et al.*, 2013) believed that an individual experiencing an allergic reaction should drink water to dilute the allergen. Other studies also reported that 71% of food handlers in Brazil (Ajala *et al.*, 2010) and 24% of restaurant workers in U.S. (Dupuis *et al.*, 2016) were unsure if offering water to dilute the allergen was the right thing to do. The only current approved treatment of food allergy is strict and careful allergen avoidance and emergency treatment with epinephrine for accidental ingestions (Parrish, Kim, & Bird, 2018). There are however studies on food immunotherapy being carried out to reduce sensitivity towards food allergen and to protect from accidental ingestion (Burks *et al.*, 2018; Freeland *et al.*, 2017). These include oral immunotherapy (i.e. daily ingestion of allergen powder) (Burks *et al.*, 2018), sublingual immunotherapy for peanut allergy (i.e. allergen extract is applied in the space under the tongue) (Burks *et al.*, 2015) and epicutaneous immunotherapy (i.e. where a small allergen patch is placed on the arm or back) for peanut (Jones *et al.*, 2017) and milk allergy (Dupont *et al.*, 2010).

Close to 79% (n=22) of the respondents were confused between lactose intolerance and milk allergy. Although there is limited survey among food services regarding the differences between milk allergy and lactose intolerance, there are evidence suggesting general confusion between cow's milk allergy and lactose intolerance (Heine *et al.*, 2017). There are some individuals with lactose intolerance who may be able to tolerate a small amount of milk products but those with cow's milk allergy may experience severe allergic reactions. Food handlers and milk-allergic customers should be aware of hidden dairy products in meals (e.g. yogurt in curries, milk powder in sausages, whey protein in fillings or sauces) (Anibarro, Seoane, & Mugica, 20017). There were also some misunderstanding and uncertainty among the respondents when it comes to cross contact of food allergens involving hands. This was inversely related to their attitudes when it comes to handwashing (Table 2). Handwashing is an essential training component for all food handlers and has always been associated with reducing

transmission of pathogens such as *Staphylococcus aureus* (Aycicek, Aydogan, Kucukkaraaslan, Baysallar, & Basustaoglu, 2004; Ebert, 2018) and *Escherichia coli* (Aycicek *et al.*, 2004) from hands to food or work surfaces. However, effective handwashing can reduce cross contact of allergens too (FARE, n.d.). For example, Perry, Conover-Walker, Pomes, Chapman and Wood (2004) reported that handwashing with common cleaning agents such as liquid or bar soap were able to remove peanut allergen.

This study reveals gaps in food allergy knowledge among takeaway staff and there remains misunderstanding and confusion among staff. All takeaway staff should receive training in food allergen management. This includes understanding the implications of food allergic reactions, risks of cross contamination, appropriate handling, storing and segregation of food allergens and symptoms associated with the allergic reaction and calling for medical help.

Attitudes towards food allergen management

Respondents scored highly in inspecting food labels of ingredients upon receipt (4.68±0.82) and generally have positive attitude towards food allergen management. There were strong disagreement among all respondents regarding the usage of the same dishcloth for all purposes (1.43±0.69). Respondents also disagreed that it is food services' responsibility to ask customers about their food allergies (2.79±1.17). However, when it comes to ordering food online or by telephone, the respondents somewhat agreed that they should ask customers if allergen information is required (4.07±0.98). The additional interface or absence of allergen notice may encourage staff to conduct a quick check with the customers. There were significant differences between staff that have worked in the food services for more than 5 years or less (Table 3). Those who have worked more than 5 years strongly agreed that separate oil should be used to prepare allergen and non-allergen containing meals ($t[26]=-2.41$, $p=0.025$). Staff with more than 5 years of working experience also implied that they were indifferent about marking food containers to identify non-allergenic dishes ($t[26]=2.24$, $=0.034$) and strongly felt that it is not the takeaways responsibility to ask about customers' food allergy needs ($t[26]=2.15$, $p=0.04$). Kitchen crew and managers' attitudes differed significantly when it comes to scheduling of meal preparation (i.e. if possible, non-allergenic meals should be prepared before meals containing allergens) ($t[26]=-2.13$, $p=0.04$). Manager and owners were more likely to schedule the meal preparation to avoid potential cross contamination of food allergens into other meals. Managerial level staff and owners usually have access to more food safety training compared to kitchen crew. There is also a high turnover rate for front desk employee and kitchen staff (Thaivalappil, Waddell, Greig, Meldrum, & Young, 2018) compared to managers and the owners and this may have contributed to the lack of awareness among the kitchen crew. Managers and owners also strongly agreed that they can handle a food allergy emergency in takeaways ($t[26]=-2.42$; $p=0.02$).

Both kitchen crew and managers strongly agreed that they checked the food labels for allergenic ingredients. This differs from Ajala *et al.* (2010) where the managers in their study did not have the habit of reading food labels compared to food handlers. Food labels of incoming materials need to be reviewed to ensure correct ingredients and raw materials were received and to identify food allergens that enter the takeaways (FSA, 2015). This is also part of the good receiving and storage practices (Adams, 2018). Using different dishcloths for different purposes i.e. to dry clean utensils that had been used for allergen and non-allergen meals is indeed good practice. Studies have shown that dishcloths, sponges and towels are vehicles of pathogenic cross contamination (Hilton & Austin, 2000; Tache & Carpentier, 2014). Although there are limited studies regarding the transfer of allergen protein via dishcloths, this is an area warrant of further investigation. The respondents unanimously agreed that it is the customers' responsibility to express their food allergies to the staff. This is consistent with Wen and Kwon (2017) where the staff perceived that customers are responsible for initiating communication with restaurant staff if they have food allergies. However, by proactively asking customers if they have any food allergies will initiate the customers to voluntarily disclose their allergy (Leithwich *et al.*, 2011). This can be helpful to engage with customers and prevent potential food allergic reactions. Signposting of allergen information particularly in ensuring customers know where to find the information or to ask a member of staff when purchasing the food at takeaways are important (FSA, 2015). Although the onus is on regulators and food providers to ensure correct food allergen information is provided, Begen *et al.* (2017) recommended that food allergic customers should pursue their legal right to make allergen enquiries when eating out. The findings from this study also clearly indicates that respondents understood that they should ask customers if allergen information is required before taking an order on the telephone. This differs from a face-to -face order as customers may not have direct access to visual allergen information. However, customer is to be signposted to where the information can be obtained (e.g. an online menu) or the staff is to provide the allergen information orally by telephone (FSA, 2015).

