FOOD FOR COLLECTIVES

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Health risk behavior of university restaurant users in Niterói County, RJ, Brazil

Comportamentos de risco sanitário de usuários de um restaurante universitário na cidade de Niterói, RJ, Brasil

Abstract

The concern with the hygienic-sanitary quality of meals offered in different food services never ceases to exist. The aim of the current study is to evaluate health risk behaviors presented by university restaurant users at the time they serve themselves the meals. The herein adopted methodology was a case study based on the application of a checklist during lunch hour from August to October 2018. The total sample comprised 336 users, among them, students and employees who had their meals in two restaurants of a public university in Niterói County, Rio de Janeiro State, Brazil. The most common issues reported by participants were: not sanitizing one's hands before serving the food (63.0%); diffuse conversation during the food-serving process (54.8%); using the food-serving utensils to arrange the food on one's plate (41.9%); and scratching or touching body parts while serving the food (25.9%). Based on these results, users presented health risk behaviors. Therefore, it is necessary adopting educational strategies to help mitigating risks of contamination by pathogens.

Keywords: Hand Hygiene. Risk behavior. Food Contamination. Food Services.

Resumo

A preocupação com a qualidade higiênico-sanitária das refeições oferecidas é constante em qualquer serviço de alimentação. Neste estudo, objetivou-se avaliar os comportamentos de risco sanitário dos usuários de restaurantes universitários no momento do autosserviço. A metodologia utilizada foi o estudo de caso, com aplicação de duas listas de verificação, durante o almoço, no período de agosto a outubro de 2018. A amostra totalizou 336 usuários, entre alunos e servidores, que se alimentavam em dois restaurantes de uma universidade pública, localizada na cidade de Niterói, Rio de Janeiro, Brasil. As falhas mais comuns observadas foram: não higienizar as mãos antes do autosserviço (63,0%); conversa difusa durante o processo (54,8%); utilizar os utensílios de servir para arrumar os alimentos no próprio prato (41,9%); e coçar ou tocar parte do corpo durante o autosserviço (25,9%). Esses resultados indicaram comportamentos de risco por parte dos usuários. Concluiu-se que é necessário que sejam estabelecidas estratégias educativas, a fim de mitigar os perigos de uma possível contaminação por agentes patogênicos.

Palavras-chave: Higiene das Mãos. Comportamento de Risco. Contaminação de Alimentos. Serviços de Alimentação.

INTRODUCTION

The habit of eating out is constantly growing due to changes in population's lifestyle and, mainly, to factors such as time and practicality at the time to eat, in recent years.[1] In addition, long working hours, as well as long journeys from work to home, and vice versa, prevent individuals from having family meals.[2] This factor also affects students, whose extended periods of classes in full-time educational systems increase the frequency of (small and large) meals eaten in university and regular restaurants or in snack bars, among others.

Data from the last Family Budget Survey (FBS) conducted by Instituto Brasileiro de Geografia e Estatística – IBGE (Brazilian Institute of Geography and Statistics) showed increased expenses due to the eating out habit, which accounted for 31.1% of the mean monthly family expenditure - the Southeastern region recorded the highest percentage of it.[3]

The production of meals, both at and out of home, is carried out in places that are vulnerable to the outbreak of possible foodborne diseases.[4] According to data from the Brazilian Ministry of Health, approximately 40% of food contamination cases are associated with inadequate food handling and/or preparation. The Brazilian Southeastern Region recorded the highest frequency of foodborne disease (FBD) outbreaks in the country; households accounted for 38% of the cases, whereas restaurants and bakeries accounted for 16.2% of them.[4]

Foodborne diseases are one of the most prevalent public health issues in the contemporary world. They are caused by etiological agents, mainly by microorganisms that penetrate the human body through contaminated food and water intake.[5]

According to Lynch et al.,[6] meals eaten out of home can favor the onset of foodborne diseases. Based on Smith & Fratamico,[7] food intake out of home is one of the factors mostly contributing to the increased incidence of FBDs, since the meals are prepared at large scale in food and nutrition units (FNUs), fact that hinders the effective control of all stages in the production chain. According to Centers for Disease Control and Prevention (CDC), 905 outbreaks, and approximately 15,000 cases of diseases caused by pathogen-contaminated food were reported in 2015. In total, 60% of these cases were associated with meal marketing and 'à la carte' restaurants accounted for 39 % of such cases.[8]

