Metrics and Performance Measures for Foodborne Disease Surveillance

CSTE Food Safety Subcommittee Webinar Series

January 28, 2015

12:00 – 1:00 pm Eastern

Webinar Agenda

- **Introduction and Welcome: Dhara Patel, Council of State and Territorial Epidemiologists**
- Moderator: Dr. Kirk Smith, Minnesota Department of Health
- Dr. Craig Hedberg, University of Minnesota
- Dr. Ian Williams, Centers for Disease Control and Prevention
- Q&A and Discussion: Presenters and Participants

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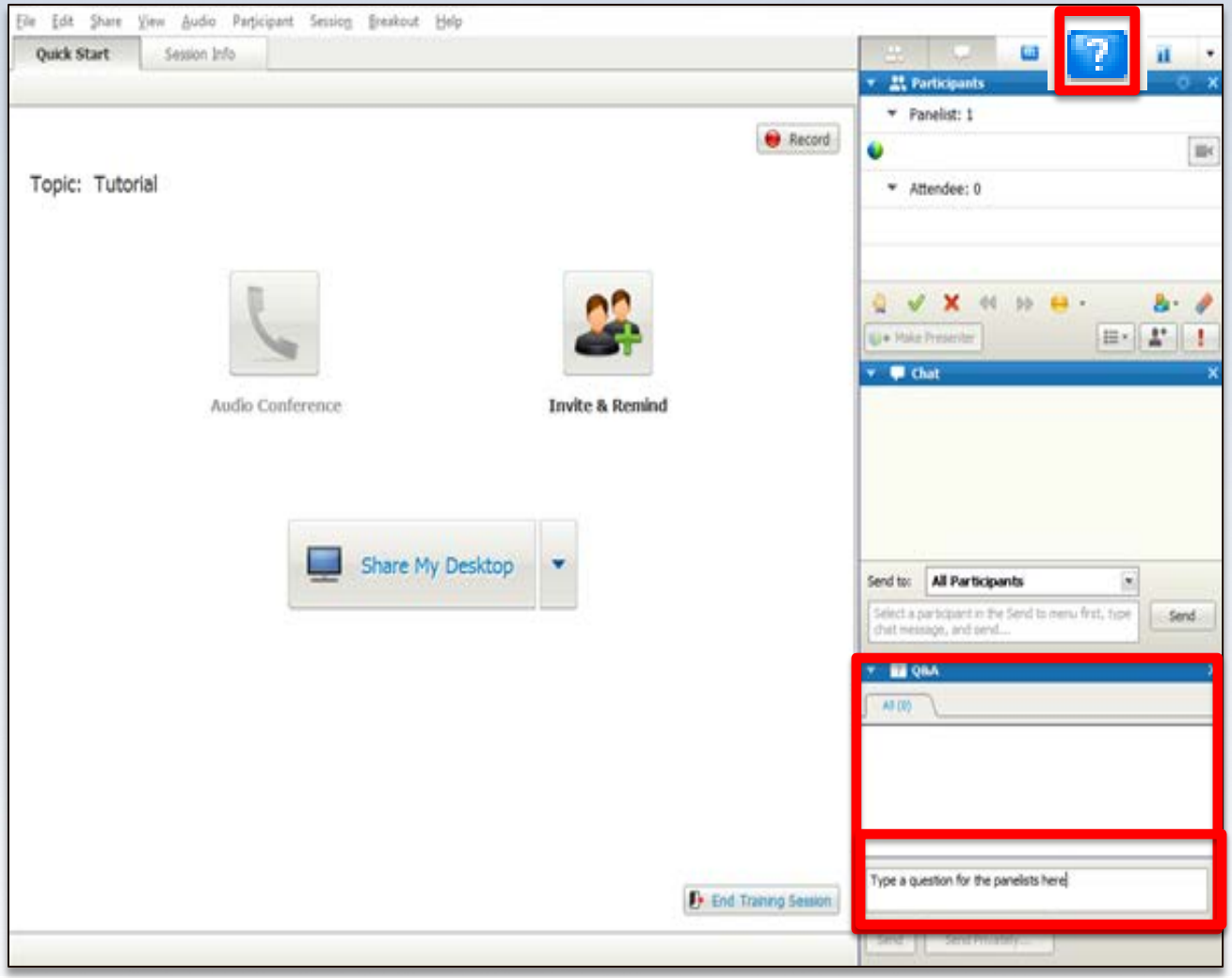

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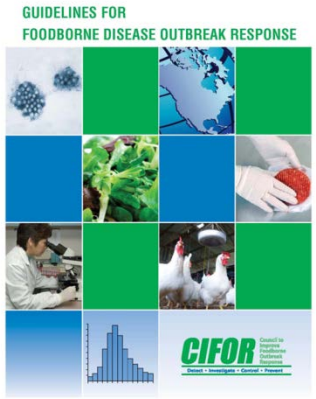
Development of target ranges for selected CIFOR *Guidelines for Foodborne Disease Outbreak Response* performance measures



Craig Hedberg, PhD
University of Minnesota
School of Public Health

Background

- CIFOR *Guidelines* included measurable indicators of effective surveillance for enteric diseases and response to outbreaks by state and local public health officials.
  - intended for agencies to evaluate performance of their foodborne disease surveillance and control programs.
  - stopped short of providing specific targets for individual metrics.
- CIFOR identified need to develop target values to help state and local public health agencies ***demonstrate performance and effectiveness*** conducting foodborne disease surveillance and outbreak control activities.

