ABRIDGED VERSION

DEVELOPMENT OF TARGET RANGES FOR SELECTED PERFORMANCE MEASURES IN THE CIFOR *GUIDELINES*

CIFOR Council to Improve Foodborne Outbreak Response

Detect • Investigate • Control • Prevent

Target Ranges for Selected Performance Measures for Program Evaluation Incorporated in Revised CIFOR Guidelines, Chapter 8

The *CIFOR Guidelines for Foodborne Disease Outbreak Response* were developed as a comprehensive source of information on foodborne disease investigation and control for state and local health departments. The Guidelines included measurable indicators of effective surveillance for enteric diseases and for response to outbreaks by state and local public health officials. The performance indicators were intended to be used by agencies to evaluate the performance of their foodborne disease surveillance and control programs. However, the Guidelines stopped short of providing specific targets for individual metrics, to avoid their use as a score card enabling cross-agency comparisons.

Since publication of the *Guidelines* in 2009, funders and public health leaders have placed more emphasis on health agency performance, accountability and transparency. Therefore, the Council to Improve Foodborne Outbreak Response (CIFOR) identified a need to develop target values to help state and local public health agencies demonstrate their performance and effectiveness conducting foodborne disease surveillance and outbreak control activities.

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

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 more current and comprehensive information becomes available, the target ranges can be refined to better reflect overall performance levels. In addition, these target ranges reflect performance that may change over time as the availability of resources changes or as new methods are introduced. Publishing the target ranges separately on the CIFOR website enables them to be updated regularly to reflect any system-wide changes.

The accompanying table lists the target ranges, expressed as *preferable or acceptable*, for each of the selected performance measures. For a performance measure where objective ranges may not always reflect implied value judgments, an explanatory footnote has been added.

For each performance measure, the table includes the performance measure, the measurement method and the target range. A list of definitions for components of the performance measures follows the table. A complete description of the performance measure can be found in the Revised CIFOR Guidelines, Chapter 8. Hyperlinks between individual performance measures and the CIFOR *Guidelines* will be developed.

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Proposed Target Ranges for Selected Performance Measures for Program Evaluation as Incorporated in Revised CIFOR Guidelines, Chapter 8

CIFOR performance measure	Measurement methods	Target range
1. Foodborne illness complaint reporting system: **Metric:** Agency maintains logs or databases for all complaints or referral reports from other sources alleging food-related illness, food-related injury or intentional food contamination, and routinely reviews data to identify clusters of illnesses requiring investigation.	If an agency has any complaint system in place and it is used to review foodborne illness complaints, it will be considered acceptable. If an agency has an electronic database that can be systematically reviewed to link complaints, it will be considered preferable.	**Preferable:** Electronic database **Acceptable:** System to log complaints
2. Outbreaks detected from complaints: **Metric:** Outbreaks detected from complaints: Number outbreaks detected as a result of foodborne illness complaints. Rate of outbreaks detected per 1,000 complaints received.	Determine the number of foodborne illness complaints that were received during the year. This will be the denominator for the metric. Determine the number of foodborne illness outbreaks that were detected as a result of a foodborne illness complaint investigation during the year. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 1,000. This will convert the observed numbers into a standardized rate.	***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.
3. Foodborne illness outbreak rate: **Metric:** Number foodborne outbreaks reported, all agents. Rate of outbreaks reported per 1,000,000 population.	Determine the population of the jurisdiction. This will be the denominator for the metric. Determine the number of foodborne illness outbreaks that were reported during the year. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 1,000,000. This will convert the observed numbers into a standardized rate.	**Preferable:** > 6 outbreaks / 1,000,000 population **Acceptable:** 1-6 outbreaks / 1,000,000 population

CIFOR performance measure	Measurement methods	Target range
4. <u>Confirmed cases with exposure history obtained</u>: **Metric:** Number and % of confirmed cases with exposure history obtained.	Determine the number of confirmed cases reported. This will be the denominator for the metric. Determine the number of confirmed cases with exposure history obtained. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100. This will convert the observed numbers into a standardized rate.	**A. *Salmonella*** **Preferable:** > 75% of cases **Acceptable**: 50-75% of cases **B. *E. coli* (STEC)** **Preferable:** > 75% of cases **Acceptable**: 50-75% of cases **C. *Listeria*** **Preferable:** > 75% of cases **Acceptable**: 50-75% of cases
5. <u>Isolate/CIDT-positive clinical specimen submissions to PHL</u>: **Metric:** Isolate/CIDT-positive clinical specimen submissions to public health laboratory (PHL): Number and % of isolates from confirmed cases and clinical specimens from patients diagnosed by culture independent diagnostic test (CIDT), submitted to PHL.	Determine the number of confirmed cases reported. This will be the denominator for the metric. Determine the number of isolates and clinical specimens from patients diagnosed by culture independent diagnostic test (CIDT), submitted to the PHL. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100. This will convert the observed numbers into a standardized rate.	**A. *Salmonella*** **Preferable:** > 90% of isolates/ CIDT-positive clinical specimens **Acceptable**: 60-90% of isolates/ CIDT-positive clinical specimens **B. *E. coli* (STEC)** **Preferable:** > 90% of isolates/ CIDT-positive clinical specimens **Acceptable**: 60-90% of isolates/ CIDT-positive clinical specimens **C. *Listeria*** **Preferable:** > 90% of isolates/ CIDT-positive clinical specimens **Acceptable**: 60-90% of isolates/ CIDT-positive clinical specimens