The report on foodborne diseases released by the World Health Organization (WHO) in 2015[9] has emphasized the difficulty in estimating the proportion of cases, as well as in identifying routes and modes of transmission. Therefore, data presented by the Ministry of Health[4] and by the CDC[8] may diverge from each other due to health registry-related difficulties, since studies have indicated that most BFDs derive from food trade.[10,11]

Food contamination can start at the raw material source and extend to transport, reception, storage, cooking and distribution stages.[12] Contamination can happens during handling due to poor hygiene conditions of handlers, equipment, utensils and of the environment, as well as to inadequate storage conditions of ready-to-eat products.[12,13] Such contamination can also take place at distribution counters during self-service, since food remains exposed to consumers and to their behaviors at the time they serve themvelves.[12,14]

Self-service is categorized as a distribution system in which users perform the service themselves. According to Silva Filho (1996), meal distribution can be carried out in three different ways: with the help of a maid, without the help of a maid (free) and/or with the help of a machine. Mixed self-service is the one that uses two meal distribution ways.[15]

University restaurants (UR) aim to provide nutritionally balanced meals with microbiological and sensory quality to meet the needs of students, servants and visitors.[5] Meals must be prepared under adequate hygienic-sanitary conditions, in compliance with the legislation in force, in order to assure the quality and safety of handled products, based on Good Manufacturing Practices (GMP), Standard Operating Procedures (SOP) and Standard Operating Hygiene Procedures (SOHP).[5]

Although these prerequisites are met during the handling and preparation of meals, users' risk behaviors can affect food safety at self-servicing at distribution counters where dishes are exposed for immediate consumption.[12,13] Thus, they must remain protected from new contamination sources, under controlled exposure time and temperature conditions in order to avoid microbial multiplication.[16]

Conscious or unconscious actions that expose something/someone to danger are called "risk behavior"; these actions can become a habit when they are constantly repeated.[17] The direct contact between consumers and distribution counters at self-servicing can lead to food contamination due to behaviors such as: sneezing and coughing, which spread microorganisms through spittle spraying; the continuous use and handling of handkerchiefs; lack of hygiene, mainly bad hand washing after excretion maneuvers and after touching objects and suspicious materials; constantly smoking (contamination of fingers with saliva); and improper habits such as scratching or rubbing the nose, hair, ears and body parts; among others.[18] Due care should be taken with personal hygiene and conduct, since humans are microorganism and parasite carriers.[19] Particular attention should be paid to one's hands, since they are the most important parts of the human body used in movement activities, in addition to be highly demanded in work tasks; consequently, they are constantly subjected to increased contamination risks.[20]

According to Trigo,[21] the transgression of fundamental hand-hygiene rules enables

product contamination, mainly food. In addition, hands are important cross-contamination vehicles due to contact between individuals, individuals and food, individuals and equipment, and between utensil and environment. Cross-contamination is the transfer of an etiological agent of foodborne disease from one surface to a non-contaminated one, whether it is biological or not.[14]

Thus, the aim of the current study was to evaluate health risk behaviors presented by users at the distribution counter of a university restaurant at self-servicing of large meals. Inappropriate behaviors can compromise the hygienic-sanitary quality of the food at distribution time, since they increase the risk of cross-contamination.

Therefore, the present research is relevant to studies about the transmission routes of etiological agents of foodborne diseases, and it may support educational actions focused on minimizing such risks.

MATERIALS AND METHODS

Research features

The present research is an exploratory case study based on non-participant observation technique, since the researcher was not part of the investigated group.[22]

Study site, period, and target audience

The research was carried out at university restaurants (UR) A and B, from a federal university in Niterói County, Rio de Janeiro State, Brazil. These URs served, on average, 2,600 users per day at lunch time, from August to October 2018. The total sample comprised 336 users, who were selected in a systematic random fashion, at 95% confidence level, based on Marconi & Lakatos.[22]

Data collection instruments

A checklist composed of two blocks was herein adopted. The first block focused on characterizing the service in order to identify and better understand the FNU, mainly its distribution aspects; whereas the second block comprised the questions to be analyzed - based on RDC 216/2014[23] and on Regulatory Norm 24/2009[24] - in order to evaluate the structure of, and the physical-functional resources available in, the meal distribution area (sink / washbasin, liquid soap, paper towels and sanitizers); and in the distribution counter and utensils (protection screen, arrangement of cutlery and plates).

