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Evaluation of prerequisite programs implementation at schools foodservice

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ABSTRACT

Introduction: Strengthening food safety measures in schools would improve protection of students and school staff from outbreaks of foodborne illness. The main objective of this study was to evaluate the non-conformities in prerequisite programs implementation at school foodservice.

Methods: This descriptive study was conducted between October and December 2011 involving 88 school foodservice units at a Portuguese Municipality. Each school foodservice was audited using a hygiene-sanitary checklist including 146 statements by the same nutritionist. Prerequisite program procedures were evaluated after categorization as standard operating procedures, sanitation and hygiene procedures and procedures for receiving and storage of foods. Food safety procedures and practices were compared between cooking and distribution food units and according to the number of meals produced daily.

Results: Non conformities were detected concerning several safety practices such as incorrect thawing, temperature control of freezing equipment and cooked food, segregation between stored food and detergents and disinfectants, procedures used for handling waste, cleaning and sanitizing.

Only 40% of foodservice units evaluated recorded temperature of cooked meals. All foodservice units audited revealed non conformities on cleaning and disinfection practices of equipment and facilities. Adequate labeling of stored items was properly done at 85% of units. Handling waste was undertaken incorrectly by all food handlers in this survey.

Reasons identified for inappropriate personal hygiene practices were mainly lack of resources and conditions for correct hand washing procedure.

No significant relationship was found between food safety procedures and practices and number of meals produced or served. Distribution food units failed safety checks in aspects such as food-handling practices and temperature control of cooked meals, more frequently than cooking units.

Conclusion: Results indicate an urgent need for food safety training of personnel and point out to the need of continuous supervision by managers. It is also important to define standard operating procedures that include food safety components and improve employee motivation and responsibility.

1. Introduction

Governments' attention to food safety has been increased due to the potential health and economic impact of foodborne outbreaks (Albrecht & Nagy-Nero, 2009; WHO, 2008). Foodborne disease is a matter of concern for vulnerable groups such as infants and young children (Albrecht & Nagy-Nero, 2009). Ensuring food safety for these groups by foodservice operations is critical. The most commonly reported reasons by several authors were food preparation practices contributing to foodborne outbreaks are improper heating of foods followed by inadequate handling, cross-contamination, poor hygiene, improper food storage and food contaminated by food handlers (Daniels et al., 2002; Osimani, Aquilanti, Babini, Tavoletti, & Clementi, 2011; Panisello, Rooney, Quantick, & Stanwell-Smith, 2000).

In recent decades, important lifestyles changes determined deep modifications on food consumption (Kearney, 2010). Additionally, families usually work far from home and the period children have to stay at schools are longer determining an increased number of children who have lunch at school (Aranceta Bartrina et al., 2008). This situation allowed the development of the foodservice industry, contributing to the increasing importance of school meals on children's daily food intake (Bes-Rastrollo et al., 2010).

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Foodborne outbreaks are frequent in semi-enclosed environments, such as school settings due to the increased number of people and increased personal contacts among them (Mellou et al., 2013).

Children spend most of their daily time at school and obtain up to 47% of their calories from meals and snacks consumed there (Briefel, Wilson, & Gleason, 2009). In Portugal, municipalities are the entities responsible for ensuring safety of meals served at primary schools and to supervise hygienic conditions of schools' foodservice according to European legislation. This control is achieved daily by hygienic audits to school canteens performed by a trained nutrition technician according to national recommendations. The results are summarized in a report that is sent to school director and to the responsible at the municipality (Graça et al., 2001). School meals in Portugal are leased to private companies that are responsible for preparing and distributing meals at schools (Barbosa, Ávila, & Rocha, 2012).

Developing or strengthening prerequisite program is one of the first steps building effective Hazard Analysis Critical Control Point (HACCP) systems. Pre-requisites are considered a basic pillar on which to build a solid self-control system. They are indispensable to the development and implementation of a successful HACCP plans (Henroid & Sneed, 2004; Wallace & Williams, 2001).

Prerequisite programs should include areas such as supplier control, temperature monitoring, personnel hygiene standards, pest control, written specifications, written cleaning and sanitation procedures and documented employee training (Youn & Sneed, 2003).

