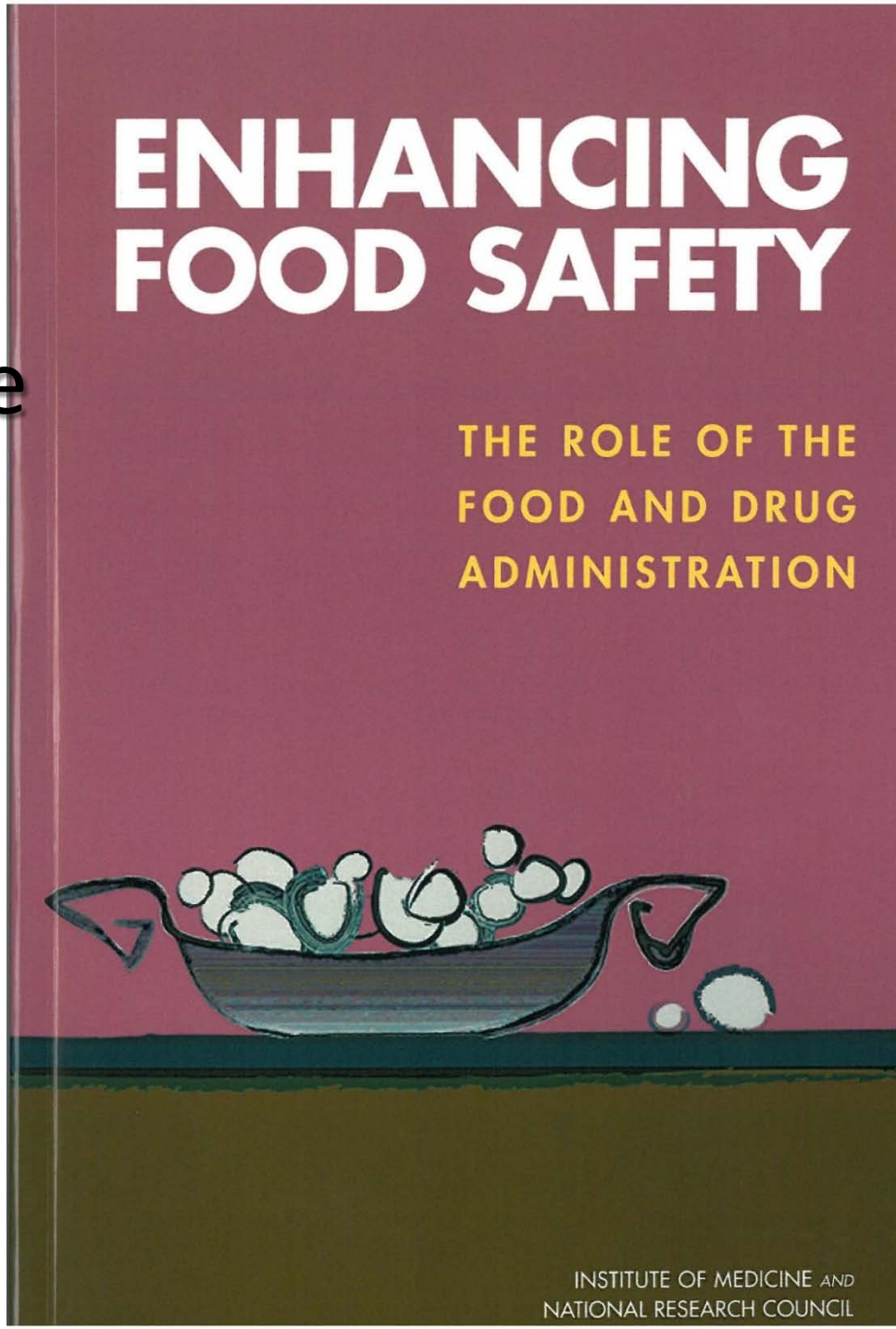
Risk Prioritization for Imports

J. Glenn Morris, Jr., MD, MPH&TM
Emerging Pathogens Institute
University of Florida

Approaches to Control of Foodborne Illness

- Risk-based
- Data intensive
  - Strategic data collection
  - Improved access to data
  - Modern Information Technology
  - Increased analytic capacity



