Food allergy knowledge, attitudes, practices, and training of foodservice workers at a university foodservice operation in the Midwestern United States

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Abstract

The increasing incidence of food allergies is a major concern for all foodservice operators. The purpose of this study was to examine food allergy knowledge, attitudes, practices, and training among employees working in a university foodservice operation. Results from a paper-based questionnaire showed statistically significant differences in employee knowledge, attitudes, practices, training received, and perceived training needs between student and non-student employees. While training specific to food allergies was not provided, employees considered food allergy training to be important for handling food safely in their workplace. Attitudes toward food allergies had a significant influence on food allergy practices. Results from this study can be used by university foodservice operations to develop food allergy policies and procedures by taking into account the needs of their employees to protect food allergy sufferers in university foodservice operations and promote well-being.

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1. Introduction

1.1. Foodservice industry in the United States

The foodservice industry is a major contributor to the economy in the United States (U.S.). In 2010, American consumers spent nearly $580 million on purchasing food away from home (NRA, 2010). Food was purchased from commercial (restaurants, caterers, cafeterias) and non-commercial foodservice operations (college, universities, nursing homes). As individuals continue to become busier, it is expected that number of individuals who eat away from home will continue to increase. Every year, an estimated 9.4 million illnesses, 55,961 hospitalizations and 1351 deaths in the U.S. result from consumption of foods contaminated with known disease agents (Scallan, Griffin, Angulo, Tauxe, & Hoekstra, 2011b). An additional 38.4 million illnesses, 71,878 hospitalizations and 1686 deaths are estimated to result from consumption of foods contaminated with unspecified agents (Scallan, Griffin, Angulo, Tauxe, & Hoekstra, 2011a). It is estimated that annually foodborne illnesses in retail foodservice operations costs consumers $6 billion in healthcare costs and loss of productivity. Food consumed at retail foodservice establishments, commercial and non-commercial sectors remain an important source for outbreaks of foodborne disease. With the increasing numbers of customers that are dining out, protecting food from all types of contamination (intentional and unintentional) is critical to the success and survival in the foodservice industry. The changing demographics of the U.S. foodservice industry is one of the major challenges that is impacting food safety (Sneed & Strohbehn, 2008). The U.S. foodservice industry is constantly changing and foodservice establishments need to be prepared for these changes.

1.2. Food allergies

Food allergies affect approximately 15 million Americans and are a growing public health concern in the U.S. (FAAN, 2010). A food allergy is an abnormal response of the immune system to proteins in certain food items (Burks, Helm, Stanley, & Bannon, 2001). Although food allergy symptoms are mostly minor, such as rashes, itching, and swelling; some allergic reactions are much more severe and can cause anaphylactic shock and possibly death (Sampson, 2004). Eight foods cause approximately 90% of reported reactions: milk, eggs, fish, shellfish, wheat, tree nuts, peanuts, and soybeans (FAAN, 2010). It is estimated that every year, food allergies are responsible for roughly 30,000 medical emergencies and 150–200 deaths in the U.S. (Sampson, 2004). Reports of fatal reactions from food allergies indicated a high proportion of the affected group were teenagers and young adults (Bock, Munoz-Furlong, & Sampson, 2001) perhaps because adolescents and young adults are
more inclined to engage in risk-taking behaviors related to food allergies (Bock et al., 2001) and 2.3% of teenagers in the U.S. have a food allergy (Pereira et al., 2005).

A study conducted from 1994 to 2004 by Bock, Munoz-Furlong, and Sampson (2007) showed that 16 food allergy-related fatalities out of 63 involved college-age students and 50% of those incidents took place on college campuses. College students with food allergies faced risks when eating at college and university dining establishments because colleges and universities were often not well equipped to meet the needs of students with food allergies (Greenhawt, Singer, & Baptist, 2009) and had none or unclear policies and procedures for allergen handling (Rajagopal & Strohbehn, 2011). In a survey of college students, Monaco, Rajagopal, and Bernstein (2012) found that students would like to see more allergen-free meal options, easy to view/read food allergy labels, and receive information about food allergy accommodations during campus orientations. Food allergies are considered a disability under U.S. federal laws such as Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992 (U.S. Department of Education, 2009), hence foodservice operations are required to provide accommodations for their food allergic customers.

