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Title:
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Date:
2022-01-01

Citation:
Zurzolo, G. A., Campbell, D. E., Said, M., Peters, R. L. & Dharmage, S. C. (2022). Anaphylaxis to foods purchased from food establishments in Australia. Journal of Paediatrics and Child Health, 58 (1), pp.77-82. https://doi.org/10.1111/jpc.15651.

Persistent Link:
https://hdl.handle.net/11343/298746

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Anaphylaxis to foods purchased from food establishments in Australia.

Original Article

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Giovanni Zurzolo is supported by a Postdoctoral Fellowship from the NHMRC-funded Centre for Food and Allergy Research (CFAR). RP is supported by an NHMRC fellowship.

What is already know?
Food allergy is prevalent in Australia.
There is currently no routinely available treatment for food allergy in Australia.
Food establishments are not required to have a food label directly on the food product.
What this paper adds
Anaphylaxis from food purchased at food establishments in not uncommon.
A high proportion of individuals are declaring their food allergy to staff.
Providing allergen information listed next to dishes on the menu ingredient lists may help reduce the risk for allergic reactions.

Keywords
Food allergy
Food labelling
Anaphylaxis

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Abstract

Introduction

Food establishments that sell non-packaged foods are not required to have a food label directly on the food product detailing the ingredients. This practice could increase the risk of anaphylaxis among individuals with food allergy.

Aim

To understand whether anaphylaxis occurs commonly in individuals with food allergy as a consequence of eating food products purchased from food establishments.

Materials and Methods

We undertook an anonymous on-line cross-sectional survey of food allergic individuals over a 9-month period. Anaphylaxis was defined as reported symptoms consistent with Australasian Society of Clinical Immunology and Allergy definition of anaphylaxis.

Results

268 responses were received over the study period and 264 consented and completed the questionnaire. **Amongst our survey participants the rate of anaphylaxis** to food purchased from establishments was 27% (n=67/246, 95% CI 21.8 – 33.3%). Of those who reported an anaphylaxis (n=67), 87% reported informing staff of their/their dependents food allergy/s. Most (81%) reported that they would like to see additional information, such as listing of allergen information next to dishes on the menu and 61% reported that staff pro-actively asking about food allergies would be beneficial.

Conclusion

Anaphylaxis from food purchased at food establishments **is** not uncommon despite a high proportion of individuals declaring their food allergy to staff. Consumers with food allergy would like to see allergen information listed on the menues and for staff to proactively enquire about food allergies. A food allergen matrix that is regularly checked/updated so staff

and consumers have easy access to information on menu items and common allergens is required.

Introduction

The prevalence of food allergy in Australia in infants has been reported to be as high as 10% [1]. There is currently no routinely available treatment for food allergy in Australia, and for most food allergens, strict avoidance remains standard practice (2). A basic essential for the consumer with food allergy is to be able to determine which foods are safe for them to consume in order to avoid allergic reactions, including potentially life-threatening anaphylaxis. It is reported that 17% of adverse food reactions in Australian adolescents with food allergy occurred in restaurants [2]. Moreover, of 22 food anaphylaxis deaths in Australia (1997-2013), 15 occurred while eating outside the home, and 2 deaths occurred at home following consumption of restaurant meals [3]. This issue is not limited to Australia, as in the UK and US, most cases of food induced anaphylaxis occur outside the home.[4, 5]. Consumers with food allergy require clear and accurate information when they disclose their food allergy. This enables them to make informed choices when purchasing food from food establishments to eat at home or outside the home. The Australia New Zealand Food Standards Code requires food sold without a label to have allergen information displayed in connection with the food or provided to the purchaser on request [6]. In addition, restaurants cafes, bakeries, delicatessens, takeaway and fast-food outlets, **wedding reception venues** and camps that sell non-packaged foods must provide accurate information about the allergen content of food including the risk of cross contamination when requested by the consumer. However, food establishments are not required to have a food label directly on the food product detailing the ingredients.

The aim of this study was to understand whether severe allergic reactions, such as anaphylaxis, occur commonly in individuals with food allergy as a consequence of eating food products purchased from restaurants cafes, bakeries, delicatessens, takeaway and fast-

food outlets, **wedding reception venues** and camps. Understanding this element of consumer safety and will aid in developing policy.

