

Using the Systems-Practice Framework to Understand Food Allergen Management Practices at College Catering Operations: A Qualitative Study

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ABSTRACT

Background The number of individuals with food allergies or intolerances attending catered university residential colleges is increasing, and safe dining options are required to minimize the risk of allergic reactions and food-induced death.

Objective This qualitative research study sought to advance professional knowledge of the factors affecting allergen management practices, particularly pertaining to college foodservices.

Design Three catered residential colleges affiliated with a major university in New Zealand were selected as research sites. The study used an ethnographic approach and systems-practice theory as a framework for data collection and organizing results. Data collection techniques included document analyses (3 hours per site), observations (6 to 8 hours per site), focus groups with foodservice workers (30 to 45 minutes per site, n=16), and interviews with foodservice managers (45 to 90 minutes per interview, n=5). Notes and transcripts were coded through the process of thematic analysis using NVivo for Mac software, version 11.1.1, to identify factors affecting allergen management practices.

Results The main factors affecting allergen management practices at college foodservices included information provided by residents about dietary requirements; communication between residents and foodservice staff; systems for allergen management; attitude of foodservice staff; and college size.

Conclusions Detailed dietary information, effective communication with residents, sufficient resources, clarification of responsibilities, and thorough systems are required for staff to perform safe allergen management practices. Ultimately, successful implementation was predominantly determined by staff attitude. Foodservice managers are advised to identify motivators and address barriers of staff attitudes toward allergen management practices to promote successful implementation.

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THE PREVALENCE OF FOODBORNE ALLERGIES worldwide has been documented to be increasing to what some are describing as epidemic proportions.^{1,2} More children than ever before are being diagnosed with food allergies³ and, although it is usually common to see remittance in the later childhood years, the number persisting through to adulthood is concerning.^{1,4} Strict avoidance of the allergen of concern and the use of epinephrine in the case of an anaphylactic emergency is the only remedy for individuals with food allergies.⁵ Responsibility for allergen avoidance and epinephrine management shifts from parent to child in adolescence.⁶ Pair this transition with adolescents leaving home to live at a university or college and their risk-taking behavior can have fatal consequences.⁶⁻¹⁵ In fact, the most food-induced allergic reactions and deaths have occurred among this age group when they eat away from

home, with many of these incidents occurring at college cafeterias.^{7,8,10} This presents a challenge for college catering operations, as many adolescents and young adults attend a catered residential college in the first year of university. Even though primary allergen management responsibility belongs to the individual,¹³ this issue directly affects foodservice operations' leaders and managers who are responsible for providing safe and suitable meals and, therefore, must have successful allergen management practices in place.¹⁶ Effective systems for allergen management are already being explored,^{17,18} including best-practice guidelines for allergen management in college foodservices and training of foodservice staff.¹⁹⁻²²

Studies investigating allergen management have been mostly quantitative and predominantly assessed foodservice staff knowledge of food allergies.²³⁻³⁰ Only a few studies have

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focused on allergen management practices, with scant literature specific to the college foodservice setting.^{26,31} Harris and colleagues³² argue that the field of dietetics is enriched by qualitative research, especially when it can add to current quantitative research to provide a more complete exposition of a phenomenon. As well as having a leadership role in individuals' management of their allergies,³³ registered dietitian nutritionists and nutrition and dietetics technicians, registered, hold leadership and management positions in foodservice operations, including college and university foodservices. They, along with their foodservice personnel, are integral to the implementation of successful allergen management practices. For this reason, a qualitative research approach has been recommended for investigating allergen management in order to evaluate processes and understand reasons for outcomes.³² It also has great potential to provide a depth of understanding that quantitative studies cannot.³⁴ Unlike the quantitative approach, qualitative research does not attempt to understand data of a large population, its strength lies in its ability to produce highly detailed data from a small sample.³⁴ However, few qualitative studies on allergen management exist²⁸⁻³⁰ and, to the best of the authors' knowledge, there are no qualitative studies investigating allergen management practices in a college foodservice setting. This research contributed to existing literature by asking: What are the requirements for and challenges of successful allergen management practices in college catering operations? An ethnographic approach was adopted and the recently developed systems-practice theory was used as a framework.³⁵

METHODS

A qualitative, ethnographic approach was taken to investigate foodservice staff's allergen management practices throughout the processes involved in providing college residents who had food allergy- or food intolerance-related dietary requirements with safe and suitable meals. These meals are referred to as "alternative meals" in this article. Ethnography has been defined as the art and science of describing a human group or culture, incorporating institutions, interpersonal behaviors, material productions, and beliefs.³⁶ Ethnography was a novel and appropriate approach for this research, given the lack of literature in this area and LeCompte and Schensul's³⁷ recommendation to use this approach to explore factors associated with a research problem in order to identify, understand, and address them, especially when they are not known.