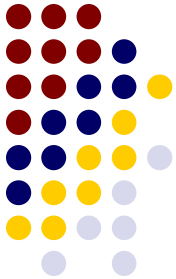
Project Objectives

- Review FoodCORE metrics, including core and optional metrics, and metrics from other states and initiatives collecting similar data.
- Create a subset of performance measures based on importance and feasibility of implementation, including metrics for epidemiology, laboratory, and environmental health programs. Performance measures were to be focused primarily on the state level, with some applicable to local programs.
- Develop definitions of terms and a methodology for measuring target values.

Project Objectives

- Develop recommended targets for each performance measure using information and data from the CIFOR Guidelines, the Enteric Disease Investigation Timeline Study (EDITS), FoodCORE, CDC's National Outbreak Reporting system (NORS), and published literature. Tiered responses were developed in conjunction with the project work group.
- Identify states to provide feedback on selected performance measures, their recommended targets, and a second iteration of the metrics.
- Revise Chapter 8 of the CIFOR Guidelines, incorporating the new metrics and associated language.

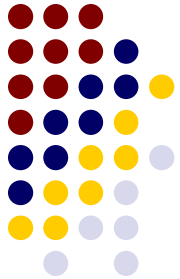
Sample Metric Comparison



- CIFOR Indicator: Reported cases with specified foodborne illnesses interviewed.
- Related CIFOR metric: % reported cases for which food history was obtained.
- Related FoodCore metric: % *Salmonella,* STEC, and *Listeria* (SSL) cases with exposure history obtained.

Based on FoodCORE experience, FoodCORE metric was adapted to replace existing CIFOR metric in revised CIFOR *Guidelines* Chapter 8. Proposed metric was changed to "% of confirmed cases with exposure history obtained."

Selected Performance Measures



- Address four key components of the public health food safety system:
  - surveillance system evaluated;
  - follow up on complaints, cases and isolates;
  - complaint/cluster investigations;
  - outbreak summaries and reporting to NORS.
- Encompass roles for epidemiology, laboratory practice, and environmental health, and include activities at both state and local levels.