Materials and Methods

Study population and sample

We undertook a cross sectional study **by an on-line survey** which was distributed to potential participants via Allergy & Anaphylaxis Australia (A&AA) Facebook page which is available globally. A&AA is a national allergy and anaphylaxis patient and carer support organization. Individual followers of A&AA Facebook page are individuals seeking information and support from A&AA, and while they are predominantly individuals with food allergy/s or carers of individuals with food allergy/s, schools/childcare/food service staff/food manufacturers, health professionals and government also utilize the information and services. Currently A&AA has more than 50,000 followers. Information about the study was available to participants prior to the commencement of the study via A&AA Facebook page. Consent was required by participants in order to participate in the study after participant information was provided. Ethical approval was granted by The Royal Children's Hospital Melbourne, Australia (HREC: 38277).

Data collection

A questionnaire was available over a 9-month period (from March 2019 -June 2020) on the Allergy & Anaphylaxis Australia Facebook page. At intervals of three months (throughout the course of the nine-month study) A&AA shared a post on their Facebook page and information on their website reminding and inviting their member group to participate in the study by reporting any anaphylaxis only during the study period (within the 9-month study period).

Participants were asked to report whether or not they, or their dependents had experienced anaphylaxis following ingestion of an unlabeled food product from a food establishment regardless if they had a past history of food allergy or not. If they/their dependent had not experienced anaphylaxis to food purchased from a food establishment then no further

questions were asked. If they/their dependent had experienced anaphylaxis, participants were asked to answer further questions regarding the past allergic medical history, current allergic status and whether they disclosed their food allergy prior to ordering the food. In regards to the trigger food or allergen, the survey specified peanut, cashew and walnut as separate allergens with "other tree nuts" listed as a separate option. They were also asked to provide further details about the food that most likely triggered the reaction, symptoms and treatment of the reaction, type of food establishment and were asked what type of changes in terms of information to consumers they would like to see in such establishments.

Definitions

Anaphylaxis was defined as the Australasian Society of Clinical Immunology and Allergy (ASCIA) definition of anaphylaxis being one or more of the following symptoms: difficult/noisy breathing, swelling of tongue, swelling/tightness in throat, difficulty talking and/or hoarse voice, chest tightness and shortness of breath, wheeze or persistent cough, persistent dizziness and/or collapse, or pale and floppy as part of a generalized allergic reaction (in young children only).

Food Establishments were defined as restaurants cafes, bakeries, delicatessens, takeaway stores, fast-food stores, **wedding reception venues** and camps.

Statistical analysis

Questionnaire responses were analysed quantitatively and percentages and 95% confidence intervals were calculated in Stata (Stata Corp 2019. Stata Statistical Software Release 16 College Station TX: StataCorp).

Results

A total of 268 responses were received (267 from Australia 1 from New Zealand) over the study period and 264 consented to take part in the study (98% response rate). Of those who consented, 246 completed the questionnaire and 33% (n=82) reported that they had experienced anaphylaxis to food purchased at a food establishment over the 9-month study period. The remaining 66% (n=164) who reported that they had not experienced an anaphylactic reaction during the study period were not used to evaluate the outcome.

Of the 82 participants with self-reported anaphylaxis, 81% (n=67) were confirmed (by self-reported symptoms) to meet the ASCIA definition of anaphylaxis **. Therefore, amongst our survey participants the rate of anaphylaxis to food purchased** from food establishments was 27% (n=67/246, 95% CI 21.8 – 33.3%).

Among those individuals with symptoms consistent with anaphylaxis, the median age was 24.3 years (SD 15.2) and 74% (n=61) were female. 97% (n=65) reported that they had known IgE-mediated food allergy prior to the episode with high rates of concomitant allergic disease; eczema (39%, n=26), asthma/wheeze (42%, n=28), allergic rhinitis (54%, n=36) and insect allergy (15%, n=10). Participants reported history of prior allergic reactions (73%, n=47) as the most common source of their knowledge of their food allergies, which was followed by supportive investigations including skin prick test (SPT) (70%, n=47), positive blood test (36%, n=24) and oral food challenge (OFC), (16%, n=11).

