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Evaluating levels of knowledge on food safety among food handlers from restaurants and various catering businesses in Vienna, Austria 2011/2012

Juliane Pichler*, Johanna Ziegler, Ulrike Aldrian, Franz Allerberger

Austrian Agency for Health and Food Safety (AGES), Division for Data, Statistics and Integrative Risk Assessment, Department for Data Management, Vienna, Austria

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ABSTRACT

The aim of this study was to detect the most important gaps in knowledge on food safety among food handlers in Vienna, Austria and to identify possible differences in levels of knowledge between food handlers from restaurants and catering companies. The survey was conducted from May 2011 to January 2012 in Vienna and 234 food handlers participated. The average knowledge score for all food handlers was 76%. We revealed no significant difference between the two sample groups; food handlers from catering businesses scored similar (75%) to those from restaurants (76%). Persons with a training at their current workplace (internal and external) scored significantly higher (82%) then persons without an on the job training (71%). Food handlers passing the mandatorily required yearly food safety training had a higher knowledge than persons without this on-the-job training ($p \leq 0.001$); 23% of the food handlers didn't participate in any training during the last year. The study identified substantial knowledge gaps concerning correct temperatures for cooking, holding and storing foods. Data from this project underline the value of harmonized action in the field of food safety, but also indicate considerable potential for further improvement in Austria.

1. Introduction

Foodborne diseases and outbreaks are crucial contributors to morbidity and mortality worldwide (Flint et al., 2005). The total health-related cost of foodborne illness in the United States is $ 51.0 billion in the basic cost-of-illness model (including values for medical care, productivity losses and mortality) and $ 77.7 billion in the enhanced model, including added pain and suffering (Scharff, 2012). No published data for Austria and the European Union are available concerning socio-economic costs of foodborne infections. Globally, the incurred costs and dimensions of foodborne diseases are still unknown but they seem to be substantial (Kuchenmüller et al., 2009).

The European Union Summary Report on Trends and Sources of Zoonoses, Zoonotic Agents and Foodborne Outbreaks – published by the European Food Safety Authority and the European Centre for Disease Prevention and Control – reported 5262 foodborne outbreaks with 43,473 cases, 4695 hospitalizations, and 25 deaths in the European Union for the year 2010 (European Food Safety Authority & European Centre for Disease Prevention and Control, 2012). Thirty-one percent of the outbreaks with strong evidence were associated with restaurants, cafes, pubs, bars and hotels and 17% were linked to catering for schools, kindergartens, residential institutions, temporary mass events and workplace canteens (European Food Safety Authority & European Centre for Disease Prevention and Control, 2012). In Austria, 193 outbreaks involving 838 people, 155 hospitalizations and two fatal cases were reported for 2010. 12 out of 161 domestically acquired outbreaks were associated with eating establishments and 198 persons were involved; 38% of the outbreaks had an unknown setting (Much, Voss, Pichler, & Allerberger, 2011).

In Austria, a large proportion of people is 'eating out' and the number of meals consumed outside the home at lunchtime is likely to increase: 24% of the Austrian population eat regularly in workplace canteens, 21% in restaurants and 16% at fast food premises (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, 2010).

Many different factors may lead to foodborne infections and outbreaks; high risk factors for foodborne disease are food from unsafe sources, poor personal hygiene, inadequate cooking,

* Corresponding author. Tel.: +43 50555 25722; fax: +43 50555 25719.
E-mail address: juliane.pichler@ages.at (J. Pichler).

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improper holding times and temperatures, and cross contamination (U. S. Food and Drug Administration, 2009). Lack of knowledge concerning food safety among food handlers may result in the transmission of foodborne pathogens to the public during food preparation (DeBess, Pippert, Angulo, & Cieslak, 2009). A recent meta-analysis has shown that food safety training increases knowledge and improves attitudes about hand hygiene practices and that refresher training and recurrent emphasis on good food handling behavior may have ongoing positive effects on hand washing practices among food handlers (Soon, Baines, & Seaman, 2012). However other studies found that although special training may improve knowledge of food safety, this does not always result in better and safer food handling behavior (Baş, Şafak Ersun, & Kıvanç, 2006; Park, Kwak, & Chang, 2010). Clayton et al. and Green et al. pointed out that behavioral change and new food safety practices will only be implemented if adequate resources (e.g. structural environment, sufficient staff and time) and a supportive management culture exist (Clayton, Griffith, Price, & Peters, 2002; Green & Selman, 2005). Apart from food safety training, several other factors and food handler characteristics like age (Martins, Hogg, & Otero, 2012), level of education and work experience may affect the knowledge scores (Angelillo, Viggiani, Rizzo, & Bianco, 2000; Martins et al., 2012).