Participant Selection

Three university residential college foodservices run by the same catering company in one of New Zealand's major cities were selected as research sites. The Institutional Review Board (University of Otago, New Zealand) approved the study protocol and all participants provided written informed consent. A range of college sizes was chosen (termed *small college*, *medium college*, and *large college*) to see whether allergen management practices were influenced by the number of residents provided for (see the Table). Each college prepared meals in their on-site kitchen using a cook-fresh production system and meals were served from the kitchen and dining room area, confining allergen management practices to these areas. The medium college also provided food to a satellite kitchen at a smaller college, which enabled allergen management practices in the distribution system to be investigated. Each college made meals for residents, college management staff, and registered guests every day of the week. All colleges were comparable in that they had the same overarching allergen management policies, given that they were all overseen by the same catering company.

Data Collection Tools

The data collection approach for ethnography has been described as examining, experiencing, and enquiring. Examining documents detailing what has already been done; gaining first-hand experience in naturally occurring events through observation; and enquiring what is actually going on through focus groups and interviews.³⁸ Therefore, the data collection techniques in this study were document analyses, observations, focus groups, and interviews. Documentation analysis examines material related to the research topic that has already been produced by others³⁸ so the researchers identified all documents relating to allergen management. During observations, participants were observed in their natural setting, thereby providing objective data.³⁸ For each focus group and interview, the researchers developed guides to use as a framework for discussion, as recommended by Kruger and Casey.³⁹ Data collection was carried out over a 3-week period, with 1 week at each of the college foodservice sites. The researchers were known to some of the foodservice staff at two of the sites due to previous work- and university study-related experience.

Systems-Practice Framework

In combination with ethnography, the recently developed systems-practice theory⁴⁰ was used as a framework in the

Table. Number of meals produced per day at each of the colleges^a and the number and percent of these meals that had to be safe and suitable for food-allergic and food-intolerant residents^b

Variable	Small college	Medium College		Large college
		Satellite kitchen	Medium college	
No. of daily meals	471	375	990	1,596
No. of allergen-friendly meals (% of total)	93 (20)	30 (8)	75 (8)	114 (7)

^aThe colleges were termed *small college*, *medium college*, and *large college*. The medium college catered for a smaller college from its kitchen and this one was referred to as the "satellite kitchen."

^bInformation as of May 2016.

research's qualitative approach. The systems-practice framework has not yet been trialed in any other context. The use of this framework as a tool for data collection (Figure 1) was considered novel and appropriate to apply to the analysis of college foodservice staff's allergen management practices.

In 2014, Goonan and colleagues⁴⁰ introduced the systems-practice framework to foodservice literature, which amalgamated foodservice systems theory and social practice theory. Systems theory acknowledges that foodservice organizations are highly complex entities with a myriad of inputs,

Systems Component	Sub-system	Elements of Practice Theory		
		Materials	Images	Skills
Inputs	Raw materials Information Energy People Facilities Money Time			
Operations	Procurement, receiving & storage Preparation Production Service Cleaning & sanitation			
Controls	Plans Contracts Laws & regulations			
Management	Functions Linking processes: - Communication - Decision making			
Memory	Financial Personnel Forecasting			
Outputs	Finished goods Services Ideas Financial accountability Customer/ employee satisfaction			
Feedback				
Environmental Factors				

Figure 1. Checklist used to guide documentation analysis and observations.