Cashew and other tree nuts (49%, n=33, each) were the main allergens that participants reported they were allergic to, followed by peanut, (46%, n=31) walnut, (42%, n=28). Other food allergies reported by participants are presented in table 1.

Symptoms of the reported anaphylactic episodes are presented in Figure 1 and Table 1. Swelling/tightness in throat 70% (n = 47) was the most common symptoms reported. Other

reported cases had symptoms that were consistent with ASICA guideline of anaphylaxis in combination with hives or welts 58% (n=39) and abdominal pain/vomiting 53% (n=36) (Figure 1).

Table 1 describes the characteristics of all reported allergic reactions. Overall ,73% (n=49) reported reactions occurring within five minutes of ingesting the food. The most common allergen that was considered to trigger the reaction was cow's milk 19% (n=13) other tree nuts (not cashew and walnut) 18% (n=12) and cashew 16.4 (n=11). 55% (n=37) were treated with adrenaline (medically administered adrenaline 32.8% (n=22) or an Adrenaline Autoinjector (AAI) 2.3% (n=15). Approximately 1 in 6 participants were not carrying an AAI when the reaction occurred (n=11/58), however only 2/11 of these individuals had a prescribed AAI at the time of the episode (Table 1).

Most (87%, 59/67) participants reported informing staff of their/their dependents food allergy/s. The main wording participants reported using to inform staff was "I am severely allergic to xxx" 76% (n=51), (Table 2). Reactions most frequently occurred following consumption of foods purchase from restaurants 39% (n=26) and cafés 25% (n=17) (Table 2). The most common type of cuisine that was responsible for the reaction in this study was "Australian" (club, pubs and burger place), 52% (n=35) and Asian and Italian 12% each (n=8). More than half of participants (52%, n=35) reported to the establishment that they had experienced an allergic reaction to the food, while only 7% (n=5) reported the reaction to a government agency for investigation (Figure 2, Table 2).

Following the anaphylaxis event, approximately two thirds of participants (68%, n=46) reported that they were unlikely to eat out again. Most participants (80.6%, n=54) reported that they would like to see additional information, such as listing of allergen information next to dishes on the menu. Additionally, 61% reported that staff pro-actively asking about food allergies would be beneficial. (Figure 3).

Discussion

Our study demonstrates that individuals with food allergy are experiencing anaphylaxis when ordering food and eating outside the home, at establishments such as restaurants cafes, bakeries, delicatessens, takeaway and fast-food outlets, **wedding reception** venues and camps. Over the 9-month period, we received 67 reports of anaphylaxis to foods purchased in such settings. We found that substantial miscommunication, and lack of information or knowledge regarding allergen ingredients between consumers with food allergies and food establishments. Prior to participants ordering their food, 87% of consumers with food allergy informed staff at the food establishment of their allergies with direct statements such as "I am severely allergic to XXX".

Although the overall numbers of reported episodes are too small to make conclusive subgroup analysis, we did observe a higher rate of anaphylactic reactions within restaurants and cafés, compared with fast food settings. A possible explanation of this is that some larger fast-food outlets have a very detailed menu list available to consumers on-site or their website outlining each specific ingredient added to the meal. In addition fast food venues are also more likely to have strict supply chain and standardized recipes. It is possible however that this may have been the result of skewed reporting and an overall small study sample size as out of the potential pool of 50,000 individuals in the AAA Facebook Group, only 267 responded. Somewhat concerningly, very few respondents reported the reaction to an enforcement agency. Although we did not specifically capture the reasons for this, future studies could examine this issue. . However, consumers with food allergy were almost unanimous in their belief that allergen information should be listed next to dishes on the menu rather than this information only being provided to consumers when asked, as is the current legislation [7].

Young adults most frequently reported anaphylaxis and the most common trigger allergen for this cohort was cow's milk. This fact is of particular interest as cow's milk allergy is more frequently seen in infants [8]. Also, this study demonstrates that young adults are at risk of anaphylaxis when eating out and are less likely to carry their AAI on their person. However, this higher risk may be due to the increased likelihood that this age group will engage in risk taking behavior, as seen in other studies [9].