All foodservice employees bear the responsibility of ensuring that the food served to their customers is safe, particularly, foods prepared and served to patrons with food allergies. However, there are few studies related to the food allergy knowledge, attitudes, practices, and training of foodservice workers in college and university dining settings. The purpose of this study was to examine food allergy knowledge, attitudes, practices, and training among college and university dining employees. Findings will be helpful in developing food allergy training specific to college and university dining settings and development of policies and procedures to protect patrons with food allergies.

2. Material and methods

2.1. Research design

A paper-based questionnaire based on guidelines by Dillman, Smyth, and Christian (2007) was developed after an extensive review of literature related to food allergies. This study was carried out at a large-sized university (enrollment of 32,0000 students) in a suburban setting in the Midwestern U.S. The questionnaire was reviewed by three individuals with expertise in food safety and foodservice operations to establish content and construct validity. The questionnaire was then administered to students (n = 42) in an undergraduate food safety class to determine face validity. The questionnaire was modified and distributed to a convenience sample of foodservice employees working in university dining. Data was collected by visiting various foodservice establishments during different shifts to avoid sampling bias. Managers provided consent to access the establishments and distribute the questionnaires. After obtaining permission, questionnaires were given to the managers for distribution at the beginning of the work day and picked up at the end of the same day or returned by campus mail. As a token of appreciation, respondents were included in a drawing to receive $5 gift cards as an incentive. The questionnaire and research protocol was approved by the University Human Subjects Institutional Review Board (IRB) prior to data collection.

2.2. Questionnaire design

The questionnaire consisted of five sections. The first section contained 11 multiple-choice questions that measured employees’ food allergy knowledge. Correct responses were coded as 1 and incorrect responses as 0. The second section contained 14 items that assessed employee attitudes toward food allergies and handling customers with food allergies using a 5-point Likert scale, ranging from one (1) “Strongly disagree” to five (5) “Strongly agree”. The third section contained 11 items that assessed the frequency of specific food allergy practices in their workplace using a 3-point Likert scale (“1 = Never”, “2 = Sometimes”, “3 = Always”).

The fourth section consisted of a screening question to identify those employees who had received training specific to food allergies and allergen handling, either during employee orientation or on-the-job. A response for training received was coded as 1, while no training received was coded as 0. Respondents who had never received food allergy training were asked to skip section four and only respond to the fifth section. In the fifth section, respondents rated their perceived food allergy training needs using a 5-point Likert scale ranging from one (1) “Very unnecessary” to five (5) “Very necessary”. The five items related to training were developed based on the Food Code (FDA, 2009). The final section consisted of demographic questions.

2.3. Statistical analysis

Questionnaires were hand coded and data was analyzed using Statistical Package for Social Sciences (SPSS) version 19.0. Descriptive statistics and Cronbach’s coefficient of reliability were calculated. One-way analysis of variance (ANOVA) and independent t-test were used to examine significant differences in food allergy knowledge, attitudes, practices, and perceived training needs based on respondents’ characteristics and work status (student/non-student employees). For unequal variances between groups, Welch test was conducted and F-test was conducted when there were equal variances between groups. Games-Howell or Bonferroni post-hoc tests were conducted to determine within group differences. Pearson correlation coefficients were calculated to examine relationships among subjects’ knowledge, attitudes, practices, training, and perceived training needs. Multiple linear regression analysis was used to test which variable among knowledge, attitudes, and training had the greatest effect on practice.

3. Results

3.1. Demographic characteristics

Two hundred and sixteen respondents returned the questionnaire, of which 23 questionnaires that were incomplete or improperly filled were excluded, resulting in 193 useable questionnaires. Table 1 shows the demographic characteristics of respondents.