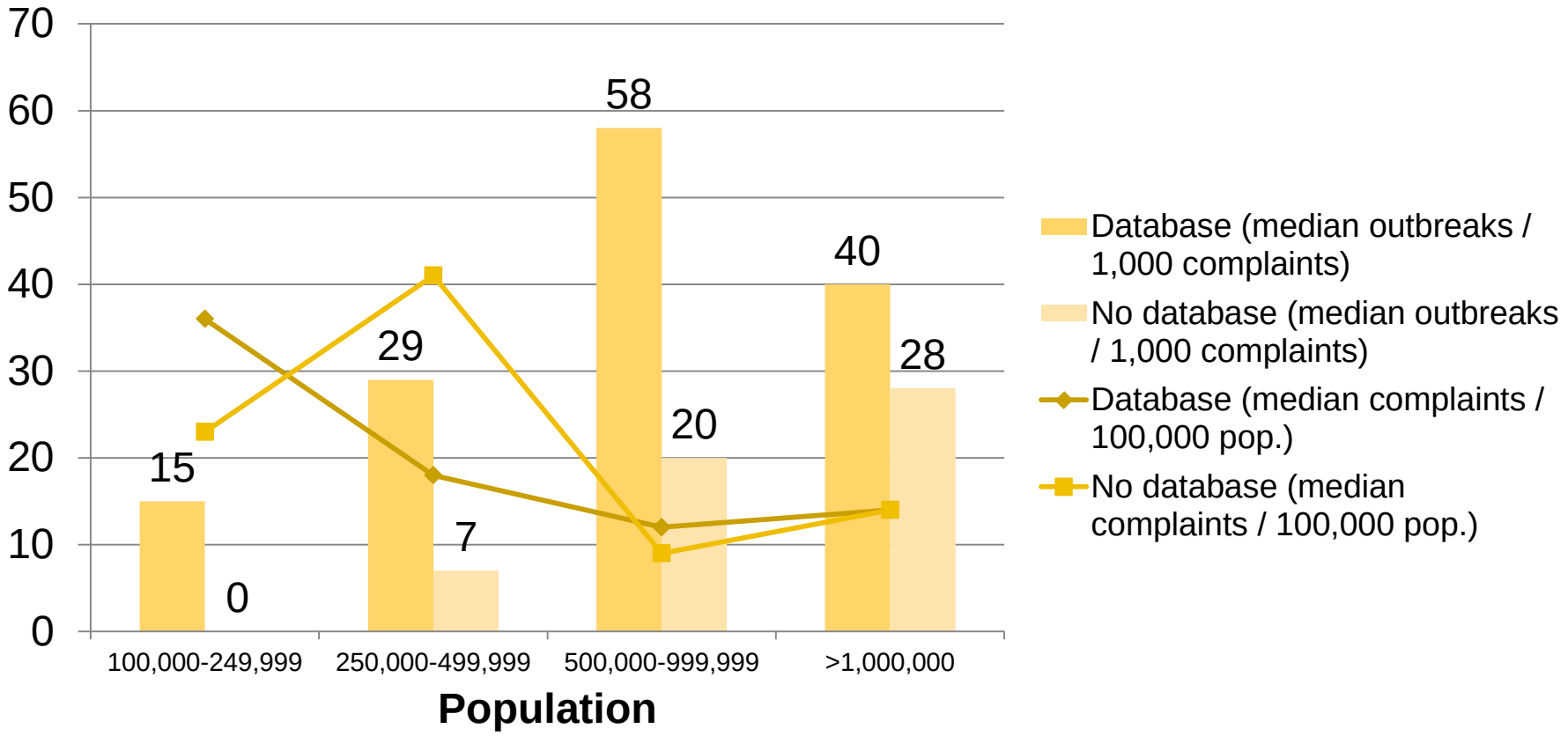
Definitions-Example

- Foodborne illness complaint reporting system
  - Foodborne illness complaint: A report of illness experienced by one or more persons following exposure to a specific event or establishment.
  - Foodborne illness complaint log: A paper registry of complaints that records information about the complaint and specific establishment.
  - Foodborne illness complaint database: An electronic database that records information about the complaint and specific establishment in a searchable format.

Target Range Development

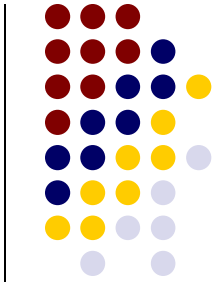
- Target ranges for the selected performance measures were based on available information.
  - Most of the target ranges were derived from evaluations of surveillance data published in the peer-reviewed literature.
  - In addition, results of Year 1 FoodCORE analyses, NORS data, and PHEP Guidance were used to establish target ranges.
- As information becomes available, target ranges can be refined to better reflect overall performance levels.
  - In addition, target ranges reflect performance that may change over time as the availability of resources changes or as new methods are introduced.