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processes, outputs, and feedback loops, all operating under management structures and influenced by their environments.⁴¹ In using this theory, a structure was provided for research to assess the whole operation. Social practice theory breaks down “practices” into three essential components—materials, images, and skills—to enable a comprehensive understanding of the factors that affect practices.^{42,43} These components are defined as all the things, equipment, stuff, technologies, and tangible physical entities required to do practices (materials); the ideas, mental activities, symbols, and meanings about or toward practices (images); and competence, know-how, and techniques required to do the practices (skills).^{42–44} The amalgamation was designed to be a useful practitioner tool to guide management strategies for pro-environmental behavior changes,⁴⁰ but the authors of this research proposed that it could be used to assess allergen management practices and guide management strategies for safe and successful allergen management practices. Notes were made on a systems-practice framework checklist about key areas where allergen management featured in the foodservice system during document analyses and observations, and what practice element it related to (Figure 1). The systems-practice framework was also used as a foundation for the development of data collection tools for focus groups and interviews to ensure each stage of the foodservice system and each practice element were considered. Information from document analyses and observations, and best practice guidelines²⁰ were used to develop questions for the focus group and interview guides.

Data Collection

Document analysis data was collected first (approximately 3 hours per site), followed by observations (6 to 8 hours per site), focus groups (one focus group per site each lasting 30 to 45 minutes), and interviews (45 to 90 minutes per interview). Document analyses involved investigation and analysis of existing records related to allergen management, including catering company and specific hall policies, plans and forms, communication systems (including signage at meal times and in kitchen storage areas); labeling of products and meals, recipes, and laminated food labels for staff and residents to refer to; staff training manuals and forms; allergen spillage records; and quality assurance tools and records. Observations were conducted under natural settings for brief periods during each main meal service, lunch and dinner production times, when products were received and put into storage, and for 2 hours observing distribution and service to the satellite kitchen at the smaller college. Singleton and Strait’s⁴⁵ observational note-taking guidelines, which included a running description, ideas, questions, and photographs, were adopted. Focus groups were held on site at each college. All foodservice staff (chefs, kitchen assistants, and serving staff) working at the time on the day participated in the focus group at the request of the catering company manager. There were three participants at the small college, six at the medium college, and seven at the large college. A wide range of staff roles were represented, which enabled different aspects of allergen management to be captured. Foodservice managers were not included in focus groups, to encourage honesty. Interviews were conducted with five managers; the catering company manager, the foodservice managers of the

small, medium and large colleges; and the head chef/foodservice manager of the satellite kitchen. Focus group and interview discussion topics were drafted based on the information gathered from document analyses and observations. Questions were omitted, adapted, or added depending on how the discussion developed.

Data Analysis

Braun and Clarke’s⁴⁶ thematic analysis “recipe” was used to process the data and the systems-practice theory was used as a framework for data analysis.³⁶ Initial data analysis began with the researchers transcribing verbal data, reading through all the data, consulting literature, and brainstorming ideas. The three practice theory elements (ie, materials, images, and skills) were used as grandparent nodes and child nodes were the themes that related to each element.⁴² The researchers determined four to five main themes for each element and included an extra “miscellaneous” grandparent node to capture any data that did not fit into other nodes, but were important to consider or investigate further. Data were assigned to relevant nodes and included as quotes, extracts, documents, or photographs. Relevant components of systems theory⁴¹ were acknowledged within each theme, but not explicitly used in the structure because there was a lot of crossover between components, and it allowed for a more concise overview. Analysis was performed using NVivo for Mac (version 11.1.1) software⁴⁷ to code data. Key themes and the main results from the document analyses, observations, focus groups, and interviews are described in the following section, using the three practice elements as a structure, and then summarized under one main “Practices” heading (see Figure 2).

RESULTS

Five main themes arose from the data relating to “materials”: information foodservice staff required for allergen management; menus and recipes for alternative meals; products for alternative meals; costs associated with allergen management; and policies and procedures relating to allergen management.

The four main themes that arose from the data relating to “images” were general attitude of foodservice staff toward allergen management; frustrating aspects; challenging aspects; and a sense of responsibility for allergen management taken by staff and residents.

There were four main themes that related to “skills”: communication between residents and foodservice staff, within staff and between staff and hall management; training given to foodservice staff; adaptation of menus and recipes; and separation of alternative products and alternative meals.