3.2. Food allergy knowledge, attitudes, practices, and training of employees

Respondent responses to food allergy knowledge items are shown in Table 2. The mean knowledge score was 8.62 ± 1.95 (out of 11 possible points). The Cronbach’s coefficient of reliability was 0.64. Respondents were knowledgeable when asked about the definition of food allergy (96.4%) and what service staff should do to prevent an allergic reaction (91.7%). On the other hand, respondents were less knowledgeable when asked to identify common food allergens (46.4%) from a given list and the best treatment for controlling a severe food allergy reaction (58.0%).

Attitudes of respondents toward food allergies and customers with food allergies are shown in Table 3. The mean score for...
Attitudes toward food allergies were 4.11 ± 0.47 on a 5-point Likert scale. The Cronbach’s coefficient of reliability was 0.81. Attitudes toward provision of accurate information about food ingredients to customers with food allergies had the highest mean rating of 4.51 ± 0.62, while attitudes toward handling food allergy practices had the lowest mean of 3.44 ± 1.12.

Table 4 shows the mean ratings of food allergy practices in the workplace. Overall mean rating for food allergy practices was 2.78 ± 0.25 on a 3-point Likert scale. The Cronbach’s coefficient of reliability was 0.73. The statement, “If a mistake is made when preparing a meal for a food allergic customer, I remade the food” had a mean rating of 2.94 ± 0.29, while the statement “When preparing fried food for patrons with a food allergy, I make sure that I change the oil in the deep fryer to prevent cross-contact” had a mean rating of 2.40 ± 0.78.

Table 5a shows the types of food safety training and frequency of food allergy training the employees received. The Cronbach’s coefficient of reliability was 0.96. Majority of employees reported that they had not received any training specific to food allergies (69.4–78.8%). Of the respondents who had received food allergy training, 30.6% reported that they had received training on how to avoid cross-contact between foods during food preparation and/or service.

Table 5b shows the perceived food allergy training needs of respondents ranging from 1 (Very unnecessary) to 5 (Very necessary). The Cronbach’s coefficient of reliability was 0.97. Majority of employees stated that they had not received any training specific to food allergies (88.8%).

Table 6 shows the knowledge items' coefficients of reliability. The statement, “I change the oil in the deep fryer to prevent cross-contact” had a mean rating of 2.94, while the statement “If a mistake is made when preparing a meal for a food allergic customer, I remake the food” had a mean rating of 2.40. Overall mean rating for food allergy practices was 3.44 ± 1.12.

Table 7 shows the knowledge ratings of food allergy practices in the workplace. The statement, “If a mistake is made when preparing a meal for a food allergic customer, I remade the food” had a mean rating of 2.94 ± 0.29, while the statement “When preparing fried food for patrons with a food allergy, I make sure that I change the oil in the deep fryer to prevent cross-contact” had a mean rating of 2.40 ± 0.78.

Table 8 shows the knowledge ratings of food allergy training needs of respondents ranging from 1 (Very unnecessary) to 5 (Very necessary). The statement, “I change the oil in the deep fryer to prevent cross-contact” had a mean rating of 2.94, while the statement “If a mistake is made when preparing a meal for a food allergic customer, I remade the food” had a mean rating of 2.40. Overall mean rating for food allergy practices was 3.44 ± 1.12.

Table 9 shows the knowledge ratings of food allergy training needs of respondents ranging from 1 (Very unnecessary) to 5 (Very necessary). The statement, “I change the oil in the deep fryer to prevent cross-contact” had a mean rating of 2.94, while the statement “If a mistake is made when preparing a meal for a food allergic customer, I remade the food” had a mean rating of 2.40. Overall mean rating for food allergy practices was 3.44 ± 1.12.

Table 10 shows the knowledge ratings of food allergy training needs of respondents ranging from 1 (Very unnecessary) to 5 (Very necessary). The statement, “I change the oil in the deep fryer to prevent cross-contact” had a mean rating of 2.94, while the statement “If a mistake is made when preparing a meal for a food allergic customer, I remade the food” had a mean rating of 2.40. Overall mean rating for food allergy practices was 3.44 ± 1.12.
Food allergy practices of employees (necessary). The average mean rating for perceived training needs during food preparation and service as being very necessary (M = 4.47, SD = 0.86). Respondents perceived training on how to identify the main food allergens as least necessary (M = 4.26, SD = 0.93).