Median Outbreak Rates and Outbreaks per Complaint Rates



Li J, et al. J Food Protection 2011;74

Performance Measures Related to Complaint-Based Surveillance

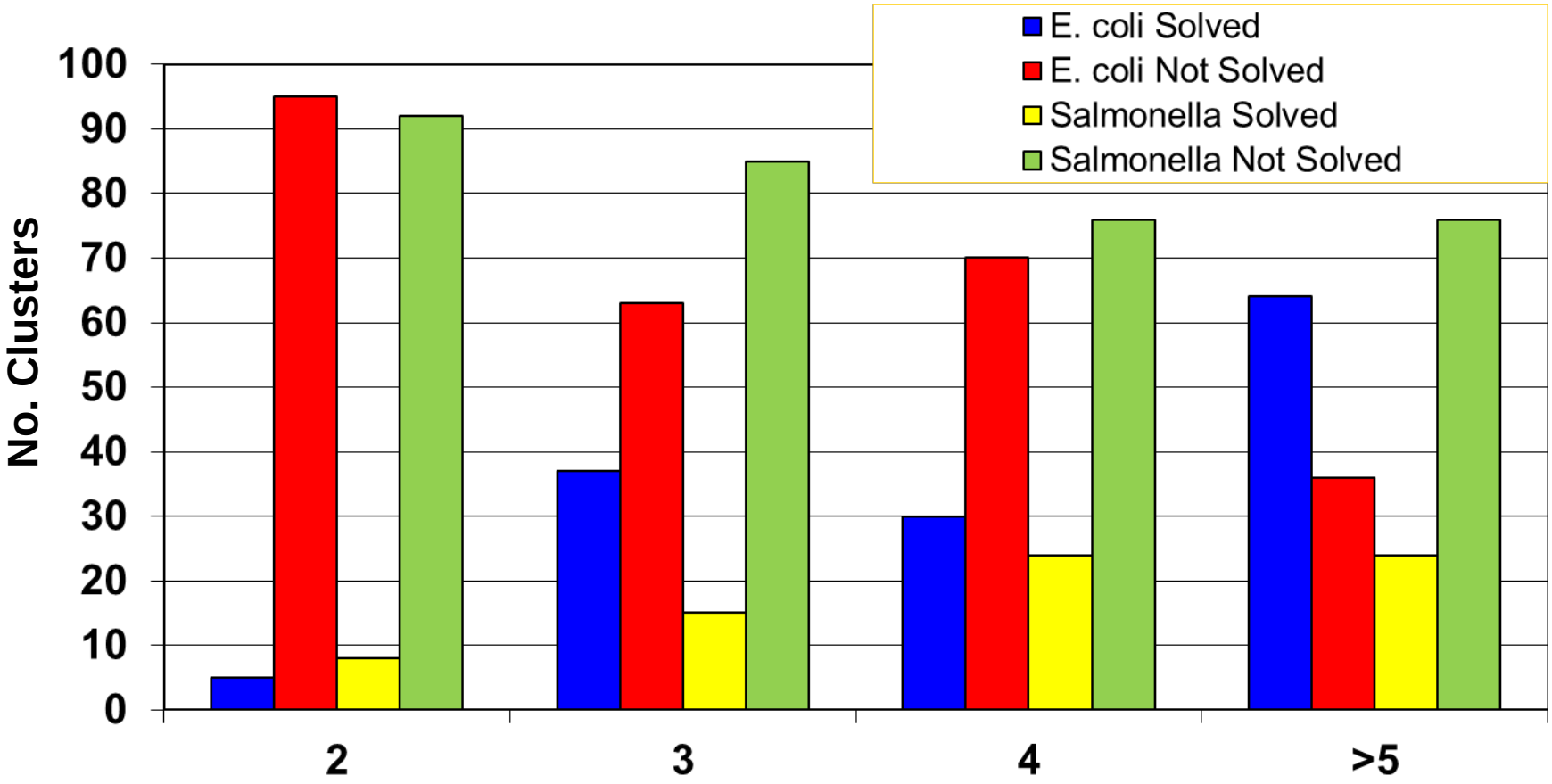


CIFOR Performance Measure	Target Range
1. Foodborne illness complaint reporting system	Preferable: Electronic database
	Acceptable: System to log complaints
12. Complaint investigation interval	Preferable: < 7 days
	Acceptable: 7-21 days
10. Outbreak clinical specimen collections	Preferable: >75% of outbreaks
	Acceptable: 50-75% of outbreaks
2. Outbreaks detected from complaints	Preferable: >20 / 1,000 complaints
	Acceptable: 10-20 / 1,000 complaints

Minnesota

E. coli O157 Clusters, 2000-2008

Salmonella Clusters, 2001-2007



Rounds JM, et al. Emerg Infect Dis. 2010;16
Rounds JM, et al. Epidemiol Infect. 2012 140(8)

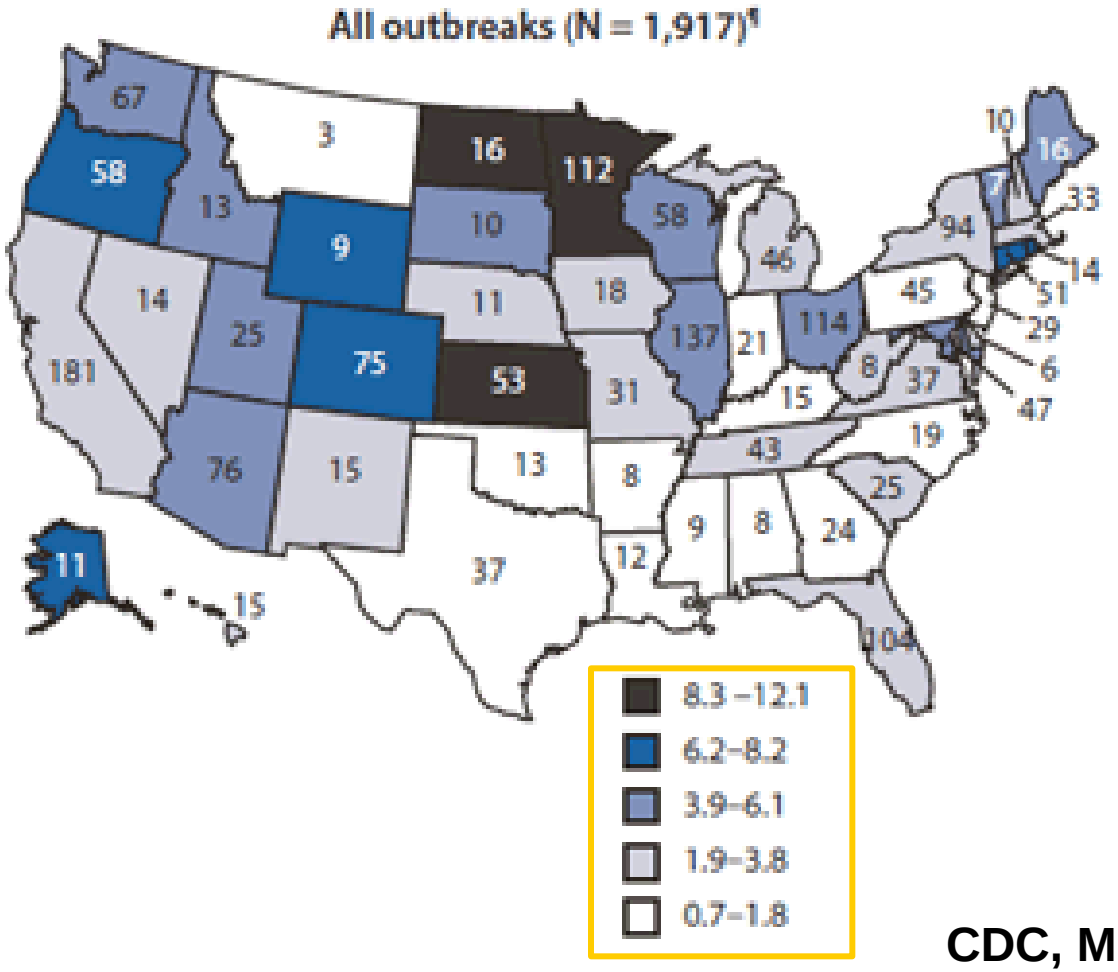
Performance Measures Related to Pathogen-Specific Surveillance: Case-Based