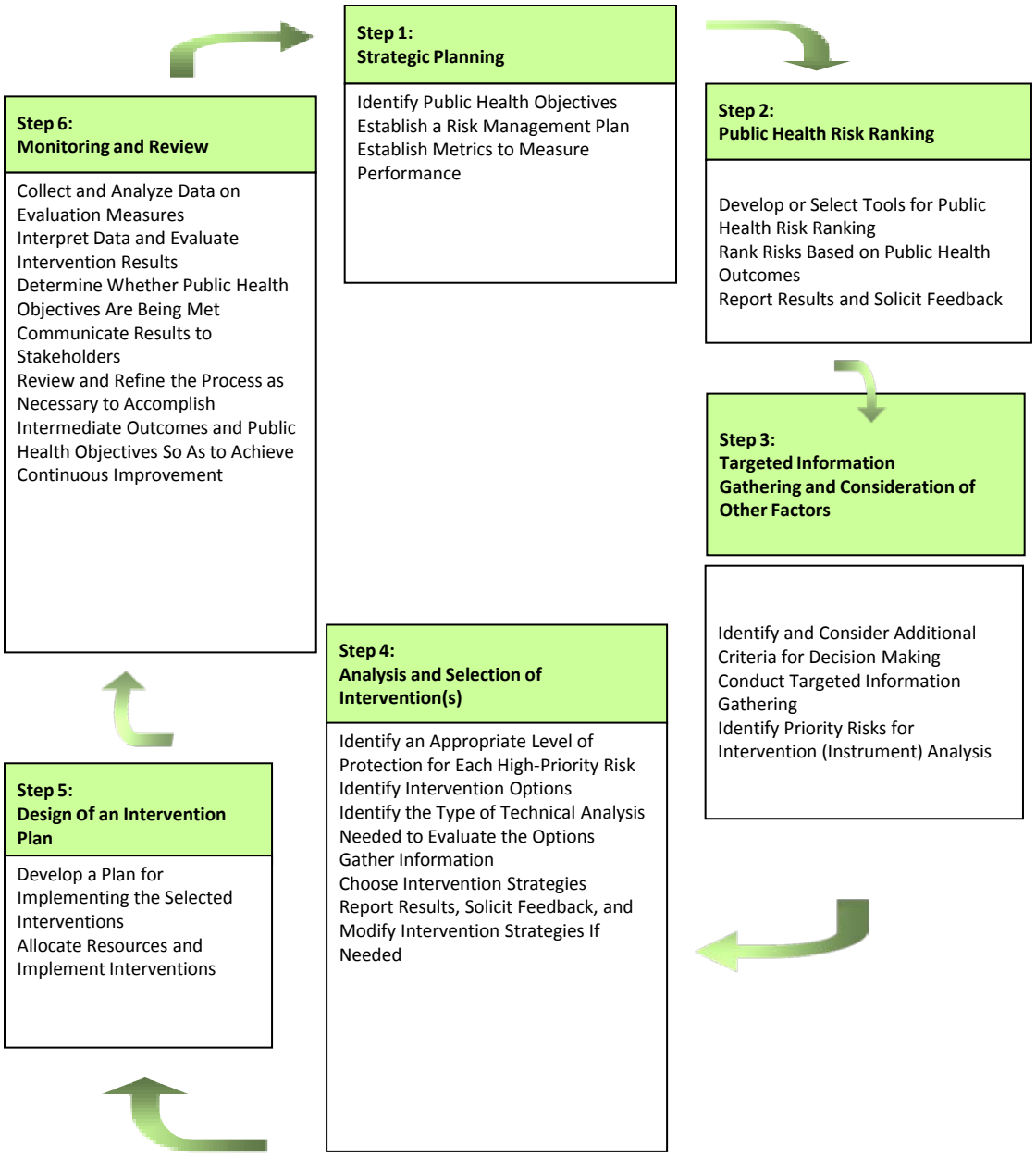
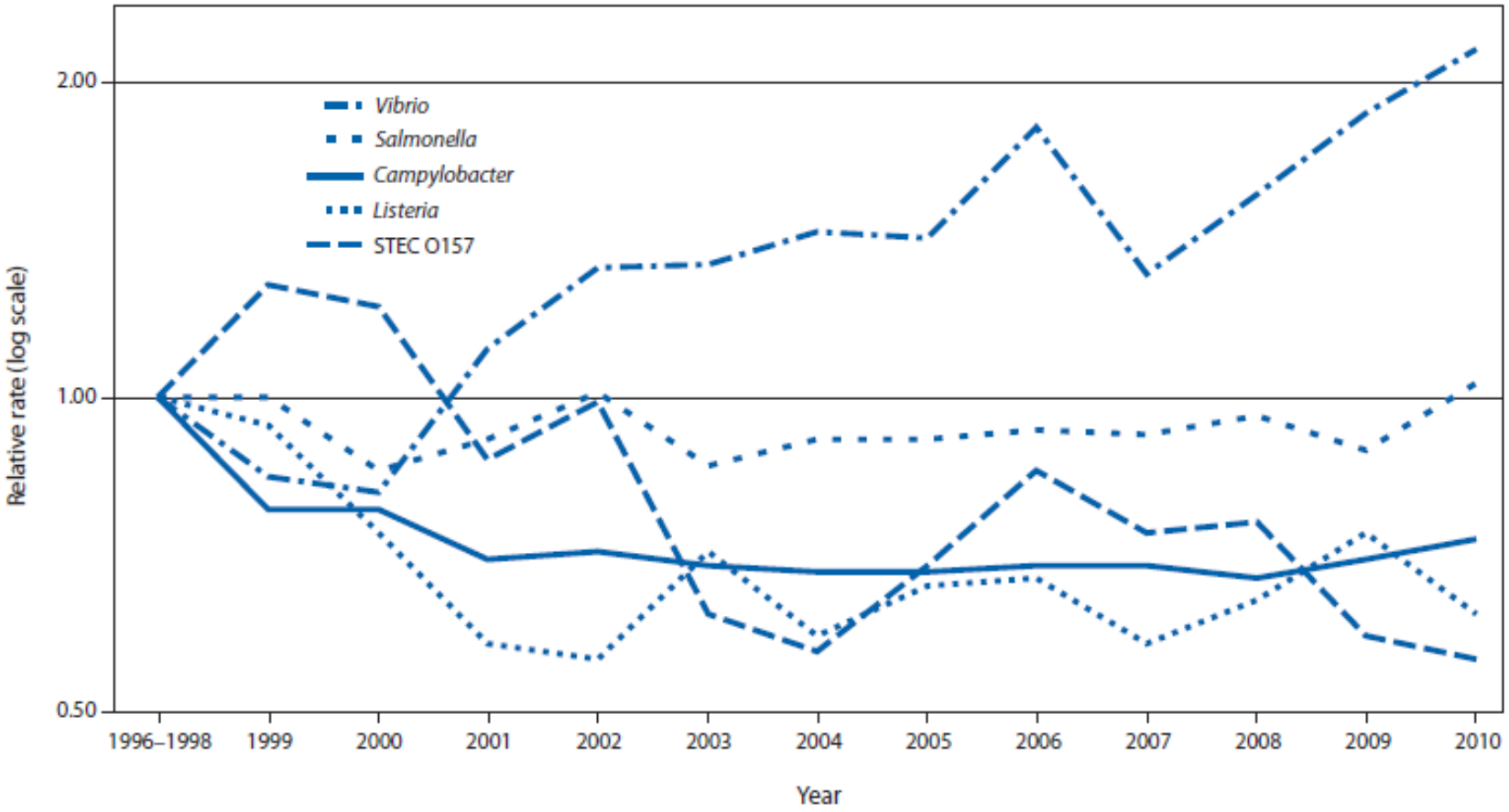