### Table 3
Attitudes of employees toward food allergies (n = 193).

<table>
<thead>
<tr>
<th>Attitude items (α = 0.81)</th>
<th>Mean²</th>
<th>SD³</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is important to me that accurate information about food ingredients is provided to customers with a food allergy.</td>
<td>4.51</td>
<td>0.62</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>I think preventing incidences of food allergies is an important part of my job responsibilities at my workplace.</td>
<td>4.48</td>
<td>0.71</td>
<td>2 (1.0) 6 (3.1) 75 (38.9) 108 (56.0)</td>
</tr>
<tr>
<td>I believe appropriate precautions can be taken to avoid cross-contact between foods at my workplace.</td>
<td>4.47</td>
<td>0.65</td>
<td>2 (1.0) 11 (5.7) 75 (38.9) 105 (54.4)</td>
</tr>
<tr>
<td>I believe that the disclosure of accurate allergen information to customers with a food allergy will decrease the likelihood of a food allergic reaction.</td>
<td>4.41</td>
<td>0.75</td>
<td>1 (0.1) 12 (6.2) 73 (37.8) 103 (53.4)</td>
</tr>
<tr>
<td>I think all foodservice employees should be knowledgeable about food allergies.</td>
<td>4.33</td>
<td>0.76</td>
<td>1 (0.1) 5 (2.6) 13 (6.7) 84 (43.5) 90 (46.6)</td>
</tr>
<tr>
<td>I am willing to change my food handling behaviors related to handling food allergens.</td>
<td>4.31</td>
<td>0.66</td>
<td>0 (0.0) 2 (1.0) 15 (7.8) 98 (50.8) 78 (40.4)</td>
</tr>
<tr>
<td>I believe that knowledge about food allergies would make me more confident about handling food at my workplace.</td>
<td>4.30</td>
<td>0.69</td>
<td>0 (0.0) 2 (1.0) 20 (10.4) 89 (46.1) 82 (42.5)</td>
</tr>
<tr>
<td>I think understanding the basics of food allergies will be useful to me in my workplace.</td>
<td>4.24</td>
<td>0.70</td>
<td>1 (0.5) 3 (1.6) 14 (7.30) 106 (54.9) 69 (35.8)</td>
</tr>
<tr>
<td>I believe small amounts of a food allergen cannot cause a food allergy.</td>
<td>4.12</td>
<td>1.24</td>
<td>103 (53.4) 54 (28.1) 8 (4.10) 13 (6.7) 15 (7.8)</td>
</tr>
<tr>
<td>I think the manager in my workplace should educate me about food allergies and allergen handling.</td>
<td>3.93</td>
<td>0.85</td>
<td>1 (0.5) 9 (4.7) 43 (22.3) 89 (46.1) 51 (26.4)</td>
</tr>
<tr>
<td>Learning more about food allergies is important to me, personally.</td>
<td>3.74</td>
<td>0.94</td>
<td>4 (2.1) 11 (5.7) 60 (31.1) 74 (38.3) 44 (22.8)</td>
</tr>
<tr>
<td>I think individuals involved in food preparation should be more knowledgeable about food allergies than servers or cashiers.</td>
<td>3.64</td>
<td>1.10</td>
<td>7 (3.6) 28 (14.5) 36 (18.7) 78 (40.4) 44 (22.8)</td>
</tr>
<tr>
<td>I am willing to attend food allergy training courses/workshops to learn more about food allergies.</td>
<td>3.63</td>
<td>1.04</td>
<td>7 (3.6) 18 (9.3) 57 (29.5) 69 (35.8) 42 (21.8)</td>
</tr>
<tr>
<td>I believe I can effectively handle a food allergy emergency situation at my workplace.</td>
<td>3.44</td>
<td>1.12</td>
<td>9 (4.7) 36 (18.7) 43 (22.3) 71 (36.8) 34 (17.6)</td>
</tr>
</tbody>
</table>

*Scale for statements: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree.