CIFOR Performance Measure	Target Range
4. Confirmed cases with exposure history obtained (*Salmonella*, STEC, *Listeria* separate)	Preferable: >75% of cases
	Acceptable: 50-75% of cases
11. Cluster investigation interval	Preferable: < 7 days
	Acceptable: 7-21 days
13. Cluster source identification	Preferable: >20% of clusters with > 5 cases
	Acceptable: 10-20% of clusters with >5 cases

Performance Measures Related to Pathogen-Specific Surveillance: Isolate-Based

CIFOR Performance Measure	Target Range
5. Isolate submissions to PHL (*Salmonella*, STEC, *Listeria* separate)	Preferable: >90% of isolates
	Acceptable: 60-90% of isolates
7. Isolate submission interval (Salmonella, STEC, Listeria separate)	Preferable: < 7 days
	Acceptable: 7-8 days
6. PFGE subtyping of isolates (Salmonella, STEC, Listeria separate)	Preferable: >90% of isolates
	Acceptable: 60-90% of isolates
8. Isolate subtyping interval (Salmonella, STEC, Listeria separate)	Preferable: < 4 days
	Acceptable: 5-6 days
9. PHEP *E. coli* O157:H7 and *Listeria* subtyping interval	Acceptable: $\geq$ 90% of PFGE subtyping results submitted to PulseNet within 4 working days.

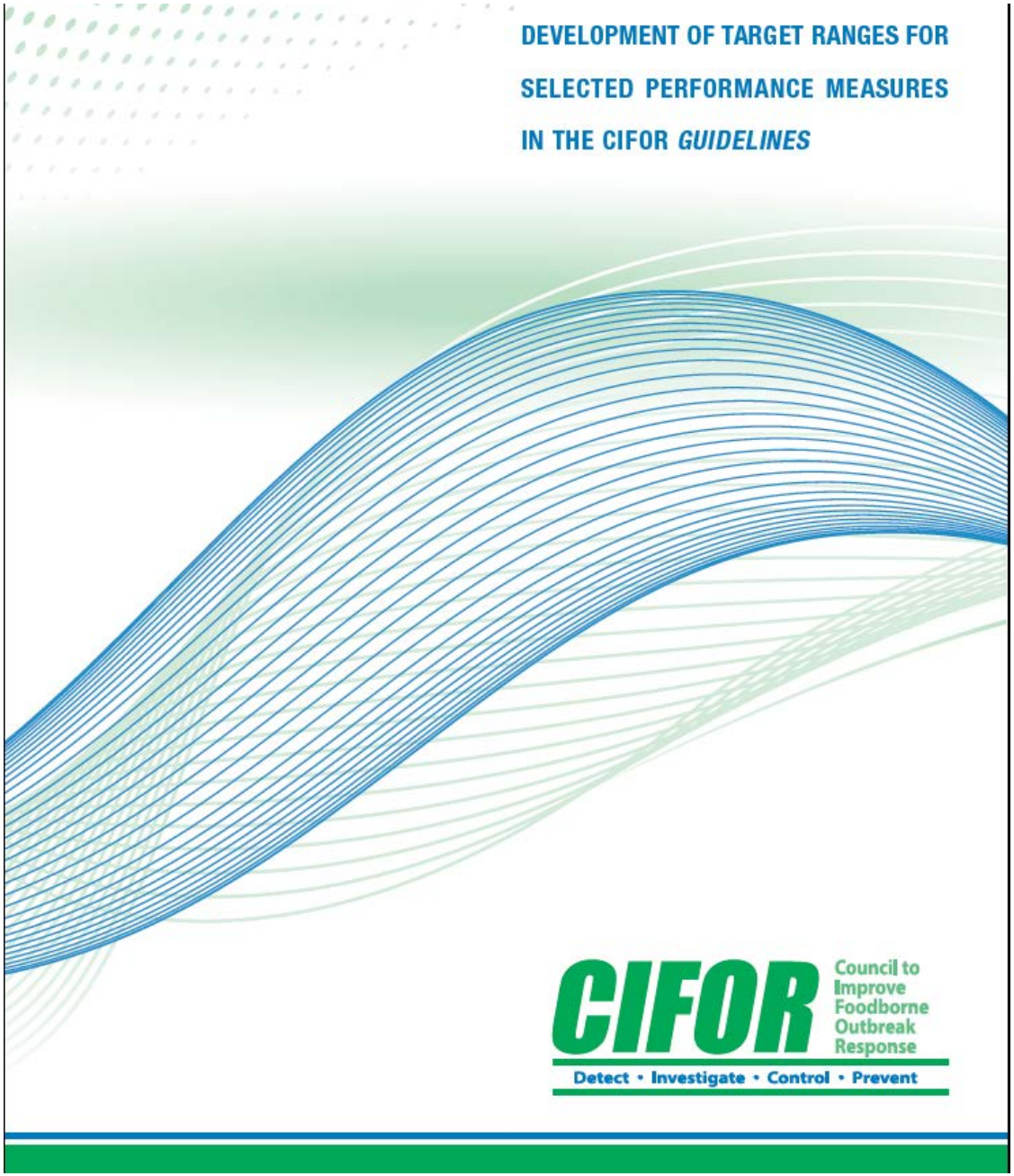
Average annual rate of reported foodborne disease outbreaks per 1 million population* and number of outbreaks, by state— Foodborne Disease Outbreak Surveillance System, United States, 2009–2010



