



Food safety knowledge among food service staff in hospitals in Jordan



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ABSTRACT

This study aimed to measure food safety knowledge among food service staff in hospitals in Jordan. A total of 532 food service personal (dietitians, cooks and food workers) from 37 hospitals (public, private, and university hospitals) were conveniently selected to participate in this cross sectional study. The participants completed a questionnaire composed of two parts (general characteristics and food safety knowledge). The overall food safety knowledge of food service staff is fair with a mean score of 56.3 out of 90 points (62.5%). Respondents had sufficient knowledge on “cross contamination prevention and sanitation” aspect, while they had very poor to good knowledge on “foodborne pathogens and related symptoms and illnesses”, “safe storage, thawing, cooking, holding and reheating of the foods”, “health problems that would affect food safety” and “personal hygiene” aspects. There were no significant associations between the total food safety knowledge score and age, educational level, marital status, income, experience, nature of work and attending course(s) on food safety. Respondents from public hospitals and who believed that HACCP is not important for food safety had significantly lower food safety knowledge score than those from private sector (OR: 3.3, CI: 1.76–6.01) and those who believed that HACCP is important (OR: 3, CI: 1.64–5.36), respectively. Food workers and respondents who have experience ≤ 48 months had significantly lower food safety knowledge score than dietitians (OR: 2.6, CI: 1.33–5.2) and those who have experience > 48 months (OR: 1.9, CI: 1.06–3.51), respectively. There is an urgent need for tailored food safety education and training programs that improve food safety knowledge of food service staff in hospitals in Jordan.

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1. Introduction

Food safety is an important issue for consumers, food service institutions and regulatory agencies. Every year, millions of people are hospitalized and many die worldwide from foodborne infections due to consumption of contaminated food (World Health Organization, 2000). Food handling mistakes during food preparation have been associated with most incidences of foodborne diseases (Ehiri & Morris, 1996; Greig, Todd, Bartleson, & Michaels, 2007).

In hospitals, food service staff is the major food handlers, although nurses and other hospital staff may distribute or cater meals. Food service staff in hospitals represent potential source of food contamination and hospital related foodborne outbreaks, since they may possibly transmit pathogens into foods during every step of food handling from buying to distribution (Maguire et al., 2000).

The importance of providing safe food for hospitalized patients and the deleterious effect of contaminated food on their recovery were confirmed (Kandela, 1999). The main risk of serving contaminated food in hospitals is that such food is given to immunocompromized persons (Custovic & Ibrahimagic, 2005). Patients receiving foods from a kitchen with poor hygienic practices could suffer a food poisoning which could result in an outbreak comprising the whole hospital (Ayliffe, Lowbury, Geddes, & Williams, 1992). In Jordan, an outbreak of *Salmonella* food poisoning occurred in a tertiary care university hospital due to contamination of mashed potatoes by a food handler (Khuri-Bulos, Khalaf, Shehabi, & Shami, 1994). In Australia, in the years 1995–2000, the outbreaks in elderly caring facilities and hospitals were responsible for 35% of deaths from foodborne diseases (Dalton et al., 2004). Recently, an outbreak of cryptosporidiosis linked to poor hygienic conditions was reported in a pediatric hospital in China (Wang et al., 2013).

Previous studies conducted in different parts of the globe have shown that food service staff in hospitals have a lack of knowledge on the basics of food hygiene including proper holding

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temperatures of foods, cross-contamination prevention, occasions of hand washing, acceptable refrigerator temperature ranges and etiologic agents (Angellilo, Viggiani, Greco, Rito, & the Collaborative group, 2001; Askarian, Kabir, Aminbaig, Memish, & Jafari, 2004; Bas, Temel, Ersun, & Kivanc, 2005; Buccheri et al., 2007; Kunadu, Ofosu, Aboagye, & Tano-Debrahthath, 2016; Tokuç, Ekuklu, Berber-oğlu, Bilge, & Dedeler, 2009).

The HACCP system was introduced into food industries in Jordan in 1990s since then HACCP and its prerequisite programs have been applied in food service institutions in hospitals to prevent food contamination and foodborne illnesses. The World Health Organization (WHO, 1999) has defined the prerequisite programs as the practices and conditions needed before and during the implementation of HACCP and which are necessary for food safety. Prerequisite programs include documented employee training and written cleaning and sanitation procedures.

There is limited data concerning food safety knowledge of food service staff in hospital environment in Jordan and the risks they pose to the patients. Therefore, the objectives of this research were to assess food safety knowledge among food service staff in private, public and university hospitals in Jordan, determine the groups who need urgent food safety education programs and to provide baseline data for implementing HACCP in hospital food service system.