### Table 4
Food allergy practices of employees (n = 193).

<table>
<thead>
<tr>
<th>Practice items (α = 0.73)</th>
<th>Mean³</th>
<th>SD⁴</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>If a mistake is made when preparing a meal for a food allergic customer, I remake the food.</td>
<td>2.94</td>
<td>0.29</td>
<td>SD D N A SA</td>
</tr>
<tr>
<td>I wash my hands thoroughly with soap and water and wear a fresh pair of gloves before preparing an allergen-free meal.</td>
<td>2.89</td>
<td>0.33</td>
<td>2 (1.3) 5 (3.3) 143 (95.3)</td>
</tr>
<tr>
<td>I try to listen carefully, understand, and then answer customers' questions about food allergies or allergens in the food.</td>
<td>2.86</td>
<td>0.36</td>
<td>1 (0.6) 17 (9.9) 154 (89.5)</td>
</tr>
<tr>
<td>I use separate equipment (tongs, ladles) for handling allergen-containing foods.</td>
<td>2.86</td>
<td>0.37</td>
<td>1 (0.7) 19 (13.0) 126 (86.3)</td>
</tr>
<tr>
<td>I use clean and sanitized equipment and utensils at my workplace to prevent cross-contact between allergens.</td>
<td>2.83</td>
<td>0.39</td>
<td>1 (0.5) 29 (15.7) 155 (83.8)</td>
</tr>
<tr>
<td>If I am unsure about the ingredients in a menu item, I still assure the customer that the food does not contain any allergens.</td>
<td>2.71</td>
<td>0.63</td>
<td>143 (80.3) 18 (10.1) 17 (9.6)</td>
</tr>
<tr>
<td>When preparing food for a customer with food allergies, I pay more attention to safe food handling practices than when preparing food for a customer without food allergies.</td>
<td>2.56</td>
<td>0.70</td>
<td>16 (10.2) 40 (25.5) 101 (64.3)</td>
</tr>
</tbody>
</table>

*Scale for statements: 1 = Never, 2 = Sometimes, 3 = Always.

3.3. Differences in knowledge, attitudes, practices, training received, and perceived training needs based on employee demographic characteristics

Independent t-test was used to assess differences in knowledge, attitudes, practices, training received, and perceived training needs between student and non-student employees. Performance on the knowledge test varied significantly based on working status (student versus non-student) \((t = -3.82, p < 0.05)\). Non-student employees \((M = 9.42, SD = 1.20)\) had higher knowledge test scores than student employees \((M = 8.42, SD = 2.05)\). The means of attitudes toward handling customers with food allergies were significantly different \((t = -4.10, p < 0.05)\). Non-student employees \((M = 4.38, SD = 0.39)\) had more favorable attitudes toward food allergies and food-allergic patrons than student employees \((M = 4.04, SD = 0.46)\). The means for food allergy practices were significantly different \((t = -3.25, p < 0.05)\). Non-student employees \((M = 2.87, SD = 0.17)\) had higher practice scores than student employees \((M = 2.75, SD = 0.26)\). The means for food allergy training received were significantly different between student and non-student employees \((t = -5.00, p < 0.05)\). The results showed that non-student employees \((M = 2.84, SD = 2.30)\) had received more food allergy training than student employees \((M = 0.86, SD = 1.70)\). Both student and non-student employees had high means for perceived food allergy training needs. The means for perceived training needs were significantly different \((t = -2.79, p < 0.05)\). Non-student employees \((M = 4.68, SD = 0.50)\) perceived food allergy training to be more necessary than student employees \((M = 4.30, SD = 0.80)\).