CDC, MMWR 2013

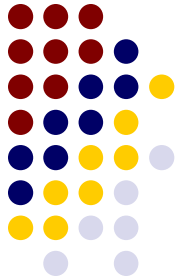
Performance Measures Related to Outbreak Reporting

CIFOR Performance Measure	Target Range
3. Foodborne illness outbreak rate	Preferable: >6 outbreaks / 1,000,000 population
	Acceptable: 1-6 outbreaks / 1,000,000 population
14. Outbreak etiology reported to NORS	Preferable: >68% of outbreaks
	Acceptable: 44-68% of outbreaks
15. Outbreak vehicle reported to NORS	Preferable: >60% of outbreaks
	Acceptable: 48-60% of outbreaks
16. Outbreak contributing factor reported to NORS	Preferable: >55% of outbreaks
	Acceptable: 33-55% of outbreaks



http://www.cifor.us/documents/MetricsReport_Abridge_FINAL.pdf

Implementation Challenges



- Not all data elements will be readily accessible to all agencies.
- Definitions contain elements that may not be adequately described, may be ambiguous, subject to interpretation, or rejected by some agencies.
- Target ranges reflect performance that may change over time as the availability of resources changes or as new methods are introduced.
- CIFOR workgroup will be needed to clarify or modify definitions and update target ranges over time.

Next Steps

- Centers of Excellence (COE) documenting their own performance against Target Ranges and assisting other states in their use.
- CIFOR endorsed development of an online tool to allow states to document their performance against the CIFOR Performance Metrics Target Ranges.
- APHL contracting development of web-based tool that will be on the CIFOR website hosted by NACCHO.
- CIFOR Metrics Working Group and COE Metrics Working Group jointly working to guide development of on-line tool.
  - Craig Hedberg (hedbe005@umn.edu) co-ordinating combined work groups.

Minnesota CIFOR Target Range Performance Measures for 2013

2. <u>Outbreaks detected from complaints:</u> **Metric:** Outbreaks detected from complaints: Number outbreaks detected as a result of foodborne illness complaints. Rate of outbreaks detected per 1,000 complaints received.	***Preferable:** >20 outbreaks / 1,000 complaints **Acceptable:** 10-20 outbreaks / 1,000 complaints *Evidence base may not always support value judgment on range. Very low numbers of documented complaints could inflate the observed rate.	**Preferable:** (29 complaint outbreaks / 704 complaints) x 1,000 = **41.2** outbreaks per 1,000 complaints
3. <u>Foodborne illness outbreak rate:</u> **Metric:** Number foodborne outbreaks reported, all agents. Rate of outbreaks reported per 1,000,000 population.	**Preferable:** > 6 outbreaks / 1,000,000 population **Acceptable:** 1-6 outbreaks / 1,000,000 population	**Preferable:** (42 outbreaks / 5,420,380) x 1,000,000 = **7.75** outbreaks per 1,000,000 population

Project Workgroup and Consultants

- John Besser PhD, CDC, Enteric Diseases Laboratory Branch
- Gwen Biggerstaff MSPH, CDC, Outbreak Response and Prevention Branch
- David Boxrud MS, Minnesota Department of Health, Public Health Laboratory
- Scott Holmes MPH, Lincoln Lancaster County Health Department
- Timothy Ihry DVM, MSA, DACVPM, USDA, Food Safety and Inspection Service
- Ernest Julian, Ph.D., Rhode Island Department of Health, Office of Food Protection
- William Keene, PhD, MPH, Oregon Health Division
- Mel Knight, REHS, National Environmental Health Association
- Bela Matyas MD, MPH, Solano County Public Health
- Dale Morse, MD, MS, CDC, Division of Foodborne, Waterborne and Environmental Diseases,
- Dhara Patel, MPH, CSTE
- Lauren Rosenberg MPA, CSTE
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- Don Sharp, MD, MPH, CDC, Division of Foodborne, Waterborne and Environmental Diseases
- Kirk Smith, DVM, PhD, Minnesota Department of Health
- Regina Tan, DVM, MSPH, DACVPM, USDA, Food Safety and Inspection Service
- Patricia White, DVM, USDA, Food Safety and Inspection Service
- Ian Williams, PhD, MS, CDC, Outbreak Response and Prevention Branch

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Defining and Implementing a Standard for Interview Timeliness During Multistate Foodborne Disease Outbreak Investigations

Ian Williams, PhD, MS

Chief, Outbreak Response and Prevention Branch

Division of Foodborne Waterborne and Environmental Diseases

Centers for Disease Control and Prevention

January 2015

National Center for Emerging and Zoonotic Infectious Diseases

Division of Foodborne, Waterborne, and Environmental Diseases

Goal

- To improve the timeliness and completeness of case patient interviews using structured questionnaires during multistate foodborne disease outbreak investigations.