Step 1:
Strategic Planning
Identify Public Health Objectives
Establish a Risk Management Plan
Establish Metrics to Measure Performance
Step 2:
Public Health Risk Ranking
Develop or Select Tools for Public Health Risk Ranking
Rank Risks Based on Public Health Outcomes
Report Results and Solicit Feedback
Step 3:
Targeted Information Gathering and Consideration of Other Factors
Identify and Consider Additional Criteria for Decision Making
Conduct Targeted Information Gathering
Identify Priority Risks for Intervention (Instrument) Analysis
Step 4:
Analysis and Selection of Intervention(s)
Identify an Appropriate Level of Protection for Each High-Priority Risk
Identify Intervention Options
Identify the Type of Technical Analysis Needed to Evaluate the Options
Gather Information
Choose Intervention Strategies
Report Results, Solicit Feedback, and Modify Intervention Strategies If Needed
Step 5:
Design of an Intervention Plan
Develop a Plan for Implementing the Selected Interventions
Allocate Resources and Implement Interventions
Step 6:
Monitoring and Review
Collect and Analyze Data on Evaluation Measures
Interpret Data and Evaluate Intervention Results
Determine Whether Public Health Objectives Are Being Met
Communicate Results to Stakeholders
Review and Refine the Process as Necessary to Accomplish Intermediate Outcomes and Public Health Objectives So As to Achieve Continuous Improvement