Independent t-test and Analysis of Variance (ANOVA) were performed to compare differences in the total means for food allergy knowledge, attitudes, practices, training received, and perceived training needs based on respondents’ demographic characteristics. Statistically significant differences in food allergy training received were found between males and females \((t = 1.99, p < 0.05)\). Males \((M = 1.63, SD = 2.22)\) reported they had received more training than females \((M = 1.02, SD = 1.81)\). Statistically significant differences were observed in food allergy training received and attitudes toward food allergies between those who had completed food safety certification and those who did not complete certification. Employees with food safety certification scored higher on the attitudes scale and had received more training than employees without food safety certification \((t = 2.73, 4.63\) respectively, \(p < 0.05)\). Non-student employees had higher knowledge scores than sophomores \((Welch = 4.07, p < 0.05)\). Statistically significant differences in attitudes were observed between non-students than sophomores and juniors \((F = 5.15, p < 0.05)\). Non-students had received more food allergy training than freshman, sophomore, junior, and senior students \((Welch = 6.85, p < 0.05)\).

Significant differences by age group were found for the three variables: attitudes, food allergy training received, and perceived training needs. Employees over the age of 50 had more positive attitudes toward food allergic customers than employees aged 18–25 \((Welch = 5.36, p < 0.05)\). Employees between the ages of 34–41 and 42–49 years perceived food allergy training to be more necessary than those 18–25 years old. Employees over the age of 50 rated food allergy training to be more necessary than those 18–25 years old \((F = 3.09, p < 0.05)\).

Multiple linear regression analysis was employed to identify which variable(s) among knowledge, attitudes, and training received affected food allergy practices. The assumptions necessary for multiple linear regression analysis were assessed as follows. Normality, constant variance, linearity, and outliers were examined for verifying assumption \((Norusis, 2008)\). Normality was examined by reviewing the histogram and Q–Q plot of the studentized residuals. The constant variance was verified by examining plots with standardized residuals as the Y variable and standardized predictions as the X variable. Linearity was evaluated by examining the scatter plot of dependent and independent variables. The results met the requirement and no assumptions were violated. The absolute value of the correlation coefficient \((R)\) between knowledge, attitudes, and training received and practice is 0.42. R-squared, the proportion of explained variability is 18% of practice and is explained by knowledge, attitude, and amount of training that employees have received. The results showed that the model was significant \((F = 13.11, p < 0.05)\). Attitudes related to food allergy were positively related to employees food allergy practices \((B = 0.40, p < 0.05)\).
4. Discussion

Results from this study provided insight into the food allergy knowledge, attitudes, practices, training received, and perceived training needs of foodservice employees working in a university foodservice operation in the Midwestern U.S.

Respondents in this study were knowledgeable about what a food allergy is and how to handle customers with food allergies; however, most respondents were not knowledgeable about the top eight food allergens from a given list of allergens and the use of injectable epinephrine in case of a severe food allergy reaction. Previous research has shown that food handlers lacking in knowledge about food allergies were more likely to handle food allergy emergencies or address the needs of allergic customers inappropriately (Madsen et al., 2010). This result is of great concern because by not knowing the top eight food allergens, foodservice employees might cause cross-contact without realizing that the ingredient is an allergen, which could cause serious harm to food allergy sufferers (Mandabach, Ellsworth, Vanleeuwen, & Waters, 2005). Thus, foodservice operations should educate employees about the eight allergens that (peanuts, tree nuts, milk, eggs, fish, shellfish, soy, and wheat) account for 90% of all food-based allergic reactions (FAAN, 2012). Therefore, university dining foodservice operators should foster an environment (gloves, handwashing sinks, tongs, standard operating procedures, active managerial control) that encourages employees to follow food safety practices.

In terms of training, respondents reported receiving little training specific to food allergies and handling customers with food allergies. The U.S. Food Code (2009) specifically emphasizes the importance of increasing foodservice employees’ food allergy knowledge through training, the lack of training specific to food allergies might be explained by this fact that the requirement of training specific food allergies is not yet mandatory. In the state where this research was conducted, foodservice operations were required to follow the 2005 Food Code at the time of this study, which only mentions food allergies but does not require that food allergy training be performed. There are also a number of barriers to implementing food allergy training such as cost of training employees, high turnover, time restrictions, language problems, and employees’ apathy toward food allergies (Abbot, Byrd-Bredbenner, & Grasso, 2007).