In Austria, little is known about level of knowledge of food safety and practices of food handlers in restaurants and catering companies. The aim of this study was to detect the most important gaps in food safety knowledge among food handlers in Vienna (capital and largest city of Austria, total population: 1.73 million) and to identify possible knowledge differences between food handlers from restaurants and catering companies concerning food safety. Furthermore the study should elucidate any relationships among different food handler characteristics like education, work experience, previous food safety training and food safety knowledge. The results of this survey can improve the efficacy of educational brochures and training materials for different target groups.

2. Materials and methods

2.1. Questionnaire development and data collection

The aim of the survey was to obtain baseline information on knowledge, behavior, and personal hygiene practices of food handlers, as well as data on food establishment characteristics. The basis of the questionnaire was developed within an international hygiene study on food handling knowledge from the University of Illinois at Chicago School of Public Health, Division of Epidemiology and Biostatistics (Dworkin, Udompat, Panchal, & Liu, 2011; Panchal, Liu, & Dworkin, 2012). Besides Chicago and Vienna, the questionnaire was applied in two other studies, conducted in Neuchâtel, Switzerland (Panchal, Bonhôte, & Dworkin, 2013) and Bolzano, Italy. The English questionnaire was translated into German and adapted to the Austrian food law and food handling requirements. Meetings with experts from the Vienna Chamber of Commerce and the University of Vienna, Department of Nutritional Sciences led to questionnaire adjustments. After pilot testing was completed, the final survey instrument was launched.

The knowledge assessment part of the questionnaire consisted of 42 knowledge questions addressing relevant topics like appropriate handling of high risk food groups, correct storage, processing and cooking of food, proper temperatures for heating and cooling food, correct hand washing and whether to work while ill. Additionally, participants were asked about their personal hygiene, socio-economic data, work experience, work tasks and their history of food safety training. Data on food service establishment characteristics like restaurant size, food service style, cuisine-type and average entrée price were also collected (data not shown). The questionnaire included true–false, yes–no, multiple-choice and fill-in-the-blank questions and the possibility to answer 'do not know'. The interviewers insisted that the questionnaires were completed during their visit to preclude the participants from looking up information and being supported by workmates. The food handlers were able to ask the interviewer in case of any language difficulties or ambiguity concerning the questions. No compensation was offered to the food handlers for participating. The German questionnaire was translated back into English for this publication.

2.2. Study samples

The survey was conducted from May 2011 to January 2012 in Vienna and involved 234 food handlers. The study population consisted of 157 restaurant food handlers and 77 food handlers from catering businesses. Of the 77 catering food handlers, 40 worked for the Austrian Armed Forces and 37 for private catering companies. For the restaurant study sample a member list of 2037 restaurants in Vienna was used, provided by the Vienna Chamber of Commerce. Out of this list, 279 restaurants were selected as a random sample to be approached and 235 agreed to take part in the survey in the first approach. Each of the 235 restaurants (food service styles fast food, informal and formal) was contacted by phone to arrange a date for an on-site interview; 64% of the restaurant managers agreed to participate in the survey with at least one food worker. Finally, 157 food handlers (managers and ordinary workers) from 150 different restaurants in Vienna were interviewed by a self-administered questionnaire. The 40 food handlers from the Austrian Armed Forces, working with a cook & chill technique, were interviewed in four different facilities in Vienna, including one central kitchen and three finalizing kitchens. In three different private catering businesses 37 persons out of a total staff of 89 persons agreed to be interviewed.

For statistical analysis participants were condensed to two sample groups: restaurant food handlers and food handlers from various catering businesses (private caterings and participants from the Austrian military services). All 234 participants of the survey were assured of confidentiality.

2.3. Statistical methods

Statistical analysis was performed using SPSS 20.0 for Windows (SPSS Inc, Chicago, IL). The relative knowledge score (the percentage of the correct answers) was calculated by dividing the sum of correct answers by the total number of valid responses. "Relative" refers to the relation of correct answers in terms of total (valid) responses. In the following discussion of the knowledge score, the relative reference is implied. *T*-tests were performed to compare the knowledge scores between two groups-categorical variables, such as gender. Analysis of Variance (ANOVA) models were carried out to compare knowledge scores across levels of categorical variables between more than two groups, such as age or level of education. To identify knowledge gaps among food handlers, chi square tests were used to compare the percentage of correct responses to each of the 42 questions across the two sample groups (food handlers from restaurants, food handlers from catering businesses). To identify effects to the food handler knowledge score, multivariate analysis was carried out using a general linear model. The backward selection method with a level of significance <0.05 was used to determine food handler characteristics and food establishment variables that remained in the final multivariate model.