

Foodborne outbreaks risk mitigation “from epidemiologic investigation to school education”

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Introduction

Foodborne outbreaks (FBO) caused by consumption of contaminated foods represent an important cause of morbidity and mortality worldwide. FBO epidemiological surveillance data analysis is essential to identify their risk factors, to be used as scientific evidence to support their risk management and burden mitigation activities. Prevention of FBO can be optimized by teaching good food safety practices to different target populations, including consumers, food handlers and health educators.

Purpose

Develop, adapt and implement school educational materials on food safety, for different school levels, in order to contribute to the prevention of FBO in Portugal, by empowering students to make more informed choices and to adopt better and safer food practices, aiming for a healthier life.

Material and Methods

1. Identification of FBO risk factors: FBO investigation data, obtained at National Institute of Health (INSA), from 2009 to 2013, were compiled and analysed^{1,2}, leading to the identification of FBO risk and contributing factors^{3,4};
2. Identification of Good Food Safety Practices: Good preventive practices were compiled and published in a Consumer Good Practices Guide⁵ (CGPG), disseminated in INSA website, based on the characterization of bad practices, identified as risk to the occurrence of the FBO;
3. Elaboration of School Educative Material: the CGPG scientific content was adapted to the different school curricula levels, through collaboration between health and education sectors;
4. Dissemination of School Educative Material: the material were made available on the website of INSA and will be disseminated at school meetings all over the country.

Results and Discussion

Considering the 84 documented FBO that occurred in Portugal between 2009-2013, from food products analyzed in INSA laboratories, the majority occurred in domestic kitchens (29%) and canteens (26%) and the major food vehicle was mixed meals (70,3%)^{3,4}. Considering EFSA's code system, FBO occurrence and contributive factors are shown in Figure 1.

To tackle these factors, through food safety education targeted to consumer's risk, was elaborated and disseminated at INSA website School Educative Material adjusted for different educational stages : 2 powerpoints (Figure 2), 1 flyer (Figure 3) and 1 learning assessment questionnaire of students after class. Currently, all material developed is being presented to several teachers of different country regions, to raise awareness of transmitting this knowledge in their classes.

Separate raw from cooked foods

- Raw foods can contain fluids or blood with micro-organisms, which can be transferred during preparation or storage to other ready-to-eat foods, making them a risk to the consumer
- The proper handling of food can prevent food-borne diseases:
 - Separate raw and cooked food, either in storage as in the preparation and cooking
 - Wash your hands after touching raw food
 - In the refrigerator, keep cooked food on the upper shelves and raw food on the bottom shelf
 - Use different clean equipment and utensils (knives, cutting boards) to handle raw and cooked foods
 - Place the frozen food in packages or containers (plastic, glass or stainless steel) to avoid cross-contamination, which is the transfer of microorganisms from contaminated foods (especially raw foods) to non contaminated foods (namely cooked or ready-to-eat foods)

Cooking the food thoroughly

- Minimize the time between cooling and cooking, cooking and consumption, cooking and cooling and cooling and consumption
- Cook, heat or reheat the food to more than 70° C to kill the micro-organisms making sure that juices are clear, not pink (e.g. meatloaf, large pieces of meat, whole birds)
- Make sure that all the food was wholly subjected to safe temperature in stove, oven, grill and specially microwave oven
- Taste the food using only once clean utensils
- Cover the food to be consumed, to avoid contamination
- Keep warm dishes above 60° C, in stove or oven, until the moment of consumption
- Keep cold foods in the refrigerator until the time to serve
- Avoid manipulating the cooked food with your hands. Use clean spoons, spatulas (others)
- Refrigerate promptly all cooked and perishable food, preferably below 5°C.
- Do not leave cooked food at room temperature for more than 2 hours

When shopping food

When storing/preparing food

By maintaining hygiene and cleaning

By separating raw food from cooked food

By cooking the food thoroughly

Food shopping

- Make a shopping list
- Choose good quality foods
- Separate raw and cooked foods
- Keep foods at a safe temperature (placing them in isothermal bags)
- Choose a variety of fresh and safety processed foods (e.g., pasteurized)
- Do not buy spoiled food
- Check the good condition of the package
- Read the label of the food product: name, origin, nutritional information, conservation mode, expiration date, method of preparation/cooking and other important information
- Buy food at room temperature first and lastly the chilled and frozen one, keeping them in isothermal bags
- Do not buy frozen food showing ice crystals (it has already thawed)
- Buy only foods within the period of validity
- Take the food home as soon as possible. If some food thaw on the way home, keep it refrigerated and cook it as soon as possible

Food preparation

- Keep kitchen areas, tools and equipment clean and dry before and after use and between different tasks, especially after handling raw foods
- Do not use food beyond its expiry date
- Do not thaw frozen food at room temperature
- Keep and handle raw and cooked food separately, washing your hands often and not using the same utensils
- Fix and clean up spilled food, dirty surfaces and equipment used as you go preparing/cooking food
- Wash thoroughly, under running water, eaten raw foods (fruits, vegetables)

Maintaining hygiene and cleaning

Wash your hands with drinking water before/during/after the preparation of food (especially after touching raw food) and after going to the bathroom, touching pets and garbage or smoking

Correct washing of the hands:

- 1- Wet your hands with warm running water
- 2- Lather your hands with SOAP
- 3- Carefully wash the spaces between the fingers, the back and the palms of hands, thumbs and nails
- 4- Rinse with warm running water
- 5- Soaping your hands again, rubbing them for 20 seconds at least
- 6- Rinse with warm running water
- 7- Dry with a single use disposable paper towel to prevent the further spread of micro-organisms by wet hands or by multiple uses of dishcloths