CIFOR performance measure	Measurement methods	Target range
6. PFGE subtyping of isolates: **Metric:** No. and % of isolates with pulsed field gel electrophoresis (PFGE) information.	Determine the number of isolates submitted to the PHL. This will be the denominator for the metric. Determine the number of isolates with PFGE information. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100. This will convert the observed numbers into a standardized rate.	**A. *Salmonella*** **Preferable:** > 90% of isolates **Acceptable**: 60-90% of isolates **B. *E. coli* (STEC)** **Preferable:** > 90% of isolates **Acceptable**: 60-90% of isolates **C. *Listeria*** **Preferable:** > 90% of isolates **Acceptable**: 60-90% of isolates
7. Isolate/CIDT-positive clinical specimen submission interval: **Metric:** Median number days from collection of clinical specimen to receipt of isolate or clinical specimen from a patient diagnosed by CIDT, at PHL.	For each isolate or clinical specimen from a patient diagnosed by culture independent diagnostic test (CIDT), determine the date of specimen collection and the date of receipt at the PHL. Determine the number of calendar days between these dates, which is the isolate/CIDT-positive clinical specimen submission interval. Analyze the distribution of all known isolate/CIDT-positive clinical specimen submission intervals for the year. Report the median value for isolates/CIDT-positive clinical specimens with known isolate/CIDT-positive clinical specimen submission intervals. Determine the percentages of isolates/CIDT-positive clinical specimens with missing information for which an isolate/CIDT-positive clinical specimen submission interval cannot be determined. Although this is not part of the target range, it is an important process metric that affects the usefulness of the target range to guide performance improvement.	**A. *Salmonella*** **Preferable:** < 7 days **Acceptable**: 7-8 days **B. *E. coli* (STEC)** **Preferable:** < 7 days **Acceptable**: 7-8 days **C. *Listeria*** **Preferable:** < 7 days **Acceptable**: 7-8 days

CIFOR performance measure	Measurement methods	Target range
8. Isolate subtyping interval: **Metric:** Median number days from receipt of isolate to PFGE subtyping results.	For each isolate, determine the date of receipt at the PFGE laboratory and the date of upload to PulseNet. Determine the number of calendar days between these dates, which is the isolate subtyping interval. Analyze the distribution of all known isolate subtyping intervals for the year. Report the median value for isolates with known isolate subtyping intervals. Determine the percentages of isolates with missing information for which an isolate subtyping interval cannot be determined. Although this is not part of the target range, it is an important process metric that affects the usefulness of the target range to guide performance improvement.	**A. *Salmonella*** **Preferable:** ≤ 4 days **Acceptable**: 5-6 days **B. *E.coli* (STEC)** **Preferable:** ≤ 4 days **Acceptable**: 5-6 days **C. *Listeria*** **Preferable:** ≤ 4 days **Acceptable**: 5-6 days
9. PHEP *E. coli* O157 and *Listeria* subtyping interval: **Metric:** PHEP *E. coli* O157 and *Listeria* subtyping interval: % of PFGE subtyping data results for *E. coli* O157:H7 and *Listeria* submitted to the PulseNet national database within four working days of receiving isolate at the PFGE laboratory.	Determine the number of isolates submitted to the PHL. Determine the number of isolates for which PFGE subtyping was performed. This will be the denominator for the metric. Determine the number of primary patterns from subtyped isolates uploaded to PulseNet. Determine the number of results from PFGE subtyped isolates that were submitted to PulseNet within four working days of receipt at the PFGE laboratory. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100.	**Acceptable**: ≥ 90% of PFGE subtyping results submitted to PulseNet within 4 working days.

