

Leftovers and Other Food Safety Information for iPhone/iPad Application (“Smartphone” Technology)

Julie A. Albrecht, PhD, RD¹; Carol Larvick, MS²; Ruth E. Litchfield, PhD, RD³; Christopher Weishaar, BS⁴

INTRODUCTION

Foodborne illness continues to be a public health concern in the United States (US).¹ Each year, an estimated 48 million Americans (1 in 6) become ill, 128,000 are hospitalized, and 3,000 die from foodborne illness.¹⁻³ *Clostridium perfringens* is cited as causing 1,606 outbreaks (second highest) and *Bacillus cereus* caused 164 outbreaks (sixth highest) in which a pathogen was known as the causative agent.^{2,3} Both of these pathogens have been associated with improper cooling and storage of leftover food. To educate consumers on safe food handling practices in their homes, The Partnership for Food Safety Education has developed the *Fight BAC!* messages of clean, separate, cook, and chill.⁴ One of the Healthy People 2020 objectives focuses on increasing the proportion of consumers who follow these key food safety practices (clean, separate, cook, chill).⁵ Leftover food safety involves properly chilling and reheating (cooking) food when appropriate.

Children are at heightened risk for foodborne illness and are disproportionately affected by 4 foodborne microorganisms: *Campylobacter*, *E.coli* O157:H7, *Listeria*, and *Salmonella*.⁶⁻⁸ This heightened risk for foodborne illness is a result of undeveloped immune systems and lower body

weights susceptible to smaller amounts of pathogens that can cause illness. Another risk factor for children is the handling of food by others who may have poor or unsafe practices.⁹ The main food preparers in families with young children in 2 Midwestern states identified safe handling of leftover food as a concern.¹⁰ These leftovers consisted not only of food remaining from preparing large batches of food, but also food taken home from a deli, takeout restaurant, fast food, and “doggy” bags. A similar concern was also found in a nationwide survey conducted with the main food preparers in families with young children.¹¹ Resources on safe handling of food and proper storage are needed to help consumers prevent foodborne illness. For young families, use of technology may allow convenient access to food safety resources when information is needed. Approximately one third (35%) of adults in the US have smartphones that are used daily to access e-mail and the Internet. Of these adults, 58% are between 25 and 34 years of age.¹² Smartphone applications are delivering information for Extension audiences in other areas.¹³ Using smartphone technology is an innovative method of delivering information to young families with children who have questions about safely handling leftovers and other food.

PROJECT DESCRIPTION

The objective of this project was to develop an iPhone/iPad application to inform families with young children on safe food handling of leftovers and other food, and the risk of foodborne illness for a wide range of food products. Focus groups and a survey examining food handling beliefs, knowledge, and practices based on the Health Belief Model indicated families with young children were unsure or unaware of leftover food safety.¹⁴ Social marketing strategies were used in the delivery of the *4 Day Throw Away* educational program.¹⁵ The *4 Day Throw Away* Application was developed in cooperation with a private company with the technology and experience to convert a database of information into an easy and attractive format for consumer use. Numerous state Extension publications on food storage, and in some cases, retail food Web sites, were used to create the database, which consisted of 15 food groups and over 300 individual food items.¹⁶⁻²⁰ The groups were: Baby Food; Bakery Goods and Mixes; Beef, Pork, and Meat Dishes; Beverages; Cereal and Pasta; Dairy; Eggs and Egg Dishes; Fish and Seafood; Fruits; Leftovers and Take-outs: Other Foods; Poultry and Poultry Dishes; Spices, Herbs, Condiments, Extracts; Vegetables; and Wild Game. Within each food group, the number of food items ranged from 1 (Baby Food) to 46 (Dairy, and Other Foods). The database included the following information for each food item: (1) recommended storage time at room temperature (70° F); (2) recommended storage time in refrigerator (40° F or lower); (3) recommended storage time in freezer (0° F or lower); (4) heat or reheat temperature; (5) foodborne microorganism associated with the food; and (6) special information

¹Department of Nutrition and Health Sciences, University of Nebraska–Lincoln, Lincoln, NE

²University of Nebraska–Lincoln Extension, Dakota City, NE

³Department of Food Science and Human Nutrition, Iowa State University, Ames, IA

⁴Communications and External Relations, Iowa State University, Ames, IA

Address for correspondence: Julie A. Albrecht, PhD, RD, Department of Nutrition and Health Sciences, University of Nebraska–Lincoln, 119 LEV, Lincoln, NE 68583-0807; Phone: (402) 472-8884; Fax: (402) 472-1587; E-mail: jalbrecht1@unl.edu

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specific to the food such as “Refrigerate leftovers within 2 hours,” “Do not feed baby from jar,” “Separate leftovers into smaller portions and store in shallow containers to allow quicker cooling,” and “If you are pregnant, heat to 165°F.”

Navigation screen shots of the application are shown in the Figure. The first (and main) tab, “Food Groups,” initially presents a table of the 15 food groups as the beginning layer of navigation. The second tab or layer is a table listing the food items within the selected food group. After selection of a food item, the third layer presents food safety details of the item. The last layer allows selection of a foodborne microorganism associated with the food item to display detail on the foodborne illness. The “Search” tab allows the user to search for a food item and select from a list of matching items. The application was launched and promoted by news releases and social media channels.