A second checklist focused on observing consumers' behavior in the restaurant was drawn up; it was divided into two stages, namely: hand hygiene time and at self-servicing. The structured recording instrument[22] was adapted from Zandonadi et al.[12] and had questions about hand hygiene techniques and users' behaviors at self-service time.

The following hand hygiene aspects were observed: washing one's hands with water; washing one's hands with soap and water; drying one's hands with paper towels; drying one's hands naturally; drying one's hands on clothing; and using sanitizers. One, or more, items could be observed as behavior(s) of a single consumer at this stage.

Seventeen (17) self-service behaviors were selected because they could pose risks to consumers, namely: not washing one's hands or not using the sanitizer right before self-servicing; talking on top of the food at the distribution counter; touching one's hair near the food exposed at the counter; letting body parts touch the food; coughing on top of the food; sneezing on top of the food; scratching or touching body parts during self-service; leaning over the food; letting neckties, shirts sleeves, purses, shirts, dresses or coats touch the food; arranging the food on the plate using food-serving utensils; removing the food from the plate and returning it to the vats using one's hands; removing the food from one's plate and returning it to the vats using food-serving utensils; using the utensil of one food type to serve a different one; exchanging utensils among different food types; letting the utensil fall into the food; handling the mobile phone; and talking on the mobile phone.

Data analysis

Data collected in the objective questionnaire were tabulated in Excel®2013 spreadsheet and analyzed as relative frequency in the same software, based on descriptive statistics.[25]

RESULTS AND DISCUSSION

The URs were characterized as mixed meal distribution self-services, whose salads, side dishes and garnish are distributed without assistance (i.e., they are freely served by users themselves), whereas the protein dish is served by a kitchen-maid.[15]

The URs did not meet all the requirements set for the structure and physical-functional resources of the distribution area. There was lack of sanitizers to enable hand hygiene (Chart 1) and lack of protection for cutlery and plates, as shown in Chart 2.

According to RDC 216/2004,[23] food distribution counters must be provided with protective barriers to avoid contamination resulting from users' action or proximity to the exposed food. The same principle applies to the utensils (plates and cutlery) to be used.

UR users often selected forks and knives - although it was not one of the herein analyzed items - and this behavior, in association with lack of hand hygiene, can lead to cross-contamination from users' hands to utensils on the counter.[26]

According to the CDC guide entitled ***'Guia de fatores colaboradores para os surtos de doenças alimentares'*** (Factors that Contribute to Outbreaks of Foodborne Illness), food handlers and service users are pathogen-transmission sources due to cross-contaminations of the following types: individual-surface-food or individual-food.[27] Figueiredo et al.[28] have found ***Staphylococus aureus*** on the surface of benches, knives and counters used in the food marketing field. This microorganism is often found in human mucosa (skin, and nasopharyngeal and oropharyngeal regions), which can transmit it to food and to contact surfaces.[29]

Chart 1. Characterization of physical-functional resources in the distribution area of the university restaurants (UR-A and UR-B) investigated in Niterói County, Rio de Janeiro, Brazil, 2018.

Physical structure and resources	UR - A	UR - B
Sink / Washbasin	Yes	Yes
Liquid soap	Yes	Yes
Paper towel	Yes	Yes
Sanitizer	No	No

Legend:
UR = university restaurant.

Chart 2. Characterization of the distribution counter of the university restaurants (URs) investigated in Niterói County, Rio de Janeiro, Brazil, 2018.

Distribution counter and utensils	UR - A		UR - B	
	C1	C2	C1	C2
Protection screen	Yes	Yes	No	Yes
Cutlery rack with protection	No	No	No	No
Dish rack with protection	No	No	No	No

Legend:
UR = university restaurant
C = counter

With respect to users' behavior during self-servicing, 36.9% (n = 336) of users in URs A and B used the area set aside for hand hygiene, 18.2% (n = 336) washed their hands only with water and dried them in different ways, whereas 49.2% (n = 124) of users who used the washbasin (n = 124) washed their hands only with water.

