



Assessment of Knowledge, Attitudes, and Practices of Food Service Staff Regarding Food Safety at Mashhad University Hospitals

Mohammad Hashemi^{1,2}, Arefeh Erfani¹, Maliheh Dadgar Moghaddam³, Maliheh Doustinouri¹, Fateme Asadi Touranlou¹, Naghmeh Azadi⁴, Asma Afshari^{*1}

1. Department of Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.

2. Medical Toxicology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran.

3. Community Medicine Department, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.

4. Department of General Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.

ARTICLE INFO

ABSTRACT

Article type:
Research Paper

Article History:
Received: 28 Feb 2024
Accepted: 23 Apr 2024
Published: 16 Nov 2024

Keywords:
Knowledge
Attitude
Practice
Food service staff
Food safety
Hospital
Food service

Introduction: Foodborne diseases are severe public health problems. Food service staff who work in kitchens play an essential role in spreading foodborne pathogens. Food infections are preventable, and food safety education is critical essential for preventing them. Considering the importance of safe food preparation in hospitals and its impact on patients' health, this study aimed to evaluate the knowledge, attitude, and practice of food service staff in the hospitals of Mashhad University of Medical Sciences.

Methods: This cross-sectional study was conducted at nine hospitals of the Mashhad University of Medical Sciences during 2019–2020. The knowledge, attitude, and practice of 57 food service staff of hospitals catering were evaluated by a validated questionnaire based on a World Health Organization publication.

Results: The study found that 35.1% of participants were chefs, 57.9% worked in a cook series, and 7% were nutritionists. The means scores of correct answers in food safety knowledge, practice, and attitude were 84.78%, 78.77%, and 80.54%, respectively, demonstrating good knowledge, practice, and attitude of food service staff in the hospital of Mashhad University of Medical Sciences. Among the people who answered the questions, 89.5% had passed food hygiene courses.

Conclusion(s): It is necessary to provide educational courses on food hygiene and safety for food service staff in hospitals.

► Please cite this paper as:

Hashemi M, Erfani A, Dadgarmoghaddam M, Doustinouri M, Asadi Touranlou F, Azadi N, Afshari A. Assessment of Knowledge, Attitudes, and Practices of Food Service Staff Regarding Food Safety at Mashhad University Hospitals. *J Nutr Fast Health*. 2024; 12(4): 235-240. DOI: 10.22038/JNFH.2024.78388.1505.

Introduction

Food hygiene and safety are among the most critical issues in human health. Every year, millions of people worldwide are exposed to food contamination and health risk factors. Food contamination is recognized as one of the most prevalent issues worldwide (1).

The World Health Organization considers foodborne diseases as one of the most significant health problems in the world. A large number of people are exposed to foodborne pathogens due to the lack of knowledge about the safe and correct conditions of food storage in developing countries. Furthermore, the level of food contamination in developing countries is increasing (2). According to statistics, the

incidence of foodborne infections in developing countries is 13% higher than that in industrialized countries (3). Approximately 200 types of diseases are caused by the consumption of contaminated food. Food-borne diseases can range from mild illnesses to severe problems and even lead to death in children, infants, people with weak immune systems, and pregnant women and their fetuses. The occurrence of diseases in this group of people is much more severe. The most common cause of foodborne diseases is bacteria and their toxins (4). Food contamination can occur at any stage of food processing, from production to consumption (farm to home), as the result of environmental contamination, such as water, soil, or air (5).

* Corresponding authors: Asma Afshari, Department of Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran. Tel: +98 5138002409, Emails: Asmafshr@gmail.com.

© 2024 mums.ac.ir All rights reserved.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Various systems have been developed to monitor food safety in different centers to combat the increasing number of foodborne diseases.

Hospital food hygiene presents unique challenges, especially in light of the fact that patients may be more susceptible to nutritional and microbiological hazards than healthy subjects. In addition, nosocomial outbreaks of infectious intestinal disease are associated with a higher mortality risk compared to community outbreaks, and foodborne outbreaks are the most dangerous. Many patients admitted to the hospital are exposed to food contamination due to a defect in the immune system, and even the slightest contamination in food can endanger their lives (6). Vulnerable groups to foodborne pathogens in hospitals include the elderly, people with diabetes, cancer, and immunodeficiency syndromes, surgical patients, and people treated with antibiotics (7, 8).

In hospitals, the employees of the food production and distribution department are the essential sources of food contamination transmission from the time of purchasing raw materials to the time of broadcasting and food distribution (9). A number of studies have revealed that food contamination epidemics in hospitals can be linked to the lack of knowledge of the employees in the food production and distribution department about the basics of hygiene, including hand hygiene, environmental hygiene, correct food storage, and freezing temperatures, and how to properly wash raw materials (10).