2. Materials and methods

2.1. Setting

The study was conducted on 36 representative hospitals from 3 different sectors (private, public and university hospitals). The hospitals were conveniently chosen from 90 available hospitals from different regions in Jordan. In these hospitals, the food services are carried out by the hospitals' food service staff (mainly in private and university hospitals) or contracted out by food service company that uses the hospital's kitchen to prepare the meals (mainly in government hospitals). The meals are plated individually according to dietary regimen or patients' choice.

2.2. Data collection

A cross-sectional study was conducted from July to December 2015. Representative convenient sample of 532 food service staff (dietitians, cooks or food workers) were recruited from the selected hospitals. The objectives and the protocol of the study were briefly explained to the interested hospitals and food service staff by a well-trained researcher. Upon initial approval, an informed consent form was signed from each participant in the study. The study protocol was approved by Human Ethics Committee at Jordan University of Science and Technology.

2.3. Questionnaire

The participants were asked to complete a questionnaire that composed of two parts. The first part was developed by the researchers to collect information about general characteristics of food service staff. The second part of the questionnaire was adapted from published, reliable, and valid studies with some minor modifications to assess participants' food safety knowledge (Al-Mohaithef, 2014; Angelillo et al., 2001; Bas, Temel, Ersun, & Kivanc, 2005; Osaili et al., 2013). This part of the questionnaire included 90 questions about food safety aspects: i) personal hygiene (16 questions), ii) cross contamination prevention and sanitation (24 questions), iii) safe storage, thawing, cooking, holding and reheating of the foods (21 questions), iv) knowledge of health problems

that would affect food safety (10 questions), and v) knowledge of foodborne pathogens and related symptoms and illnesses (19 questions). In addition, the questionnaire included 3 questions about HACCP system. The questionnaire was self-administrated but it was answered by face-to-face interview for illiterate participants.

2.4. Questionnaire validity and reliability

Content validity was confirmed by using translation back translation method. The questionnaire was translated from English to Arabic by bilingual investigator (Arabic, English). To confirm the accuracy of translation, another bilingual investigator retranslated the questionnaire back from Arabic to English. The two English versions (original, translated-back translated) were compared to assure no variance in the meaning. Expert panels (fluent in Arabic) examined the Arabic version of the questionnaire and their comments were considered.

Questionnaire reliability, the degree to which the food safety knowledge test is consistent and stable was measured using a test-retest method. The questionnaire was reliable with regard to overall internal reliability ($r^2 = 0.74$).

2.5. Data analysis

Data was analyzed by using the Statistical Package for Social Sciences Version 21.0 (SPSS, Inc., Chicago, IL, USA). Descriptive statistics (means, standard errors, frequencies, and percentages) were calculated for all variables. A multivariate general linear model (GLM) was carried out to identify the relationship between respondents' characteristics and the overall food safety knowledge score. Also, a multivariate GLM was carried out to identify the relationship between HACCP implementation in hospitals and respondents' scores in each of the tested food safety aspect.

In addition, multivariable binary logistic regression analysis using enter method was carried out to identify factors independently associated with high level of food safety knowledge. Respondents' characteristics and perception about the importance of HACCP system were included in the regression models to test their association with overall food safety knowledge level. Findings with a P -value of ≤ 0.05 were considered to be statistically significant. The overall food safety knowledge score of each respondent was calculated by summation of correct answers of the 90 tested questions. Each correct answer was given 1 point while wrong or not sure answer was given 0 point. Respondents' total knowledge scores were divided into quartiles. Respondents who had score above or equal the 3rd quartile of total knowledge score (≥ 75 th percentile) would be considered as having high knowledge level while below 3rd quartile (< 75 th percentile) would be considered as having low level of knowledge. Since the present study participants were hospital food service staff and weakened immune system are common among hospitalized patients, the cutoff point of having high food safety knowledge was set at 3rd quartile (cutoff value is 60).

3. Results

3.1. General characteristics of food service staff

A total of 532 food service staff personal (50.4% males and 49.6% females) participated in the study from 36 hospitals from different regions in Jordan. Seventy two percent, 22% and 6% was recruited from public, private and university hospitals, respectively. The age < 30 years comprised 41.5% of the respondents, the age between 30 and 40 years comprised 36.5% of respondents and the age > 40 years comprised 21.9% of the respondents. About 58% of the respondents

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