Practices

Practices involved the active integration of the three practice theory components—materials, images, and skills.⁴² Taking each of the themes mentioned from each practice element into consideration, the key findings were grouped into five main areas that influenced the allergen management practices of foodservice personnel at the college foodservice sites. These were information, communication, systems, staff attitude, and college size. Data sources are indicated by D

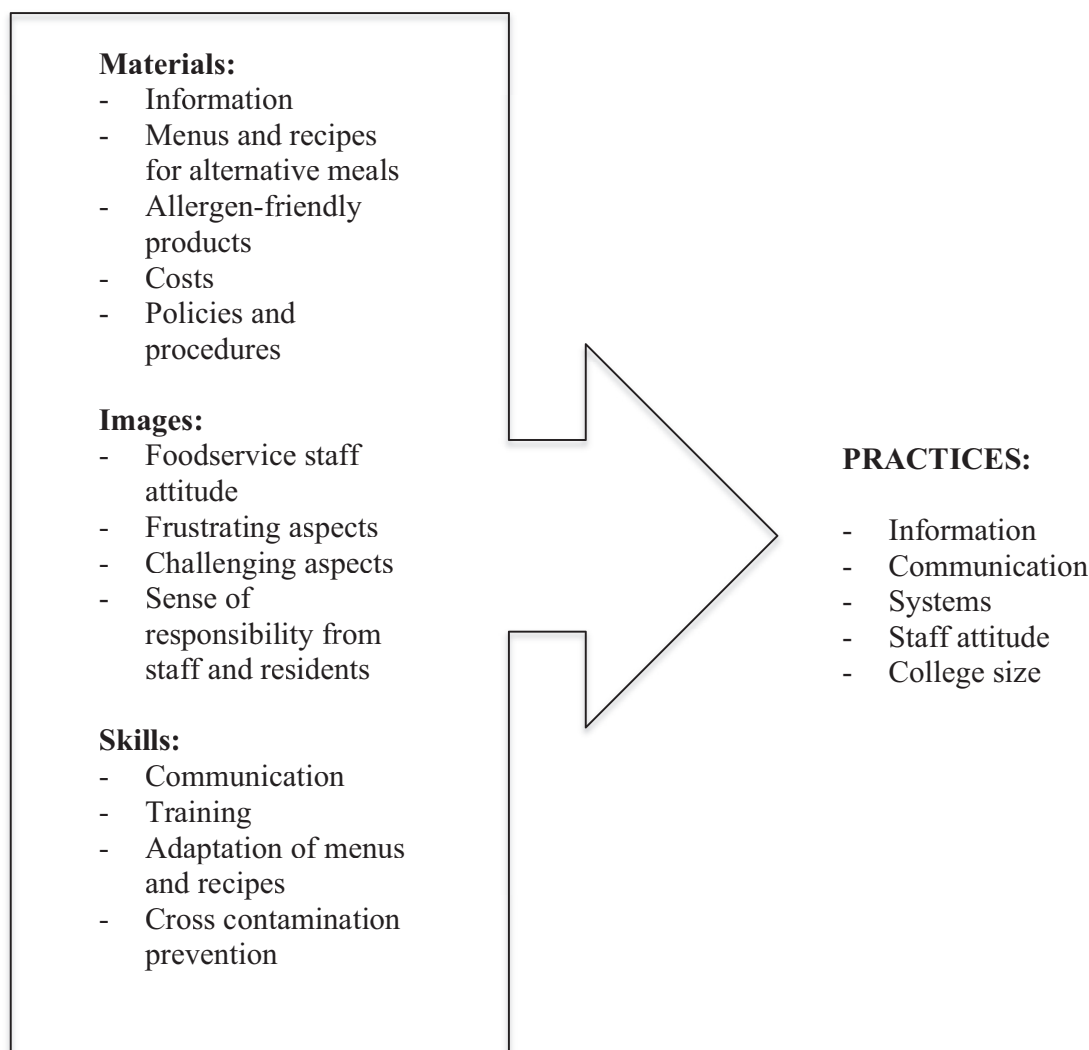


Figure 2. Overview of key themes for the practice elements “materials,” “images,” “skills,” and key themes for integrated “practices.”

(document analyses), O (observations), F (focus groups), and I (interviews).