A strength of the study is that the focus was on anaphylaxis rather than other milder allergic reactions, as we considered that potentially life-threatening events were more likely to be recalled accurately and reported. We used the ASCIA definition of anaphylaxis, which is well accepted in Australia, but is stricter than some other internationally recognized definitions, such as those of the NIAID or WAO, in which systemic symptoms in any two systems may be considered anaphylaxis, without any requirement for at least one symptom affecting the lower respiratory tract/larynx or cardiovascular system. One limitation of our study is that we were unable to substantiate the reports. Furthermore, our rates of reactions cannot be generalized to the whole food allergic community, as participation was only sourced from members of one advocate group. In addition because of the nature of the survey there will be inherent selection bias in the results. Therefore, we are unable to make a population-based prevalence estimate based upon this cohort, which would require a large prospective population-based cohort.

Our results are consistent with the findings of the others from other countries regarding food establishments and issues with miscommunication, lack of information and lack of education regarding allergen ingredients. In Europe, 295 restaurant staff were asked to name three common food allergens, with only 30% able to correctly perform this task. In addition, the attitudes of staff towards serving customers with food allergies was disappointing as staff

preferred not to serve customers with food allergies; believing that some allergies indicated by customers are not true [10]. In comparison, a US study of food allergy knowledge and attitudes [11] reported that managers, food workers, and servers were generally knowledgeable and had positive attitudes about serving customers with food allergies. However, more than 10% of managers and staff believed that a person with a food allergy could safely consume a small amount of the relevant allergen. Managers and staff also had lower confidence in their restaurant's ability to properly respond to a food allergy emergency [11].

Our study did not investigate current knowledge and attitudes among staff in food establishment, however some reports of anaphylaxis within this study may be due to miscommunication between consumers with food allergy and staff in food establishments in regard to allergen ingredients. Further studies are required to investigate this. Training for personnel, ingredient lists for all menu items, dedicating equipment and areas specifically for preparing allergen-free food may help to reduce the risk for allergic reactions among consumers within food establishments.

Conclusion

This survey demonstrates that the majority of participants who reported anaphylaxis in this study had declared their allergy to the food outlet. ,. Such outlets may be able to reduce the risk for allergic reactions among consumers by providing allergen information listed next to dishes on the menu ingredient lists, ensuring all staff are adequately trained in the management of food allergies and encouraging staff to proactively ask consumers about allergies. Consumers with food allergy are also encouraged to declare food allergies at point of purchase and when ordering food and report any allergic reactions to the appropriate authorities so that the suitable action can be taken. A large prospective population-based study would further assist in defining the prevalence of severe allergic reactions in such settings as would a national anaphylaxis register.

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Table 1 *Details about the reaction among participants that reported anaphylaxis N=67*

Table 2 Details about participants actions both prior to and following their reaction N=67

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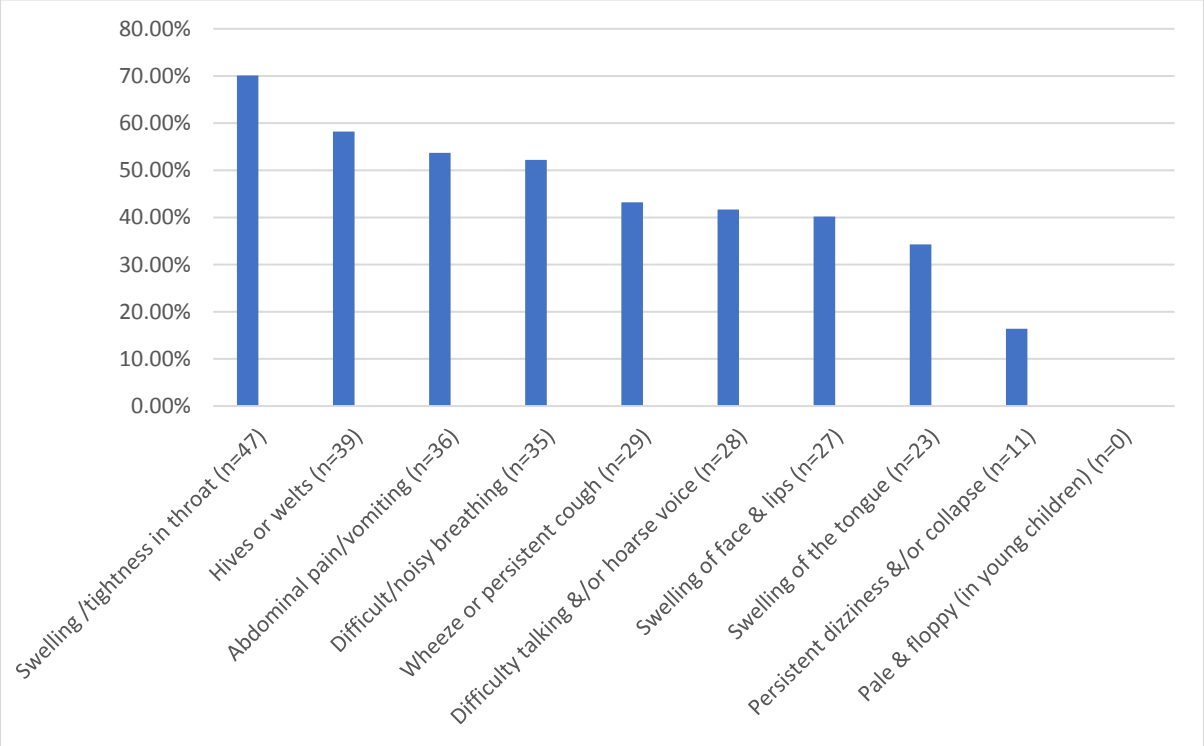
Figure 1 : Symptoms that were consistent with anaphylaxis reported after eating at open food establishments. *N=67