Basically, every person who prepares food or distributes it should be aware of its preventive role in food-borne diseases, so paying particular attention to the food of in-patients in the hospital is of utmost importance. The people involved in this matter should have passed the necessary training regarding food hygiene and safety and apply this training practically (2). KAP studies are helpful in evaluating the provision of healthcare. Three elements make up KAP: practice, attitude, and knowledge. KAP studies are simple to perform, quantifiable, and easy to understand (11). This study aimed to assess the knowledge, attitude, and performance of food service personnel in Mashhad University hospitals in relation to food safety issues.

Materials and Methods

Informed consent was collected from all participants, and the Mashhad University of Medical Science Ethics Committee granted its clearance for this study (IR.MUMS.MEDICAL.REC.1398.292).

Study Design

A validated questionnaire similar to WHO publications¹ about the five keys to safer food manual, evaluated by experts, was designed and consisted of four sections: demographic information, 15 questions about knowledge, 12 attitude questions, and 11 practice questions. A cross-sectional survey was conducted on nine hospitals of Mashhad University of Medical Sciences in 2019–2020 to collect information.

A designed questionnaire was provided to the food service staff, and the level of attitude, knowledge, and practice about the importance of food safety and the way food service staff work in observing safety and food health rules during food production were evaluated after obtaining informed consent. The designed questionnaire was provided to these people for completion (1, 6, 12–13).

Information Collection

The study data were collected from 57 participants from 9 hospitals of Mashhad University of Medical Sciences. All food service staff in medical training centers of Mashhad University of Medical Sciences were included in this study as entry criteria, and the dissatisfaction of people participating in the study was considered an exclusion criterion.

Statistical Analysis

This study was conducted using all convenient data. The collected data from 57 participants were imported into the SPSS software version 16, and the proportion of correct answers to all the study's questions for each of the three groups of knowledge, attitude, and practice was calculated.

Results

Out of 57 people in the community under investigation, 35.1% (20 people) are cooks and chefs, 57.9% (33 people) work in the service sector, and the remaining 7% (4 people) work in the nutrition expert sector. The studied population included 36.9% (21 people) in the age

1. <https://www.who.int/publications-detail-redirect/9789241594639>

group of 30 years and less, 43.9% (25 people) in the age group of 31–40 years, and 19.3% (11 people) in the age group of 41 years and more. Based on work experience, 8.8% of people had less than one year of work experience, 29.8% had 1-5 years of work experience, 40.4% had 5-10 years of work experience, and 21.1% had more than ten years of work experience. According to this survey, the studied population had a literacy

rate of 7%, a primary education rate of 24%, a secondary education rate of 26%, a diploma rate of 50.9%, and a higher education rate of 17.6%. Out of the 57 participants in the study community, 89.5% had finished the health and food safety training program, which represented 78.9% of those who started it within the last six months (Table 1).

Table 1. Demographic information of food service staff

Subject	Value(%) (participants Number)(Total:57)
Age (years)	
<20 years	1/8% (1)
21-30 years	35/1 % (20)
31-40 years	43/9% (25)
41-50 years	14% (8)
>50 years	5/3% (3)
Educational level (years)	
elementary	7 (11)
middle and high school diploma	24.6 (14)
Associate degree	50.9 (29)
Bachelor's degree	3.5 (11)
Masters	12.3 (7)
	1.8 (1)
Marital status	
Single	24.6 (14)
married	75.4 (42)
Job Satisfaction	
Satisfied	56.1 (31)
Relatively satisfied	33.3 (18)
unhappy	10.5 (6)
Income	
1-2 million	10.5 (6)
2-3 million	68.4 (38)
>3 million	21.1 (12)
Work experience (years)	
Less than a year	8.8 (5)
1-2 years	14 (8)
3-5 years	15.8 (9)
5-10 years	40.4 (23)
>10 years	21.1 (12)
Job position (nutritionist, chef, food worker)	
Nutritionist	
Chef	7 (4)
Services	35.1 (20)
	57.9 (17)
Passing the food health and safety course	
Yes	89.5 (51)
No	10.5 (5)
Time since passing the food safety and health course	
6 months ago	78.9 (45)
A year ago	15.8 (9)
More than a year	5.3 (3)

There were 84.78% of people who answered correctly in all the questions related to food safety knowledge, with the highest percentage of incorrect answers related to the question of keeping cooked food at room temperature (59.6% of respondents).

In the questions related to the attitude of the participants, the mean food safety attitude of people who answered the questions correctly was 80.54%, most of which were related to the importance of hand washing during work and the cleanliness of the kitchen surface. In the survey conducted on the correct performance of the participants, the mean food safety practice of food service staff was 78.77%. Food expiration dates and washing surfaces and equipment before use were the most common correct answers.