CIFOR performance measure	Measurement methods	Target range
10. Outbreak clinical specimen collections: **Metric:** Outbreak clinical specimen collections: Number and % of outbreak investigations with clinical specimens collected and submitted to PHL from two or more people.	Determine the number of foodborne illness outbreaks that were investigated. This will be the denominator for the metric. Determine the number of outbreaks for which clinical specimens were collected and submitted to the PHL from two or more people. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100.	**Preferable:** > 75% of outbreaks **Acceptable**: 50-75% of outbreaks
11. Cluster investigation interval: **Metric:** Median number days from initiation of investigation to identification of source.	Determine the number of clusters that were detected by the PHL. Determine the number and percentage of clusters where a source was identified. For each cluster for which a source was identified, determine the date at which the investigation was initiated and the date at which the source was identified. Determine the number of calendar days between these dates, which is the cluster investigation interval. Analyze the distribution of all known cluster investigation intervals for the year. Report the median value for investigations with known cluster investigation intervals.	**Preferable:** < 7 days **Acceptable**: 7-21 days
12. Complaint investigation interval: **Metric:** Median number days from initiation of investigation to implementation of intervention.	Determine the number of foodborne illness complaints that were investigated. Determine the number and percentage of foodborne complaint investigations that led to an intervention. For each complaint investigation that led to an intervention, determine the date at which the investigation was initiated and the date at which an intervention was initiated. Determine the number of calendar days between these dates, which is the complaint investigation interval. Analyze the distribution of all complaint investigation intervals for the year. Report the median value for complaint investigation intervals.	**Preferable:** < 7 days **Acceptable**: 7-21 days

CIFOR performance measure	Measurement methods	Target range
13. Cluster source identification: **Metric:** Number and % of clusters with more than five cases in which a source was identified.	Determine the number of clusters that include five or more cases. This will be the denominator for the metric. Determine the number of clusters for which a source was identified that include five or more cases. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100.	**Preferable:** > 20% of clusters with >5 cases **Acceptable**: 10-20% of clusters with > 5 cases
14. Outbreak etiology reported to NORS: **Metric:** Number and % of outbreaks for which etiology was identified and reported to the National Outbreak Reporting System (NORS).	Determine the number of foodborne outbreaks that were investigated. This will be the denominator for the metric. Determine the number of outbreaks for which an etiology was identified and reported to NORS. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100.	**Preferable:** > 68% of outbreaks* **Acceptable**: 44-68% of outbreaks
15. Outbreak vehicle reported to NORS: **Metric:** No. and % of outbreaks for which a vehicle was identified and reported to NORS.	Determine the number of foodborne outbreaks that were investigated. This will be the denominator for the metric. Determine the number of outbreaks for which a vehicle was identified and reported to NORS. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100.	**Preferable:** > 60% of outbreaks* **Acceptable**: 48-60% of outbreaks
16. Outbreak contributing factor reported to NORS: **Metric:** Number and % of outbreaks for which contributing factors were identified and reported to NORS.	Determine the number of foodborne outbreaks that were investigated. This will be the denominator for the metric. Determine the number of outbreaks for which a contributing factor was identified and reported to NORS. This will be the numerator for the metric. Divide the numerator by the denominator and multiply by 100**.**	**Preferable:** > 55% of outbreaks* **Acceptable**: 33-55% of outbreaks

* The justification for the target ranges in CIFOR performance measures 14-16 is based on the observed variability among states in investigating foodborne outbreaks (Jones T, 2013).

Definitions for components of the CIFOR performance measures
1. 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.
2. Outbreaks detected from complaints: Outbreak detected from a complaint: A foodborne illness outbreak that was detected as a result of a foodborne illness complaint investigation. Foodborne illness outbreak: The occurrence of two or more similar illnesses resulting from ingestion of a common food. Foodborne illness complaint: A report of illness experienced by one or more persons following exposure to a specific event or establishment.
3. Foodborne illness outbreak rate: Foodborne illness outbreak: The occurrence of two or more similar illnesses resulting from ingestion of a common food. Foodborne illness outbreak rate: The number of confirmed foodborne illness outbreaks within a jurisdiction during a year, divided by the population of the jurisdiction x 1,000,000.
4. Confirmed cases with exposure history obtained: Confirmed case: Case reported to local or state health department by clinical laboratory with confirmed *Salmonella*, Shiga toxin-producing *E. coli* (STEC) or *Listeria* infection. Exposure history: An interview (of any format) that assesses exposures prior to onset of illness. The assessment should go beyond assessment of high risk settings and prevention education to ascertain food consumption/preference or other exposure data. For STEC this should include disease-specific data elements identified by CSTE and for *Listeria* it should include completing the *Listeria* case form.
5. Isolate/CIDT-positive clinical specimen submissions to PHL: Isolate: Primary isolates of *Salmonella*, Shiga toxin-producing *E. coli* (STEC) or *Listeria*, limited to first or representative isolate or sample for each case. CIDT-positive clinical specimen: Clinical specimens forwarded to PHL for confirmation and isolation from patients diagnosed with *Salmonella*, Shiga toxin-producing *E. coli* (STEC) or *Listeria* by culture independent diagnostic test (CIDT). PHL: State or local public health laboratory designated to serve as a reference laboratory for confirmation and subtyping of isolates for jurisdiction.