According to Agência Nacional de Vigilância Sanitária – ANVISA[30] (National Health Surveillance Agency), hand hygiene can be performed with water, liquid soap and paper towels, or with alcohol-based hand-rub preparations, which are simple and effective measures focused on mitigating or eliminating microorganisms that can cause several diseases. If one takes into consideration that the correct hand hygiene procedure lies on washing them with water and soap and on drying them with paper towel, it is possible assuming, based on the herein collected data, that there is lack of knowledge about, or disbelief towards, the importance of this practice, since only 21.7% (n = 336) of the herein analyzed users adopted it.

The item 'use of sanitizers' was not evaluated in the current study, since restaurants A and B did not make this product available to their users. Sanitizers play the role of reducing the microbial load in peoples' hands and they can be used after users' hands were properly cleaned with soap and water (under correct friction), as recommended by ANVISA.[30] The ***Guideline for Hand Hygiene in Health-Care Settings*** by CDC[31] has reinforced the importance of using alcohol-based hand-rub preparations to reduce the microbial load in peoples' hands.

Table 1 presents 17 risk behaviors observed during self-service, which were listed based on the largest number of incidences.

Hand hygiene failure was the main risk behavior observed in both restaurants, despite the existence of a physical area for this purpose, which presented the necessary resources, except for the sanitizer. Banczek et al.[32] have recorded a very low index of users who adopted hand hygiene procedures. The ones who washed their hands, did it incorrectly, only with water, and even enabled recontamination by touching body parts or by having contact with the surface of garbage cans. According to Carvalho et al.,[33] 100% of users did not sanitize their hands before self-servicing, which increased the risk of cross contamination to the surfaces and utensils used in the service.

The contact between users and utensils is inevitable in restaurants whose distribution system is based on self-servicing. Therefore, behaviors such as touching body parts, leaning over the food, touching one's hair near the food at the counter and handling the mobile phone at self-servicing can compromise the microbiological quality of the food and lead to cross-contamination.[33] According to Silva Júnior,[16] the contact between hands and body parts, hands and hair and, soon after, between hands and utensils at self-servicing enables the cross

Table 1. Main risk behaviors observed by users of university restaurants A (UR - A) and B (UR - B) investigated in Niterói County, Rio de Janeiro, Brazil, 2018.

Risk behaviors	UR – A	UR – B
A	31.8%	31.2%
B	25.3%	29.5%
C	22.6%	19.3%
D	13.7%	12.2%
E	7.7%	8.3%
F	7.1%	8.3%
G	6.5%	6.8%
H	5.1%	5.4%
I	5.4%	2.6%
J	2.7%	2.7%
L	3.3%	1.8%
M	2.7%	2.1%
N	0.9%	0.9%
O	1.2%	0.3%
P	0.6%	0.6%
Q	0.6%	0%
R	0%	0%

Legend:
A - Not washing one's hands or using the sanitizer before serving the food
B - Talking on top of the food at the counter
C – Arranging the food on the plate with the aid of food-serving utensils
D - Scratching or touching body parts at self-servicing
E - Leaning over the food
F – Handling one's hair near the food at the counter
G – Handling mobile phones
H - Removing the food from one's plate and returning it to the vats with the aid of food-serving utensils
I – Letting body parts touch the food
J – Talking at the mobile phone
L - Letting utensils fall into the food
M - Letting neckties, shirt sleeves, purses, blouses, dresses or coats touch the food
N - Coughing on top of the food
O – Removing the food from the plate and returning it to the vats using one's hands
P - Sneezing on top of the food
Q – Exchanging utensils among different food types
R - Using the utensil of one food type to serve a different one

contamination to the food with microorganisms. In addition, the association between these microorganisms and the ideal time-temperature binomial can be harmful to consumers.

Carvalho et al.[33] and Henriques et al.[34] have classified the act of arranging the food on the plate with the aid of food-serving utensils as an unnecessary behavior that can lead to cross contamination.

FTalking on top of the food at the distribution counter was the second most recorded risk behavior among users. Carvalho et al.[33] and Henriques et al.[34] recorded significant indices of this behavior and emphasized the importance of making restaurants based on this type of service to be in compliance with RDC n. 216/2004[23], which advocates for the use of protection barriers to prevent users from contaminating the food exposed at the distribution counters. Banczek et al.[32] have also classified the behavior 'talking on top of the food during self-service' as an important factor linked to contamination with ***Staphylococcus aureus***.