Information

The information foodservice staff needed about residents' special dietary requirements influenced their ability to design the menu, know accurate numbers for making alternative meals (which affected waste), plan the budget, and know what precautions to take, depending on the severity of allergies and intolerances (F, I). Foodservice managers expressed the need for detailed and timely communication from college management regarding residents' dietary requirements at the start of the year. However, they acknowledged the information college management gave was only as good as what the residents provided (I). Residents with special dietary requirements needed to provide accurate, detailed, and up-to-date information, and inform foodservice staff promptly if there were any changes to their dietary needs. It was also helpful when these residents gave meal

ideas and recipes to help menu and recipe adaptation. Each of the college foodservices had one main menu and either adapted main meal items or made completely different meals in order to meet all of the special dietary requirements. Foodservice staff found this challenging. One chef said, “Half the chefs need a degree like what you're doing [dietetics] just to cope with it!” (F).

Communication

As mentioned, foodservice staff relied on communication from residents and hall management to plan menus and day-to-day alternative meals. Foodservice managers realized residents may feel embarrassed by their special dietary requirements: “A lot of them don't put too much [dietary requirement information] down [on their application form] because they don't want to be seen as a special case . . . I think some of them are afraid they won't get into their college of choice.” (I). The availability and friendliness of foodservice staff and the ease of the colleges' systems determined to

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some extent the amount of information and feedback that residents provided. This, however, was largely influenced by residents' attitudes and the level of responsibility they took for their special dietary requirements. It is interesting to note that the colleges did not require medical certificates in order for residents to receive special diets; residents with food preferences (as opposed to medically confirmed allergies and intolerances) were catered for and able to change these throughout the year (D, O). This was acceptable, but staff needed residents to communicate about whether or not they were coming in for meals, and to follow through on their decision, so time and food (alternative meals) were not wasted. Within the kitchen, staff at each of the colleges communicated frequently and clearly about allergens. The catering company developed allergen cards to be placed by meals in order to communicate the presence of allergens (Figure 3). The system provided an effective means for communication.

Systems

Allergen management policies and basic procedures that addressed the whole foodservice as a system were created and updated in conjunction with a contractor and auditor for the whole catering company. Consequently, each college followed the same policy. However, aspects were put into place differently at each college and this was influenced by college-specific systems. Each foodservice had catering company-provided documentation processes, as well as specific college-developed ones, and these helped with the monitoring of allergen management practices (D). Regular allergen training was given to permanent foodservice staff to provide basic knowledge and develop allergen management skills. The college foodservices had to have rigorous cross-contamination prevention systems in place because it was not viable for them to cook allergen-friendly meals in a

completely separate kitchen (which would be ideal). Overall, foodservice managers found that no matter how good the systems were, they were only as good as the staff's ability and attitude toward following them. A foodservice manager described, "Some staff need constant supervision and they can't understand why they have to do it the way people say . . . That is the biggest problem we have . . . People are fallible and unless you stick to a system, fallibility will always creep in." (I).

Staff Attitude

Staff attitude was a major influence on how well allergen management was carried out. The images that staff held impacted the way they followed (or did not follow) policies and procedures. The catering company manager said at the outset, "There's . . . the attitude of yes we've got to do this and yes we'll do it but then there's this whole attitude of oh can't be bothered doing that. You'll notice two sides—that's just human nature though." (I). This was observed. The instances where cross contamination occurred—where many resulted in an allergic reaction—were due to foodservice staff carelessness, forgetfulness, or perceived lack of importance of following the system. The examples the researchers heard about or observed included serving a substitute product that contained nuts without checking the label beforehand, accidentally serving mushrooms to a resident who was allergic to them, and a staff member using a dairy-containing margarine for dairy-free products even after being told not to (F, O). It was obvious that allergen management was easier for foodservice staff when there were clear systems in place, training was provided and standards were upheld and communicated regularly by management, but it was clear that the "image" element of practice had the most prominent impact on how well allergen management was practiced.

This Dish Contains the Following Allergens	
NUTS ☐	SHELLFISH ☐
PEANUTS ☐	FISH ☐
SOY ☐	GLUTEN ☒
DAIRY ☐	EGG ☐
OTHER ☐ _____	

Contains the Following	
ALCOHOL ☐	BEEF ☒
PORK ☒	CHICKEN ☐
LAMB ☐	_____ ☐

Figure 3. Examples of the catering company's allergen card system for communicating the presence of allergens in meal items.