Figure 2 : To whom the reaction was reported to in episodes consistent with anaphylaxis reported after eating at open food establishments. N=67*

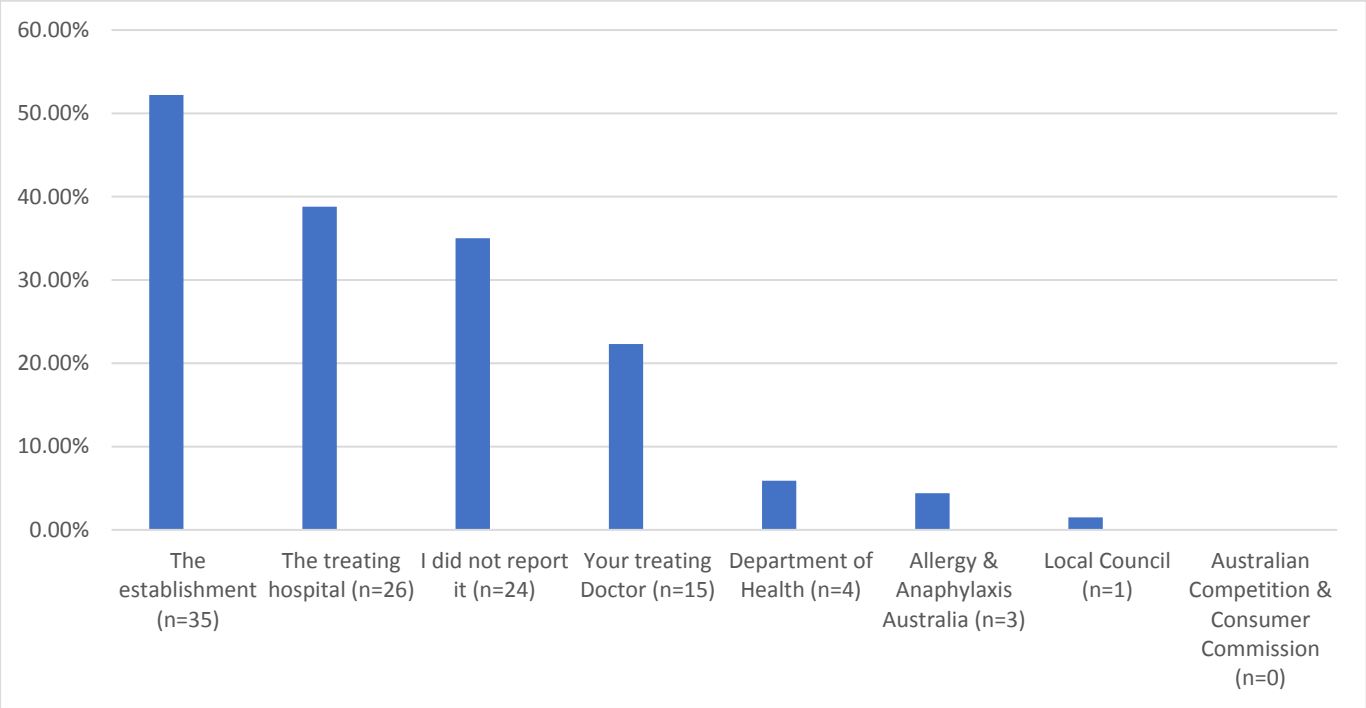
Figure :3 The type of information that participants reported would help them when eating out at Open Food Establishment, reported after an anaphylaxis reaction. N=67*