Hygiene rules

- Wash and dry tools and equipments before and after use (cutting board, steamers, knives, cleaning cloths, mops), especially after handling raw foods
- Use clean utensils for cooked foods
- Wash and dried the dishes and other utensils preferably after meals
- Change the cloths and towels daily
- Place the remains of raw or cooked foods in the dustbin with lid and pour it and clean it daily
- Protect kitchen areas and food from insects, pests and other animals

Figure 3: Educative material (flyer)

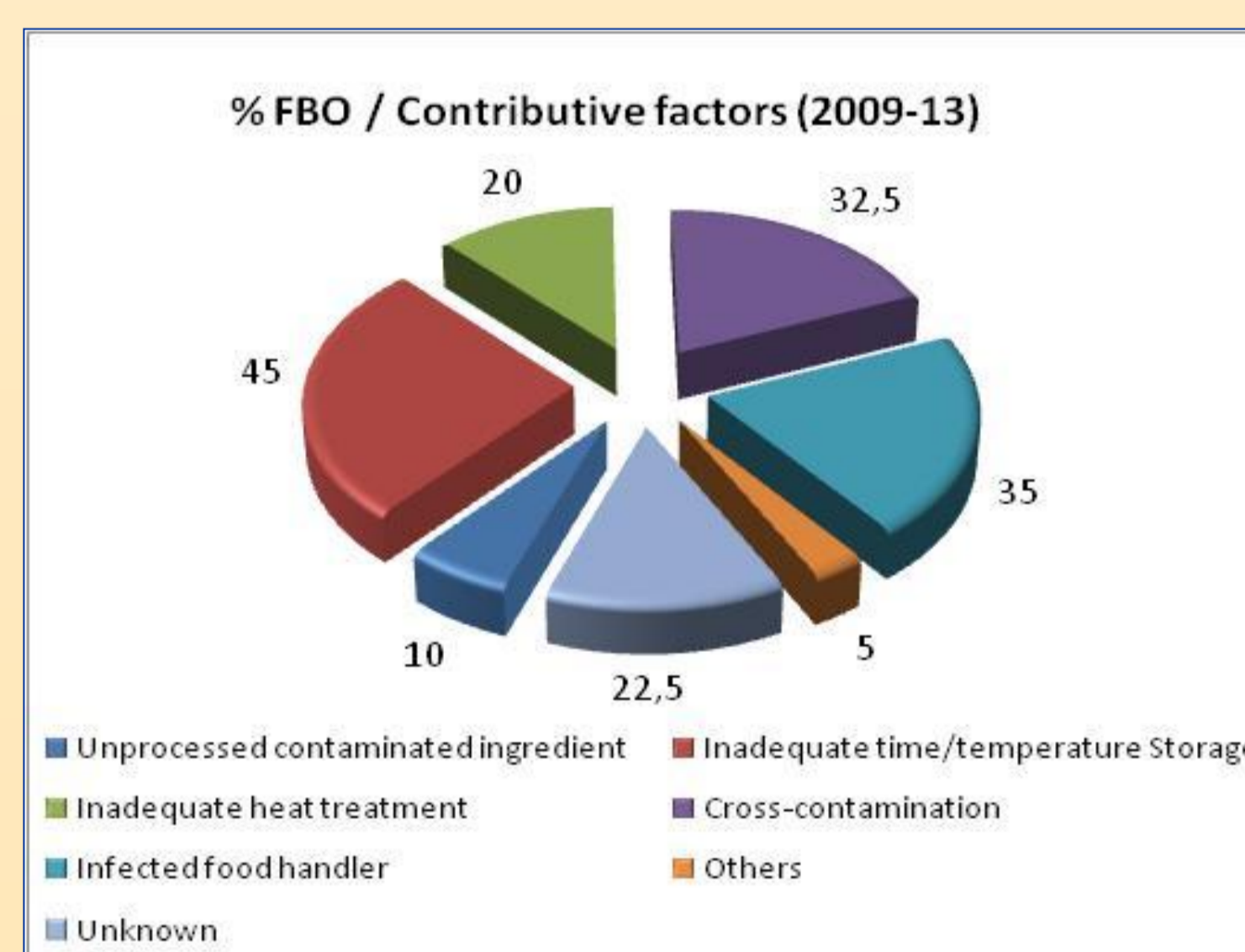


Figure 1: FBO contributive factors

Foodborne outbreak prevention

Food Hazards (hazards: microbes)

What is the temperature that bacteria like? 5°C → 60°C

Conservation of perishable foods
Avoid the multiplication of microorganisms

Forbidden zone

Conservation of perishable foods
Avoid the multiplication of microorganisms

Foodborne outbreak prevention

Food Hazards (hazards: microbes)

How bacteria multiply overtime?

0h: 1 bacterium
4h: 4 thousands
7h: 2 millions

Figure 2: Educative material (powerpoint)

Conclusions

- Data from epidemiologic and laboratory investigation of FBO can be used as scientific evidence to develop policies and strategies such as the elaboration of educative materials, directing their contents, design and implementation according to the target populations, to change consumer risk behaviour and improve FBO prevention
- The collaboration between the National Institute of Health and Schools promotes the students' education from early stages and along all levels of undergraduate school to achieve a generation more aware for the importance of prevention of FBO to reduce their associated morbidity and mortality.

References

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