College Size

The main impacts of the college size were on time and cost. The college paid the catering company a fixed amount per resident. This meant that larger halls had a bigger budget for their foodservice. Foodservice staff wanted and required a variety of allergen-friendly products in order to provide tasty and nutritious alternative meals that were similar to the main menu (to make food-allergic residents feel more “normal”), but these products cost significantly more than their regular counterparts. This was a challenge for the small- and medium-sized colleges, but not for the large hall because their budget was big enough for it not to affect them. Time was also an issue: “Yeah because it’s not just the purchase of the food, it’s the labour that goes into the food. We just about have a full time chef now that does the [alternative meals] because we have so many wide and varied amounts. But of course the amount that [the foodservice] gets paid for doing it does not increase. So we’ve still got to do all of that, to a high standard, within the budget constraints” (medium college foodservice manager, I). Time was a significant challenge for the smaller colleges because they had fewer foodservice staff to carry the load. Time was also an issue at all of the colleges no matter how many chefs they had.

DISCUSSION

Key discussion points that arose from the main results of the study were: impact of staff attitude on allergen management, requirements for successful allergen management, challenges of allergen management, and the importance of systems.

Impact of Staff Attitude on Allergen Management

The main cause of poor allergen management practices and incidents in the college foodservices, some of which resulted in food-allergic residents having a reaction, was an indifferent staff attitude. Choi and colleagues³¹ study investigating allergen management practices in a college foodservice setting found that out of all three of the variables measured of knowledge, attitudes, and training, staff attitude had the greatest effect on allergen management practices. In light of this, the current study’s finding was not unexpected. Effective cross-contamination–prevention systems and training are vital to equip staff with the appropriate skills for allergen management,^{11,12,16,21,23} but even with these in place and regular training of permanent staff, it was forgetfulness and lack of care and concern that had the most significant influence on actual practice. Barriers to safe food handling practices need to be addressed and managers are recommended to inculcate identified motivators to effectively promote safe practices in the workplace.⁴⁸ This finding warrants further investigation to explore whether the same result would be found in different college foodservices and other foodservice settings.

Requirements for Successful Allergen Management

The most successful examples of allergen management practices were when the college foodservice staff had accurate, timely, and detailed information from food-allergic residents and when there was ongoing effective communication between the residents and foodservice staff. Both college and foodservice management aim to provide excellent services to residents and clear, open communication is

essential for this to happen.⁶ Meetings with residents and their parents upon arrival at the college would help to ease fears^{49,50} and create an opportunity for expectations and responsibilities of both parties to be discussed.⁶ Clarification of dietary requirements, and mutual understanding of roles and responsibilities is fundamental for successful allergen management, otherwise it can be unnecessarily challenging for foodservice staff.

Challenges of Allergen Management

The costs related to allergen management, from products, time, and labor, were significant for each of the college foodservices. There is scant literature that discusses this.³⁰ However, this study found it was one of the greatest challenges for foodservice managers and it influenced their allergen management practices. With each foodservice’s budget determined by the number of residents at the college, the smaller colleges had less money for allergen-friendly products and fewer chefs to make the alternative meals. Each of the foodservices experienced significant time pressure and found that it could cause them to make mistakes, such as serving a mushroom-containing product to a mushroom-allergic resident. The potentially fatal consequences of neglectful behavior due to time pressure requires that allergen management be prioritized. Management involved in budgeting decisions need to acknowledge the amount of time it takes chefs to prepare special meals and make provisions that allow for an increase in labor support. In light of these results, future research could quantify costs of, and time spent doing, allergen management in foodservice in order to provide further evidence of the resources needed to empower successful allergen management practices.