Figure 1: Reported symptoms that were consistent with anaphylaxis after eating at open food establishments. *N=67



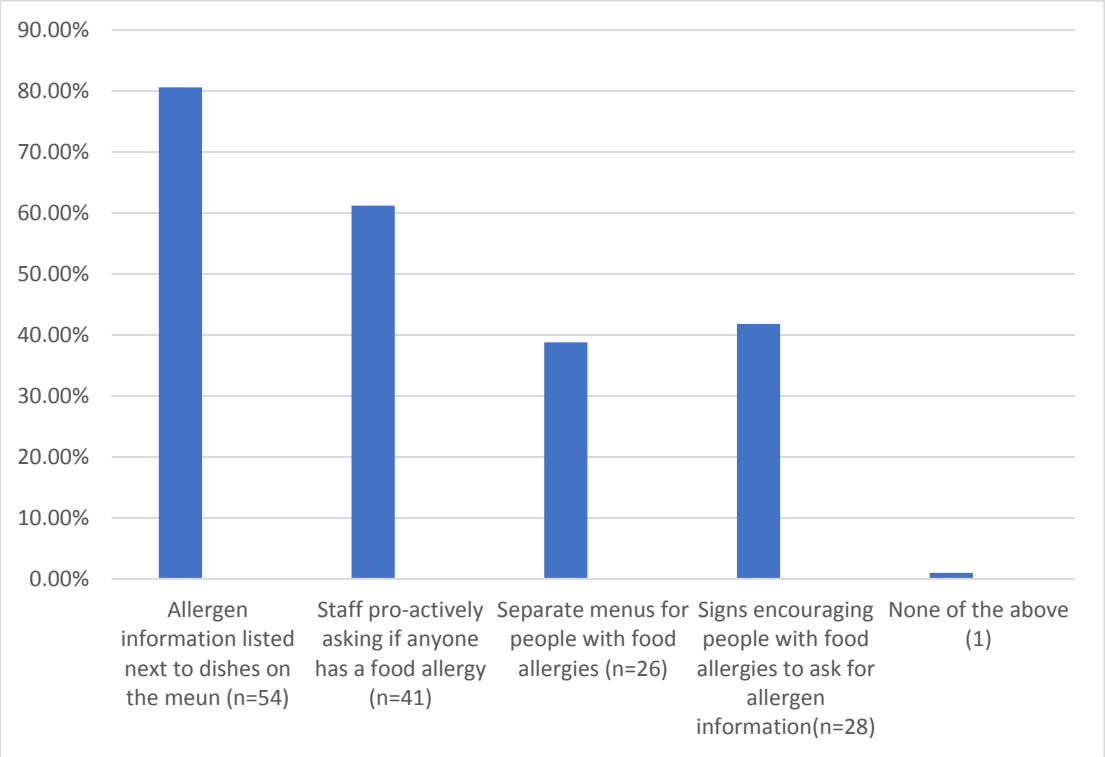
*Symptoms were compared against the Australasian Society of Clinical Immunology and Allergy (ASCIA) definition of symptoms for a confirmation of anaphylaxis. *The groups are not mutually elusive.*

Figure 2: To whom the reaction was reported to from participants that had symptoms consistent with anaphylaxis at open food establishments. N=67*



** The groups are not mutually exclusive.*

Figure :3 The type of information that participants reported would help them when eating out at Open Food Establishment, reported after an anaphylaxis reaction. N=67*



*The groups are not mutually exclusive.