IMPACT AND IMPLICATIONS

Within 6 months of application launch, 1,924 actual users and 6,429 total sessions have been measured, indicating that users are accessing the information multiple times. The unsolicited online rating of 4+ includes positive comments of simplicity of use, convenience, and helpful information. Databases of information typically presented in extension publications or Web sites can be easily transformed into an application using a spreadsheet to organize information. When developing an application, identifying content uses the same approach required for any Extension publication (hard copy or Web-based). The benefits of using applications for education and outreach are many. One benefit is the ability to conveniently update content as needed. Other features can be added as technology becomes available. For example, after the *4 Day Throw Away* Application was launched, an “alert” feature was added. This feature allows the user to enter a food item into the application when the food is placed in the refrigerator or freezer. The user will receive an “alert” when that item should be used or discarded.

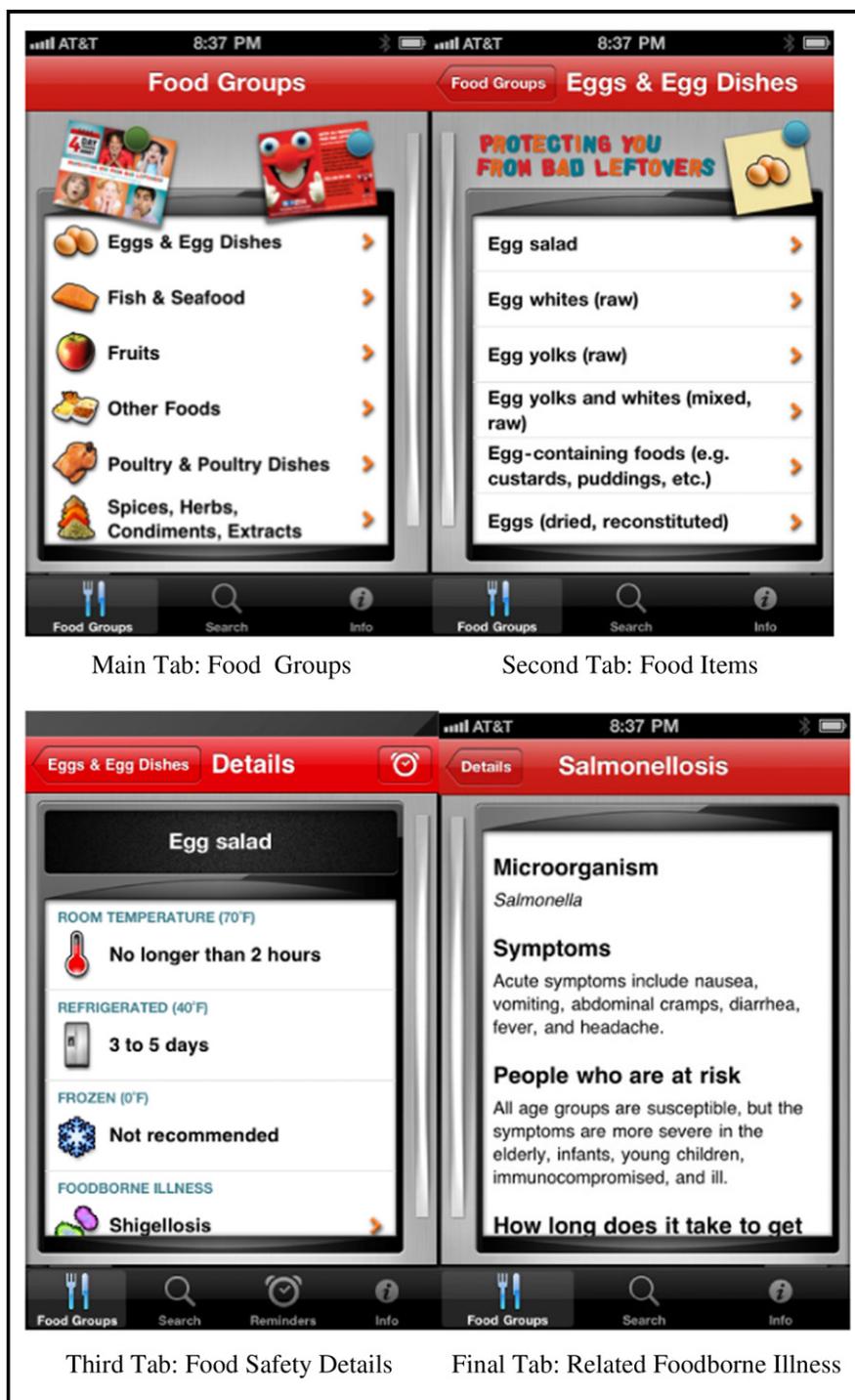


Figure. Navigation Screen shots of the *4 Day Throw Away* application.

The development of the *4 Day Throw Away* Application used research conducted with families with young children and was part of a larger social marketing campaign using social media to help parents of young children properly handle leftover food.^{10,11} Extension's use of mobile smartphone technology and application venue offers tech-savvy

consumers immediate access to food safety information for avoiding foodborne illness associated with improper handling of leftovers and other food.

NOTES

The University of Nebraska-Lincoln Institutional Review Board determined that this project did not require

institutional review board approval. This project was conducted as part of the US Department of Agriculture Food Safety for Families with Young Children, USDA-CSREES Project 2008-51110-19237. Rade | Eccles iOS Application Development provided the technology support for the application development.

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