The transition of allergen management responsibility from parent to adolescent^{6,13} presents a challenge to foodservice staff. The consequences for adolescents’ risk-taking behavior would normally be their responsibility, but if there is a contract with college foodservices, foodservice staff also have some responsibility for food-allergic residents’ allergen management. College foodservices are responsible for providing safe and suitable meals¹⁶ and so must have and adhere to thorough allergen management practices. Recent studies suggest dietitians could play a significant role in providing training and advice for this.^{21,22,33} However, the boundaries of the foodservices’ responsibilities must be clarified and discussed with residents. Best-practice guidelines recommend foodservice staff also be trained in handling epinephrine in case of an emergency,^{19,20} but residents must also share the responsibility in preventing severe reactions and carry epinephrine with them.^{6,31}

The Importance of Systems

As adolescents with food allergies are known to engage in risk-taking behavior, such as eating allergen-containing foods and not carrying epinephrine on them,^{12–15} it is highly recommended that foodservices define their responsibilities and adhere to thorough documentation systems. The most severe allergic reactions and deaths have happened among adolescents and young adults, and many have occurred when they were eating out.^{7,10,12} Bearing this in mind, foodservices must be prepared to provide evidence that they adhered to their

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responsibilities in the event of an allergic reaction or food-induced death. Effective product label reading and transfer of this information by displaying the allergen content of meals is paramount in this process to ensure food-allergic residents are fully informed.^{51,52} The allergen card system was a good example of this. Foodservice management must have an allergen management system that is thorough and well documented (including written records of changes to menu items and alternative meal ingredients) to ensure they uphold their side of the contract.

Strengths, Limitations, and Opportunities for Further Research

Very few studies have investigated allergen management in a college foodservice setting.^{18,21,31} The current study adds to the literature by presenting an in-depth understanding of allergen management practices at college catering operations as a result of the ethnographic, qualitative approach that was applied. Furthermore, this research provides another example of the recently developed systems-practice framework³⁵ to the foodservice literature.

The authors identify three limitations to this research. Firstly, this research was only conducted in three colleges, overseen by one catering company, and at one location in New Zealand, so results cannot be generalized with any certainty beyond these case study populations. In order to improve generalizability, comparative case studies could be conducted. Future research could look at replicating this study in college foodservices that are managed differently or in different geographical locations, such as the United States, to explore cross-cultural differences. The research could also be applied to different foodservice settings, such as hospitals and restaurants. Secondly, this research only looked at the foodservice management and staff's point of view, but it would have been ideal to look at food-allergic residents' points of view as well. Future research could investigate both perspectives as well as factors affecting the role and responsibilities of residents in successful allergen management. It would also be interesting for future research to explore how foodservice management supervision fits into each of the components used to analyze allergen management in this study. Finally, this research used a qualitative method and ethnographic approach. While this provided insightful data and a deep understanding of the main issues of allergen management for college foodservice staff, replicating and validating this study on a wider level would require quantitative tools. A more quantitative approach would make it easier to collect data on a large scale, such as nationwide or internationally.

CONCLUSIONS

This research has identified important factors that affect the implementation of successful allergen management practices. Foodservice staff attitude had the most significant influence on allergen management practices, as it was identified as the cause for many food-induced allergic reactions. Further research could investigate this factor alone and explore successful ways for leadership and management to manage this issue. Staff required detailed dietary information and opportunities for clear communication with residents to fulfill their role and responsibilities. Foodservice

staff and residents must work together to obtain appropriate information and devise effective communication methods. Further research could also explore the role and responsibility of residents in their allergen management while attending catered colleges. The pressure of time and the costs of allergen management revealed the need for sufficient resource to empower safe practices. College and foodservice management must acknowledge this and consider allocation of resources to specifically address this. Thorough systems, documentation processes and training is vital to prevent the potentially fatal consequences of poor allergen management. Some studies have explored this factor; however, further research is required to solidify evidence. The systems-practice framework ensured a thorough assessment of allergen management practices throughout the foodservice system and incorporated perceptions of foodservice staff as practitioners. Thus, the framework allowed for a comprehensive understanding of allergen management practices within college catering operations. It is recommended that this approach be adopted for further research into allergen management practices in a college foodservice setting as well as other foodservice contexts. Leadership and management of foodservice systems, particularly those in a college foodservice setting, must take all of these factors into consideration in order to be able to provide safe, high-quality services to an increasing number of individuals with food allergies. As prevalence of food allergy continues to increase, and increasing numbers of residents with food allergies attend catered colleges, the need for effective allergen management will be integral to the success of college catering operations.

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