This study found that staff who have more than 5 years working experience did not place emphasis on marking or placing stickers on food containers to identify allergenic ingredients used prior to delivery. This is a cause for concern as lack of written information at the point of delivery may result in difficulty in differentiating meals particularly if the food ordered are similar (e.g. stir-fried noodles [with and without soy sauce]). Managers and owners agreed that if possible, non-allergenic meals should be prepared before allergenic meals. But, back-of-house staff understood that orders need to be fulfilled according to 'first come first serve' basis and the meals completed and delivered on time. This fulfils consumers' demands for convenience and prompt delivery (Celnik, Gillespie, & Lean, 2012). Owners and staff with supervisory or managerial roles often have access to more food safety training and this may have raised their awareness about the importance of reducing cross contamination via meal scheduling. All front service staff and kitchen crew should be given refresher training or online food allergen training (such as those offered by FSA) to prevent food allergy

incidences. Based on the number of increasing food allergic reactions in a food service setting (Eisenberg & Delaney, 2018), it is crucial that members of staff are trained to recognise and respond to adverse food allergic reactions. Prompt administration of epinephrine during an anaphylactic reaction is the preferred method to treat anaphylaxis (Kemp, Lockey, & Simons, 2008) and guide to using the self-injectable epinephrine should be included in food allergy training.

Insert Table 3 here

Food allergen management practices

When it comes to food allergen management practices, most respondents reported that they always ensure clear communication regarding allergenic ingredients in meals with their customers (4.93±0.26). Similarly, if customer has a food allergy, the respondents always ensured that the information is communicated clearly to the cook (4.92±0.26) or they will verify with the cook if customers request for specific allergen-free meals (4.93±0.26) (Table 4). Staff with more than 5 years' experience reported that they clean the kitchen surfaces frequently ($t[26]=-2.43$, $p=0.02$) and tend to review the menu for allergens more often ($t[26]=-2.17$, $p=0.04$). There were however no significant differences in allergen management practices between kitchen crew and managers or owners. Clear communication between customers and front service staff to clearly identify which food allergen(s) must be omitted and proper communication between the employee and kitchen crew and cook is crucial to prevent food allergy reactions. Based on previous research, there is lack of training in ensuring clear communication between front service staff and kitchen crew (Lee & Xu, 2014) and inadequate communication led to food allergy reactions (Kwon & Lee, 2012; Leftwich *et al.*, 2011).

Insert Table 4 here

Practical implications

Limitations

The low response rate, small sample size (n=28) and self-reported practices remain major limitations of this study. Edwards *et al.* (2002) suggested various measures to increase the response rate such as (i) using personalised cover letter (e.g. by including names of takeaways), (ii) keeping the number of items and length of questionnaire manageable; (iii) sending postal reminder; (iv) contacting potential takeaways before sending the questionnaires to them; (v) ensuring anonymity and confidentiality. Alternatively, face-to-face interviews could be carried out during non-peak hours to encourage completion of survey. Another limitation was that no association was determined between

the level of knowledge, attitude and practices towards food allergen management and the hygiene ratings of the takeaways as all completed questionnaires were anonymised. Future surveys should allow takeaway staff to indicate the hygiene rating of their shops. This study cannot be generalised to other takeaways or food service settings and observations of food allergen management practices in such outlets are strongly recommended.

Conclusion

Food allergen management in takeaways cannot be over-emphasised. This study represents the first reported survey of food allergy knowledge, attitude and practices of takeaways based in North West England. Takeaways face challenges in terms of limited kitchen space, shared cooking equipment, utensils and staff are required to complete (and deliver) an order in minutes. All these challenges represent a 'time bomb' as mistakes (e.g. cross contact or accidental addition of food allergens) can be life threatening and damaging to the takeaways. Clear communication between front service staff, customers and kitchen crew are important to ensure correct allergen-free meals are prepared and delivered. Although most takeaways' staff demonstrated good level of food allergy knowledge, there still exist some misunderstanding of food allergens. For example, staff were confused about lactose intolerance and milk allergy and would also offer water to customers suffering from food allergic reactions to stop the reaction. They did not realise that hands are potential vehicles of cross contamination for allergens. Misunderstandings may potentially place food allergic customers at risk due to cross contamination of meals with food allergens. Experienced staff and managers / owners also reported more positive attitude towards food allergen management practices compared to new staff and kitchen crew. In addition to food safety training, managers or owners should strongly encourage their staff to participate in food allergy online training. Food allergen management in takeaways and food services warrant further research, particularly in collaboration with local city councils as academia and Environmental Health Officers can share resources and time to conduct more mystery dining exercises as part of the food safety inspection programme. This will reflect actual practices of takeaways and provide further insights on how we could improve the food safety and good allergen management practices of takeaways and food services in general.

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