Data are preliminary and subject to change

Development Process

- Working group developed draft standard and approach:
  - Centers for Disease Control (CDC)
  - Counsel of State and Territorial Epidemiologists (CSTE)
  - National Association of County and City Health Officials (*NACCHO*)
  - the Association of State and Territorial Health Officals (ASTHO)

Data are preliminary and subject to change

Proposed standard

- Once a multistate foodborne outbreak has been declared by CDC, state health departments in conjunction with their local health departments will initiate an interview within 48 hours using the ‘outbreak designated’ questionnaire.
- Interview performance of all states with be tracked and posted with a goal for completing 80% of interviews within 48 hours.
- States can request CDC assistance for interviews as needed.

. Data are preliminary and subject to change

When would the standard be applied?

- Once CDC holds its first multistate conference call to initiate an investigation and would end once CDC notifies state investigators that the investigation is closed.

What data will be collected to measure timeliness?

- Time from recognition that the case meets the case definition (usually upload to PulseNet) to initial interview attempt,
- Time from recognition that the case meets the case definition to completed interview, and
- For those case-patients who could not be interviewed, the reason not interviewed (e.g., refused, unable to contact, etc).

. Data are preliminary and subject to change

How will the timeliness data be collected?

- The relevant data elements would be included and tracked as part of outbreak linelists.
- Data will be collected as part of System for Enteric Disease Response, Investigation, and Coordination (SEDRIC) using the Palantir Enterprise Platform

Evaluation of Proposed Standard

- Try out in several multistate outbreaks during 2014 to evaluate proposed standard and the process for collecting required information.

Data are preliminary and subject to change

Preliminary Analysis of Interview Timeliness Data

Data are preliminary and subject to change***

Timeliness Data Collection

- Multistate investigations with a cluster-specific questionnaire deployed. Excludes:
  - NHGQ, LI, and other standard outbreak forms
- Information collected on line list:
  - Whether an interview is requested (CDC populated)
  - Notification date: upload or email date (CDC)
  - Date of first attempt (state populated)
  - Date of completion (state)
  - Number of attempts (state)
  - Whether case is lost to follow up (state)

Data Sources

- 6 multistate salmonellosis outbreaks during 2014

Serotype	PFGE Pattern	Case Count	Zoonotic	Epi Info	Vehicle *
Javiana	JGGX01.0036	33		YES	Frozen tilapia
Typhimurium	JPXX01.0410	41	YES		Frozen rodents
Infantis/Newport/ Hadar	multiple	365	YES		Live poultry
Enteriditis	JEGX01.0030	93			Chicken
Typhimurium	JPXX01.0038	90			Pork/chicken (?)
I,4,[5],12:i-	JPXX01.3161	39		YES	Pork/sausage (?)

*vehicles may be confirmed, suspected, or hypothesized

Data are preliminary and subject to change

Interviews Requested

- 661 total cases from 6 outbreaks
- 233 interviews requested with a focused questionnaire
  - 130 (56%) interviews completed
  - 58/130 (45%) completed within 2 days
  - 22/111 (20%) designated lost to follow-up
- One outbreak with multiple cluster-specific forms (Typhimurium pattern 38)
  - Expanded NHGQ and focused questionnaire both deployed
  - 24 interviews requested with focused questionnaire included in this analysis

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Interview First Attempt and Completion

Measure	n	Range (days)	mean	median
Notification* to First Interview Attempt	99	-12–36	3	1
Notification* to Completed Interview	123	-12–37	9	5

*Date of notification is either the date a focused questionnaire was deployed by CDC or PulseNet upload date

Data are preliminary and subject to change

Attempts to Reach Patients

	n*	Range (attempts)	mean=median
Completed Interviews	29	1–6	2
Lost to follow-up	7	2–7	4

*Optional for states to report

Data are preliminary and subject to change

Stratified Analysis 1
Notification to First Attempt

Variable	n	Mean (days)	Median (days)	P-value*
Epi Info				
Yes	34	0.12	0	.014
No	65	4.15	1	
Zoonotic				
Yes	54	5.39	1	<.001
No	45	0	0	
PH structure				
Centralized	24	1.63	0.5	.80
Decentralized	49	3.18	1	
Mixed/shared	26	3.69	1	

* P-values obtained from Wilcoxon-Ranked Sums or Kruskall-Wallis tests

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Stratified Analysis 2
Notification to Completed Interview

Variable	n	Mean (days)	Median (days)	P-value
Epi Info				
Yes	32	1.56	0.5	<.001
No	91	11.3	8	
Zoonotic				
Yes	81	12.5	10	<.001
No	42	1.48	0.5	
PH structure				
Centralized	33	7.36	3	.83
Decentralized	56	9.25	4.5	
Mixed/shared	34	9.29	10.5	

* P-values obtained from Wilcoxon-Ranked Sums or Kruskall-Wallis tests

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Stratified Analysis 3
Interviews Completed within 2 days

Variable	n (%)	Chi-Square	P-value
Epi Info			
Yes	23/32 (72%)	12.77	<.001
No	35/98 (36%)		
Zoonotic			
Yes	22/82 (27%)	28.43	<.001
No	36/48 (75%)		
PH structure			
Centralized	16/34 (47%)	0.42	0.81
Decentralized	28/61 (46%)		
Mixed/shared	14/35 (40%)		