Discussion

The prevalence of food-borne infections in healthcare centers and hospitals can cause serious diseases, waste valuable medical resources, spread of infection to other patients and employees, and disruption of services. A nutritious and safe diet is necessary for the treatment and recovery of the patient, and the food should be reliable, high quality, healthy, and secure. Vulnerable people are more likely than healthy people to suffer severe consequences of disease and infection under the influence of a small amount of a pathogen. At best, the outbreak of foodborne disease in health care is unpleasant, and at worst, it is life-threatening, causing significant disruption in services for patients and staff and avoidable morbidity and mortality in a vulnerable population (9). The present study was conducted to investigate the level of knowledge, attitude, and practice of food service staff and distribution workers in the hospitals of Mashhad University of Medical Sciences. Buccheri (2007) examined 401 nurses from two hospitals in Palermo, Italy, and showed a lack of general knowledge about pathogenic agents and the proper storage temperature of cold and hot ready-to-eat foods. It has been reported that 80% of people did not receive any training about food hygiene. In contrast, in the present study, 89.5% of participants had completed training courses on food hygiene and safety (6). In Adikari's study in the teaching hospital of Sri Lanka in 2016, the results showed that food workers had

insufficient knowledge regarding food hygiene (16). The results indicated that the hospitals were at an optimal level regarding performance, which was similar to the results obtained in the present study. In addition, in this study, there is a significant relationship between the variables of the level of education and the completion of the food safety and health training course by food workers and their level of awareness (3). In a study conducted by Parry et al. on food handlers in Accra, Ghana, the respondents generally had insufficient knowledge and performance in food safety. In contrast, the attitude toward food safety was negative (12). Of the personnel, 84.78% had good knowledge, and 80.54% had a good attitude toward food safety. The limitation and strength of this study was that only food handlers were studied, but the role of other health personnel, such as nurses and paramedics, is also essential. Another limitation was the incomplete cooperation of some hospital centers.

Conclusion

The mean scores of food safety knowledge, attitude, and practice among the food service staff at Mashhad University Hospital were found to be high. Considering that the role of food service staff in hospitals can impact the health of patients through food preparation, distribution, and adherence to food safety regulations, it is recommended to implement educational interventions, provide training courses, and increase awareness among the personnel. Additionally, training courses for all new personnel entering the kitchens and providing retraining sessions for existing employees are recommended. These courses should cover practical and essential topics related to food health and safety, such as the appropriate methods for defrosting frozen foods and the correct temperature for food storage.

Declarations

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

Funding

This study was supported by Research project number 971716.

Ethical Considerations

Informed consent was collected from all participants, and the Mashhad University of

Medical Science Ethics Committee granted its clearance for this study (IR.MUMS.MEDICAL.REC.1398.292).

Conflicts of Interest

The authors declare that they have no competing interests.

References

1. Jahed G, GolestaniFar H, Ghodsi R, Mohammadi M. The knowledge and attitude of students in relation with health and food safety at Tehran University of Medical Sciences. *Journal of Research and Health*. 2012;2(1):72-80.
2. Fariba R, Gholamreza JK, Saharnaz N, Ehsan H, Masoud Y. Knowledge, attitude, and practice among food handlers of semi-industrial catering: a cross sectional study at one of the governmental organization in Tehran. *Journal of Environmental Health Science and Engineering*. 2018;16(2):249-56.
3. Moghadam M, Khaniki G, Foroushani A, Shariatifar N. Food hygiene and safety knowledge, attitude and practice of food preparation and distribution handlers in Tehran University of Medical Sciences Hospitals. *Journal of School of Public Health & Institute of Public Health Research*. 2019;17(3).
4. Jones TF, Imhoff B, Samuel M, Mshar P, McCombs KG, Hawkins M, et al. Limitations to successful investigation and reporting of foodborne outbreaks: an analysis of foodborne disease outbreaks in FoodNet catchment areas, 1998–1999. *Clinical Infectious Diseases*. 2004;38(Supplement_3):S297-302.
5. Salleh W, Lani MN, Abdullah WW, Chilek TZT, Hassan Z. A review on incidences of foodborne diseases and interventions for a better national food safety system in Malaysia. *Malaysian Applied Biology*. 2017;46(3):1-7.
6. Buccheri C, Casuccio A, Giammanco S, Giammanco M, La Guardia M, Mammaia C. Food safety in hospital: knowledge, attitudes and practices of nursing staff of two hospitals in Sicily, Italy. *BMC Health Services Research*. 2007;7(1):1-11.
7. Spence C, 2017. Hospital food. *Flavour*. 2017;6(1):3.
8. Damani NN. *Manual of infection control procedures*: Cambridge University Press; 2003.
9. Al Banna MH, Khan MS, Rezyona H, Seidu AA, Abid MT, Ara T, Kundu S, Ahinkorah BO, Hagan, Jr JE, Tareq MA, Begum MR. Assessment of food safety knowledge, attitudes and practices of food service staff in Bangladeshi hospitals: a cross-sectional study. *Nutrients*. 2022;14(12):2540.
10. Spence C. Hospital food. *Flavour*. 2017;6(1):1-14.
11. Raina S. Assessment of knowledge, attitude, and practice in health care delivery. *North American Journal of Medical Sciences*. 2013;5(3):249.
12. Kunadu AP-H, Ofosu DB, Aboagye E, Tano-Debrah K. Food safety knowledge, attitudes and self-reported practices of food handlers in institutional foodservice in Accra, Ghana. *Food Control*. 2016;69:324-30.
13. Lee HK, Abdul Halim H, Thong KL, Chai LC. Assessment of food safety knowledge, attitude, self-reported practices, and microbiological hand hygiene of food handlers. *International Journal of Environmental Research and Public Health*. 2017;14(1):55.
14. Oludare AO, Ogundipe A, Odunjo A, Komolafe J, Olatunji I. Knowledge and food handling practices of nurses in a tertiary health care hospital in Nigeria. *Journal of Environmental Health*. 2016;78(6):32-9.
15. Jabari F, Majlesi M. Determining the amount of consumption in the preparation and distribution of food in Taleghani Hospital in Tehran. 2015.
16. Adikari A, Rizana MF, Amarasekara TP. Food safety practices in a teaching hospital in Sri Lanka. *Procedia Food Science*. 2016;6:65-7.