Major problems identified in the catering industry were insufficient knowledge, lack of personnel training, high staff turnover, large variety of products, low employee motivation and absence of prerequisite programs (PRPs) (Bánáti & Zoltán, 2012).

Nutrition professionals need to assess the current status of food safety prerequisite programs in their operations and standard operating procedures should be developed and implemented in school foodservice operations (Henroid & Sneed, 2004).

Scarce information is available for evaluating food safety prerequisite programs implementation at school foodservice units either in Portugal (Barros, Lameiras, & Rocha, 2008; Liz Martins & Rocha, 2011).

The main objectives of this study were to determine food safety procedures and practices used in school foodservice related to prerequisite programs and to evaluate non conformities in prerequisite programs implementation at school foodservices.

2. Materials and methods

2.1. Sample selection

A random sample of 88 public school foodservice at a Portuguese municipality in the north of Portugal was included in this descriptive study. These schools attend children aged 3–10 years old. The number of meals served at each school daily varied between 75 and 350. Food service units audited included cooking units (where meals are prepared and cooked) and distribution units (units without kitchen where meals are served).

2.2. Data collection

Data were collected between October to December 2011 using a Hygiene-sanitary checklist specific for school canteens (Rocha et al., 2009.) including 146 statements related to implementation of HACCP and prerequisite programs such as Facilities and buildings; Equipment and utensils; Waste management; Personal hygiene; Sanitation; Storage; Documentation and Training. Yes/no responses were checked for each item. The checklist was previously tested in a school food unit that was not included in the final sample. Evaluation was undertaken in all school foodservice by the same nutritionist. Each school was visited several times and the technician stayed at the food unit at least 2 h during meals production and distribution.

Assessment of school foodservice included observations of food preparation and service. In addition to observations, objective measurements such as food temperatures, temperatures of refrigerators and freezers were taken using a calibrated digital thermometer (FLUKE, Foodproplus thermometer, USA) and recommended procedures.

Prerequisite programs procedures were classified as standard operational procedures; sanitation and hygiene procedures and procedures for receiving and storage of foods.

Comparison of food safety procedures and practices between cooking and distribution food units was made, as well as according to the number of meals served daily.

Table 1
Percentage of adequacy of checked procedures concerning food temperature control, food storage, facilities and equipment and personnel ($n = 88$).

Food temperature control	
Take and record end-point temperatures of all cooked foods	40%
Hot foods held above 60 °C	78%
Cold foods held at 5 °C or below	73%
Adequate cooling of cooked/prepared foods	94%
Take food product samples	97%
Storage	
Adequate dry storage temperature	92%
Raw and cooked foods stored separately	86%
Food stored in proper containers	100%
Freezer and refrigeration temperatures are checked at least daily	60%
Freezer and refrigeration temperatures are documented with corrective action when appropriate	100%
Foods are properly labeled and dated	85%
Facility/Equipment	
Proper hand washing sink is located in food preparation area with proper drying	40%
Walls, floors, ceiling, lighting adequate for food production	100%
Food contact surfaces are clean, designated and maintained	86%
Areas are properly ventilated, clean and maintained	78%
Non-food contact surfaces are clean and maintained	78%
Adequate ware washing facilities	94%
Correct handling waste	0%
Personnel	
Proper personal hygiene practices observed	40%
Employees observed with hair restraints and clean uniforms	60%
Employees observed washing hand as needed	28%

2.3. Statistical analysis

All statistical analyses were conducted using SPSS® for Windows (version 20.0). Parametric tests were used to statistical analysis. Chi-square test was used to verify differences for each item between cooking and distribution units. *T*-test was used to determine differences for items evaluate according to the number of meals. Statistical significance at $p \leq 0{,}05$ was used for all tests.

3. Results and discussion

3.1. School foodservice characterization

Attendance rate to the school canteen was 62,5% and school foodservices served approximately 6000 meals daily. Concerning these figures, the potential impact of improving food safety practices in school foodservice operations on Public Health could be significant.

From 88 schools foodservice evaluated, 52 were cooking units and 36 had transported meals (holding hot). All the meals were