This microorganism can be found in the nasal and oropharyngeal regions, as well as in consumers' ears, hands and skin.[35] Food poisoning by ***Staphylococcus aureus*** enterotoxins is one of the most common types of FBDs in the world.[36]

According to the report released by CDC in 2019, food service users were classified, among other factors, as possible pathogen transmitters in outbreaks of foodborne diseases, when hygiene protocols are not taken into consideration at the time to handle the food.[37] According to ***Guia de fatores colaboradores para os surtos de doenças alimentares***[27] (Factors that Contribute to Outbreaks of Foodborne Illness), users are an important pathogen-transmission vehicle, whether they present, or not, clinical manifestation of the disease.

The behaviors listed in Table 1 (from H to R) recorded the lowest frequency among the analyzed users; however, the risk of cross-contamination between users and food posed by these behaviors cannot be neglected. Zandonadi et al.[12] conducted a study about users' behavior in self-service restaurants and their results were similar to the ones recorded in the current study: coughing (2%) and sneezing (0.4%) on top of the food and letting the utensil fall into the food (7%) recorded the lowest incidence rates. However, these results cannot be celebrated because, despite the low frequency of these behaviors, they can be significant ***Staphylococcus aureus*** transmission vehicles.[29]

Circumstances capable of inducing risk behaviors were recorded. The increased flow of people queuing up and waiting to be served can be a factor capable of leading to inappropriate behaviors, such as longer time to choose utensils, diffuse conversation, mobile phone handling and touching and scratching body parts. In addition, at cold and rainy days, many users wear coats that can touch the food at self-servicing.

With respect to users' food-handling behavior in items C, H, L, O, Q and R, the two restaurants recorded high percentage of failures, which ranged from 32.2% to 0.6%, except for the item referring to behavior R, which recorded zero failure. According to ***Guia Alimentar para a População Brasileira***[38] (Food Guide for the Brazilian Population), it is essential being careful at the time to handle food. The guide also points out behaviors that should be avoided in order to prevent contamination from happening, as well as highlights important actions addressed in public policies focused on promoting healthy eating.

Items B, D, E, F, G, I, J, M, N and P were classified as users' physical behaviors that could compromise the microbiological quality of the served food. Failures in this group varied from 27.4% to 0.6%; this outcome may be associated with lack of knowledge about good practices in self-service restaurants. Hygiene education campaigns should be carried out in order to inform users about the risks of having inappropriate behaviors at self-servicing and, consequently, to encourage them to avoid or mitigate such behaviors. According to Leal[1], consumers should be instructed about inappropriate behaviors that should be avoided at self-servicing in order to help preventing food contamination issues.

Based on the present results, it is possible assuming that self-service restaurant users can contribute to food contamination, at low-to-high severity level.[39]

Promoting food security and reducing health risks require continuous efforts on the part of all actors: managers, handlers and users. The effective communication of information about the risks associated with food contamination is a means to raise awareness about, and to help better understanding, the foodborne diseases and their prevention forms, on behalf of public health.[9]

All sectors of society must help improving food quality control systems in order to enable more individuals to have access to physically, chemically and microbiologically safe food.[40]

CONCLUSION

The present results allowed concluding that not only food handlers, but also consumers presenting inappropriate habits and behaviors, can affect the microbiological quality of food, since the percentage of users who presented risk behaviors in self-service restaurants was significantly high.

It is worth highlighting the lack of studies providing information about the correlation between the physical-functional structure of the food distribution area and the chemical, physical and microbiological quality of the exposed food, although the legislation reinforces the need of having such structures.

Raising users' awareness about food contamination is of paramount importance. This task can be accomplished through nutritional education procedures such as fixing folders and posters close to URs in order to clarify inadequate self-service behaviors that can lead to food cross-contamination risks, as well as through guidelines about the importance of hand hygiene and the correct way to do it.

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Collaborators

Gama JL participated in all stages of the current study, from its design to the proofreading of the final manuscript. Medeiros MGGA participated in the elaboration and orientation of both the project and the article, as well as in the discussion and elaboration of the final manuscript. Chagas RSO participated in all stages of it, from study design to the proofreading of the final manuscript.

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