FIGURE 1. Relative rates of laboratory-confirmed infections with *Campylobacter*, STEC O157, *Listeria*, *Salmonella*, and *Vibrio*, compared with 1996–1998 rates, by year — Foodborne Diseases Active Surveillance Network, United States, 1996–2010*



Abbreviation: STEC = Shiga toxin–producing *Escherichia coli*.

* The position of each line indicates the relative change in the incidence of that pathogen compared with 1996–1998. The actual incidences of these infections cannot be determined from this graph.

Primary Food Safety Problems in the U.S.

TABLE ES-2: THE TOP 10 PATHOGEN-FOOD COMBINATIONS IN TERMS OF ANNUAL DISEASE BURDEN, BY COMBINED RANK

PATHOGEN-FOOD COMBINATIONS	COMBINED RANK	QALY LOSS	COST OF ILLNESS ($ MIL.)	ILLNESSES	HOSPITAL-IZATIONS	DEATHS
Campylobacter – Poultry	1	9,541	1,257	608,231	6,091	55
Toxoplasma – Pork	2	4,495	1,219	35,537	1,815	134
Listeria – Deli Meats	3	3,948	1,086	651	595	104
Salmonella – Poultry	4	3,610	712	221,045	4,159	81
Listeria – Dairy products	5	2,632	724	434	397	70
Salmonella – Complex foods	6	3,195	630	195,655	3,682	72
Norovirus – Complex foods	6	2,294	914	2,494,222	6,696	68
Salmonella – Produce	8	2,781	548	170,264	3,204	63
Toxoplasma – Beef	8	2,541	689	20,086	1,026	76
Salmonella – Eggs	10	1,878	370	115,003	2,164	42
TOTAL		36,915	8,151	3,861,128	29,830	765

WARNING: Risk-Based Food Safety Systems are Data Intensive

The risk-based approach ***requires*** accurate, reliable, secure, timely, comprehensive data that are:

- integrated; and
- "fit-for-purpose"

Some Imported Commodities of Particular Interest

- Fresh vegetables:
  - Import share is over 17% by volume, & over 9% by weight - nearly doubled since early 80s
  - From 2000-2005, spinach & lettuce imports up >300%, onions up 51%, tomatoes 36%, etc
  - Growth primarily in Mexico and South and Central America
- Seafood:
  - Now about 80% import share by weight
  - Only one in top 10 consumed seafood products is not primarily imported: catfish
  - Growth in Asia: China, Thailand, Indonesia, Vietnam, Philippines

Sporadic Cases

- Magnitude of problem of import-related foodborne illness unclear: tough enough to attribute sporadic illness to specific foods, much less identify international sources/problems

- Between 1998-2004, only 19 outbreaks explicitly linked to imports, 4 to seafood…
  - (Tauxe RV, O'Brien SJ, and Kirk M. 2008. "Outbreaks of Food-Borne Diseases Related to the International Food Trade" in Doyle and Erickson)
- Yet outbreak data shows 984 seafood-related outbreaks between 1990 and 2004…
  - (Todd E & Caswell JA. 2008. "Role of Programs Designed to Improve the Microbiological Safety of Imported Food." in Doyle and Erickson)
- And 80% of seafood is imported…

