Food Safety Research Consortium

A MULTI-DISCIPLINARY COLLABORATION TO IMPROVE PUBLIC HEALTH

Purpose and Key Attributes of the Foodborne Illness Risk Ranking Model

Background

Scientists and public health regulators in the United States have long used the science of risk assessment to make careful, science-based decisions about specific food safety hazards, helping earn the reputation of the U.S. food safety regulatory system as being among the best in the world.

Food safety remains, however, a difficult and dynamic problem. With changing demographics and eating patterns, microbiological hazards have come to the fore as an important food safety challenge. The Centers for Disease Control and Prevention (CDC) estimate that there are 76 million foodborne illnesses each year, with an associated 325,000 hospitalizations, and 5,000 deaths (Mead et al. 1999). These challenges have led to calls by the National Academy of Sciences (IOM 1998) and the General Accounting Office (GAO 2001) for a more science- and risk-based food safety system, which includes the ability to allocate the system's efforts and resources in a manner that makes the best use of available resources to reduce the risk of illness.

Need for Decision Tools

Most food safety experts and stakeholders embrace this commonsense goal, and the regulatory agencies have made significant efforts in recent years, within the bounds of their statutory mandates and resources, to focus their efforts on the most significant food safety hazards (Taylor et al. 2003). The vision of a science- and risk-based approach to food safety requires building on these efforts and taking a more integrated, systems approach to reducing the risk of foodborne illness. This includes understanding the many factors that can contribute to the causation and prevention of foodborne illness from the point of production to the point of consumption and being able to systematically target efforts – including research, regulation, education, and private initiatives – in ways that contribute most effectively to risk reduction.

This approach to food safety requires decision tools and data that do not currently exist. Food safety decision makers need tools that enable them to look at the food system as a whole and, on the basis of the best available data and analysis, (1) identify the most significant risks from a public health perspective, (2) prioritize opportunities to reduce risk, taking into account the feasibility, effectiveness, and cost of possible interventions, and (3) allocate their efforts and resources accordingly. The Food Safety Research Consortium (FSRC) is embarked on a multi-disciplinary, multi-institutional effort to develop these tools. The FSRC is also working with the food safety agencies and stakeholder community to build an understanding of how the systems approach to food safety can work and to foster the collection of data needed for that purpose.

Purpose of the Risk Ranking Model

The first major FSRC project is the development of a model, called the Foodborne Illness Risk Ranking Model (FIRRM), to rank the public health impact of specific foodborne hazards. This is a key food safety decision tool because any data-driven, risk-based approach to setting priorities and allocating resources should begin with an understanding of which hazards in the food supply have the greatest adverse impact on public health. In the end, allocation of resources in a science- and risk-based food safety system will be guided by many factors, including the feasibility, effectiveness, and cost of possible interventions. However, the analysis should begin with the most significant risks to public health.

As explained in the FIRRM Methodology Primer (FSRC 2003), the model the FSRC is developing can help meet this need by integrating three major streams of data to produce its risk rankings: (1) data on the incidence of illness and the severity of health outcomes associated with specific pathogens, (2) data that permit the attribution of illnesses caused by specific pathogens to a food or food category, and (3) data that place a value on the health outcomes for purposes of comparing public health impacts of specific pathogen-food combinations.

Key Attributes of the Model

The FIRRM is intended to serve as a flexible tool for analyzing the relative public health importance of foodborne hazards. It does not provide a single "right answer" to this question but rather is a tool analysts can use to integrate available data and look at it from a number of different angles. The model has thus been designed to have these attributes:

- **Transparency** – The model's structure and the assumptions and methods underlying both the structure and the data incorporated in the model are readily discernible and explained to the analyst.
- **Flexibility** – The analyst can choose from among several ranking parameters and data sets and can alter many of the assumptions underlying the model and data.
- **Adaptability** – The model can be updated readily as new data become available.
- **Accessibility** – The model will be web accessible and can be downloaded to PCs with modest software costs.

Next Steps

Key steps to making the model more useful for policymaking are:

- Improving the food attribution approach to better incorporate sporadic cases.
- Incorporating relevant, more refined incidence data from CDC's FoodNet and other sources.
- Completing the valuation of pathogen-specific health outcomes.
- Developing an approach to comparing chemical and microbiological hazards.

References

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