Supplementary Tables

Table 2. Questions related to the knowledge level of food service staff

Questions related to the knowledge of food service staff regarding the five principles of food safety		Correct answer (%)
1	Washing hands before handling food.	98/2
2	Handwashing with soap and water for 20 seconds before handling food.	96/5
3	Cleaning wipes can spread pathogens.	87/7
4	When the cutting board looks clean, you can use the same board to cook raw materials.	84/2
5	Raw food should be avoided from cooked food.	94/7
6	Meat is fully cooked at 40 degrees Celsius.	61/4
7	Meat (for example, chicken meat, pounded kebab, grilled chicken, etc.) is pink when fully cooked.	80/7
8	Cooked meat can be kept overnight in the room to cool. Then, stored in the refrigerator.	59/6
9	Cooked foods should be kept in a very hot place before consumption.	70/2
10	Refrigerating food only slows the growth of microbes.	73/7
11	To prepare raw materials, prepare and cook food, you should use clean water and tap water.	82/5
12	Healthy water can be recognized by looking at it	94/7
13	Fruits and vegetables should be washed before consumption.	98/2
14	Spoiled fruits and vegetables should be separated before consumption, and then those that are fresh should be washed well	93
15	Insects (such as cockroaches and flies) and rodents (such as mice) cause contamination and pathogen transmission.	96/5

Table 3. Questions related to the attitude of food service staff.

Questions related to the attitude of food service staff regarding the five principles of food safety		Correct answer (%)
1	Frequent hand washing during food preparation is crucial and should be performed.	96/5
2	Keeping kitchen surfaces clean reduces the risk of diseases.	96/5
3	Separating raw and cooked foods helps prevent diseases.	91/2
4	Separating raw and cooked foods helps prevent diseases.	45/6
5	Proper meat thermometers are useful and necessary for measuring meat temperature to ensure complete cooking.	75/4
6	Looking at the color of the meat, touching and eating some of it, or proper thermometers are useful and necessary to ensure that the meat and food are fully cooked.	77/2
7	Always boil soups and stews to ensure their health.	78/9
8	Defrosting food in a cool place is more accurate and better.	73/7
9	I think putting cooked food out of the fridge for more than two hours is not good.	91/2
10	It is valuable to inspect food to ensure that it is fresh, healthy and safe.	94/7
11	I think I can recognize if the spoiled or fresh food by its appearance.	50/9
12	I think it is important to eliminate expired foods.	94/7

Table 4. Questions related to the practice of food service staff.

Questions related to the practice of food service staff regarding the five principles of food safety		Correct answer (%)
1	I wash my hands before and during food preparation.	91/2
2	Clean surfaces and equipment used for food preparation before use.	96/5
3	Separate tools and cutting boards when preparing raw and cooked food.	80/7
4	I separate raw and cooked ingredients when storing.	71/9
5	To check that the meat is fully cooked, I ensure the clarity of the broth or I use a thermometer.	42/1
6	To check if the meat is fully cooked, I pay attention to its color by touching and eating some of it, or by using a thermometer to make sure it is fully cooked.	78/9
7	When I want to reheat food, I hold it over the flame until the hot steam comes out.	68/4
8	I defrost frozen food in the refrigerator or in a cool place.	77/2
9	After I cook the food, I keep the leftovers in a cool place for about two hours.	68/4
10	I check the food and throw it away after the expiration date has passed.	96/5
11	Before I eat fruits and vegetables, I clean them with water.	94/7