In this study, non-student employees had higher scores for knowledge, attitudes, training, and perceived training needs than student employees. This study supported previous research which revealed that full-time employees were more concerned than student employees about providing safe food to customers (Filhrt, 2001; Lin & Sneed, 2005). Higher number of non-student employees had food safety certification and food allergy training than student employees. However, it should be noted that the institution chosen for this study required mandatory food safety training and certification for its non-student employees, while student employees only received basic food safety training and certification that was optional, which could also explain the differences in training observed in this study.

Employees with food safety certification had more positive attitudes toward food allergies and food-allergic patrons and had received more training than employees without food safety certification. In other words, employees’ positive attitudes toward food allergies and handling patrons with food allergies might be explained by the possession of food safety certification, which could also be a proxy for training received. This result is consistent with previous research (Youn & Sneed, 2003), who found that employees with food safety certification had more confidence in implementing food safety programs in their workplace than those employees that did not have certification. Therefore, it would be beneficial to require student employees to obtain food safety certification or provide in-house certification during employee orientation to improve attitudes toward food allergies and handling patrons with food allergies.

However, no significant differences in knowledge scores were observed between employees who had received food safety certification and those who were not certified; a finding similar to that observed by Henroid and Sneed (2004). This indicates that while certification and training maybe crucial for improving knowledge (Lee, 2012), it might not always be the case, as employees might not retain the knowledge or the training may not have contained updated information about food allergies. This highlights the need for providing training at regular intervals to reinforce food safety concepts and provide updated information. Training may be provided either formally (classroom) and informally (info sheets, flyers posted in preparation and service areas) that reinforces training concepts. Chapman, Eversley, Fillion, MacLaurin, and Powell (2010) found that posting of food safety info sheets in prominent locations within a foodservice establishment positively influenced food safety behaviors.
Among the three variables, knowledge, attitudes, and training received; food allergy attitudes positively correlated with food allergy practices. However, knowledge and training received did not significantly correlate with practice. These results are supported by previous studies which found that improved knowledge does not necessarily translate into improved food handling behavior (Henroid & Sneed, 2004; Roberts et al., 2008; Speer & Kane, 1990). Griffith et al. (2010) and Yiannas (2009) suggested developing a food safety culture in foodservice establishments to improve safe food handling practices by incorporating food safety management programs that take workforce value, beliefs and behaviors into consideration.

5. Conclusions

This study provided information about food allergy knowledge, attitudes, practices, training received, and perceived training needs of foodservice workers employed in university dining. It was found that majority of employees did not receive training specific to food allergies. This is concerning because of the risk-taking nature of students and the serious consequences of food allergy reactions. University dining staff should work toward providing not only food safety training as it relates to preventing microbial contamination but also provide training specific to food allergies. As new students continue to enter higher education settings, they will rely on university dining staff to provide them with safe food and also administer aid in the event of an allergic reaction. The results of this study provides decision makers in college and university dining with insight into the knowledge, attitudes, practices, training received, and training needs of university foodservice workers that can be used to develop prevention policies and specific content in training for prevention of food allergy incidents.

5.1. Limitations

The present study has some limitations that must be acknowledged. This study used a convenience sample from foodservice operations in one university; therefore, the results cannot be generalized to foodservice operations in other universities. The sample size is smaller which also impacts the generalizability of these results. Food allergy practices in this study were self-reported which can lend itself to respondent bias (Redmond & Griffith, 2006).

5.2. Future research

Given the importance of food allergy awareness and training to the foodservice industry, similar research should be carried out at other institutions to get a holistic idea about attitudes, knowledge, training received and training needs of foodservice workers in university foodservice operations. Future studies can use observations to obtain information about actual food allergy practices among university foodservice workers without relying solely on self-reported data. Focus groups can also be conducted to determine motivators and barriers to practicing food allergy behaviors. With increase in the incidence of food allergies among young adults and children, foodservice operations’ preparedness in meeting the needs of this demographic is important.

References