Data are preliminary and subject to change

Summary

- 45% interviews completed within 2 days, well short of the 80% benchmark
- Interviews took longer to complete in zoonotic outbreak investigations
- Clusters using Epi Info had quicker turn around times and a greater proportion interviews conducted within 2 days, but these outbreaks were smaller
- These associations are likely confounded by other factors like outbreak size

Data are preliminary and subject to change

Implementation Challenges

- Very complex, manual management required to track timeliness for each case in an outbreak
  - Tracking for states on the line list who is required to be interviewed
  - Multiple questionnaires in a single outbreak with different dates
  - Persistent follow up needed with states to notify about new cases, “start the clock”, and obtain timestamp
- Some states filled in completion dates without sending in the data
- Collecting the timeliness measures is signaling to states what CDC “cares about”

Data are preliminary and subject to change

Implementation Challenges

- Data quality issues
  - Some states did not attempt a true re-interview with the focused questionnaire (transcribe responses from pre-existing questionnaires to meet the 48 hour goal)
  - Varying definitions for date of notification and completion
  - Some states modified their own dates of notification and completion to meet the 48hr objective

Data are preliminary and subject to change

Proposed Next Steps

- Devise a vastly simplified system to track basic timeliness data routinely for multistate outbreaks
  - Focus on completion rather than time
  - More state responsibility for collecting data
  - Limit number of variables collected
- Develop a plan for more intensive collection of timeliness data during “nasty” outbreaks

Data are preliminary and subject to change

Thank you

The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention

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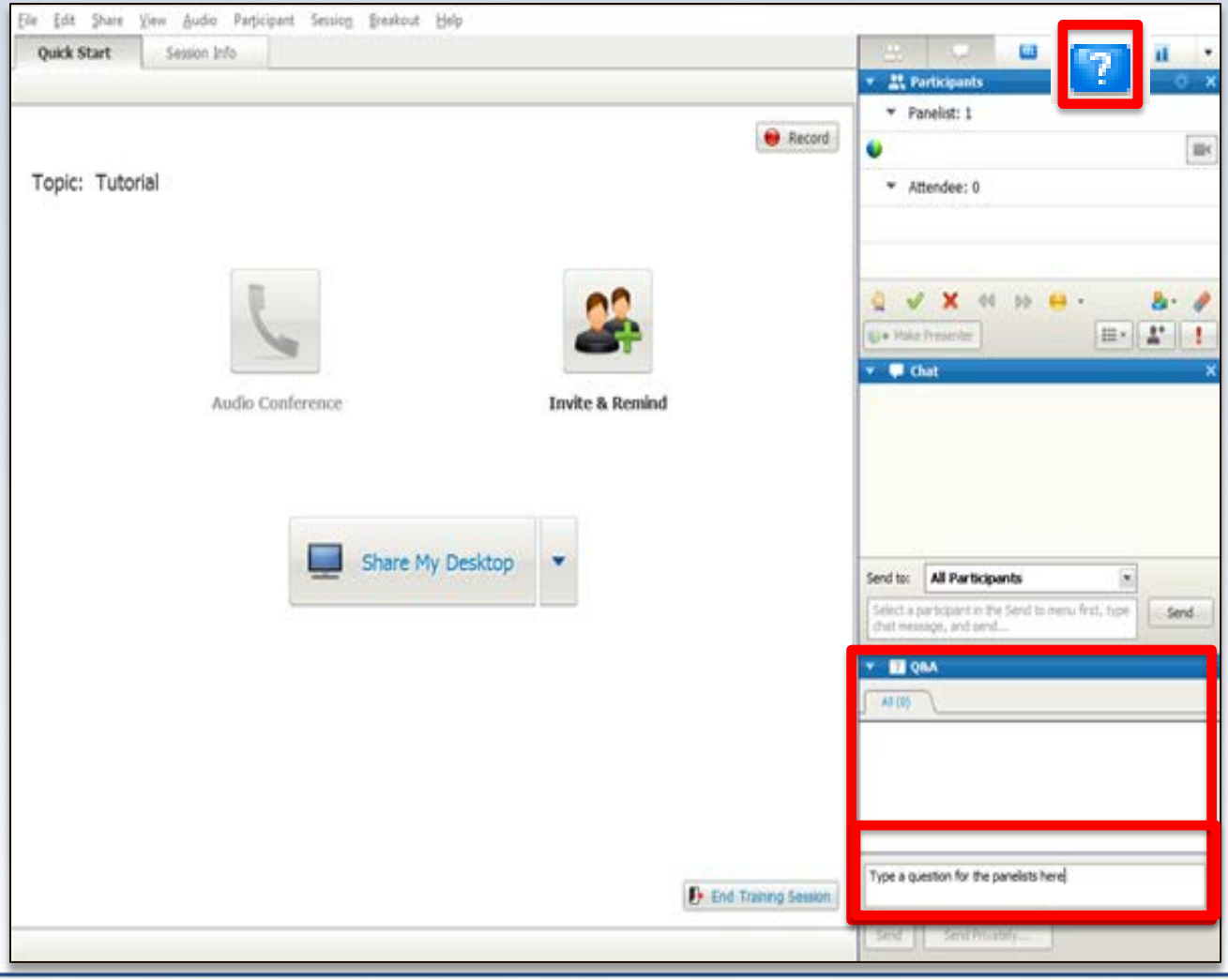

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