Risk-Based Import Food Safety Systems

- Proactive, not reactive (strategic planning)
- Process:
  - Identify major public health risks
  - Identify additional data/information needs to determine allocation of resources (talk to stakeholder communities)
  - Develop data-driven, analytic framework
  - Select intervention strategies based on risk and resource availability
  - Continuously evaluate outcomes

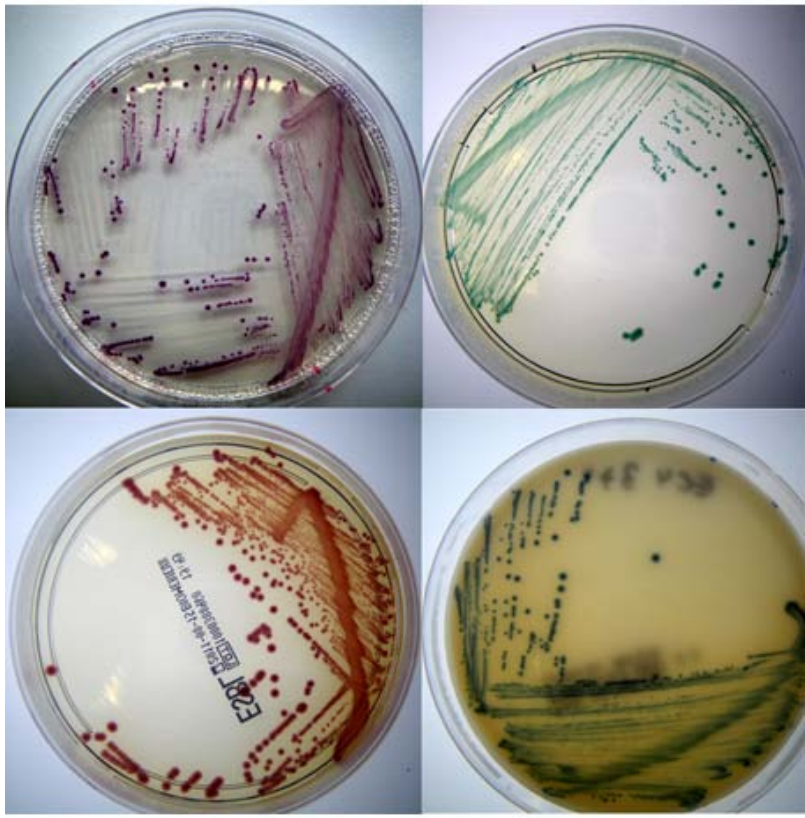
What is Risk-Based Import Safety?

- Risk refers to public health, not "risk of violation"
  - Focused on reducing illnesses and human health risk
  - Not all violations are the same – many are not directly related to public health (e.g. labeling errors)
- Targets resources towards products & shipments most likely to harm Americans
- Data driven: Goes beyond the ports to gather information that can inform assessments/evaluations of risk

New Hazards: Emerging Pathogens

- Appearance of new/ genetically different strains
  - "German" *E. coli* O104:H4
    - >3,000 cases
    - 852 HUS cases as of July 5, 2011; 32 deaths
    - Genetically: shiga toxin gene from EHEC in EAgEC genetic background
    - Sprouts likely source; ? fenugreek seeds from a single Egyptian exporter

EHEC O104:H4, Wachstum /growth 37°C



oben (up): CHROMagar STEC
unten (down): ESBL Bio Merieux

oben (up): TBX-Agar
unten (down) ESBL Brillance

New Hazards

1. Appearance of new/genetically different strains
2. Changes in opportunities for pathogen growth and spread (often anthropogenic)
3. Intentional contamination/economic adulteration

Problem: Single point source of contamination can generate a national/international outbreak

Solution: smoothly functioning, timely, accurate data systems

Risk-Based Import Food Safety

- Identify the major problems from a public health perspective (i.e., what's making people sick?), and target interventions accordingly
- Get the data
  - Figure out what you need, and design appropriate, accurate data collection systems – which may or may not include on-site inspection