6. PFGE subtyping of isolates:

Isolate: Primary isolates of *Salmonella*, Shiga toxin-producing *E. coli* (STEC), or *Listeria*, limited to first or representative isolate or sample for each case.

PFGE: Pulsed-field gel electrophoresis.

7. Isolate/CIDT-positive clinical specimen submission interval:

Isolate: Primary isolates of *Salmonella*, Shiga toxin-producing *E. coli* (STEC), or *Listeria*, limited to first or representative isolate or sample for each case.

CIDT-positive clinical specimen: Clinical specimens forwarded to PHL for confirmation and isolation from patients diagnosed with *Salmonella*, Shiga toxin-producing *E. coli* (STEC) or *Listeria* by culture independent diagnostic test (CIDT).

Isolate/CIDT-positive clinical specimen submission interval: The number of days from collection of the clinical specimen to receipt of the isolate or clinical specimen from a patient diagnosed by CIDT, at the PHL.

8. Isolate subtyping interval:

Isolate: Primary isolates of *Salmonella*, Shiga toxin-producing *E. coli* (STEC), or *Listeria*, limited to first or representative isolate or sample for each case.

Isolate subtyping interval: The number of days from receipt of the isolate at the PFGE laboratory to availability of PFGE subtyping results.

9. PHEP *E. coli* O157 and *Listeria* subtyping interval:

PHEP: Public Health Emergency Preparedness Cooperative Agreement. PHEP specifies performance measures regarding public health surveillance and investigation of specified agents.

10. Outbreak clinical specimen collections:

Foodborne illness outbreak: The occurrence of two or more similar illnesses resulting from ingestion of a common food.

11. Cluster investigation interval:

Cluster: Two or more isolates with a matching molecular subtype pattern identified in a period of two weeks.

Cluster investigation interval: The number of days from the initiation of an investigation to the identification of source, for clusters with a source identified.

Initiation of an investigation: Steps taken to investigate the possible source of a cluster of cases after it is determined that they may represent a common source outbreak. This goes beyond routine follow-up of individual cases.

12. Complaint investigation interval:

Foodborne illness complaint: A report of illness experienced by one or more persons following exposure to a specific event or establishment.

Complaint investigation interval: The number of days from the initiation of an investigation to the initial intervention.

Initiation of an investigation: Steps taken to investigate the possible source of a complaint after it is determined that it may represent a common source outbreak. This goes beyond routine follow-up of individual complaints.

Intervention: A public health action taken to control an identified hazard.

13. Cluster source identification:

Cluster: Two or more isolates with a matching molecular subtype pattern identified in a period of two weeks.

Cluster source identification: The number of identified clusters for which a specific food transmission setting, meal, food item or ingredient was identified, leading the cluster to be considered an outbreak.

14. Outbreak etiology reported to NORS:

Foodborne illness outbreak: The occurrence of two or more similar illnesses resulting from ingestion of a common food.

NORS form: National Outbreak Reporting System, Foodborne Disease Outbreaks and Enteric Disease Outbreaks Transmitted by Contact with Persons, Animals, or Environmental Sources, or by an Unknown Mode; NORS Form (CDC 52.13 Form).

Etiology identified: For most etiologic agents CDC considers an outbreak to have a confirmed etiology if there are two or more lab-confirmed cases (*MMWR* 2000, Vol. 49/SS-1, App. B). Etiology may be suspected based on characteristic combinations of clinical symptoms, incubation periods, and duration of illness.

15. Outbreak vehicle reported to NORS:

Foodborne illness outbreak: The occurrence of two or more similar illnesses resulting from ingestion of a common food.

NORS form: National Outbreak Reporting System, Foodborne Disease Outbreaks and Enteric Disease Outbreaks Transmitted by Contact with Persons, Animals, or Environmental Sources, or by an Unknown Mode; NORS Form (CDC 52.13 Form).

Vehicle identified: A specific food item or ingredient was confirmed or suspected to be the source of the outbreak based on one of the following: (1) Statistical evidence from epidemiological investigation, (2) Laboratory evidence (e.g., identification of agent in food), (3) Compelling supportive information, (4) Other data (e.g., same phage type found on farm that supplied eggs), (5) Specific evidence lacking but prior experience makes it a likely source.

16. Outbreak contributing factor reported to NORS:

Foodborne illness outbreak: The occurrence of two or more similar illnesses resulting from ingestion of a common food.

NORS form: National Outbreak Reporting System, Foodborne Disease Outbreaks and Enteric Disease Outbreaks Transmitted by Contact with Persons, Animals, or Environmental Sources, or by an Unknown Mode; NORS Form (CDC 52.13 Form).

Contributing factor identified: Contributing factors (CFs) are defined as the food safety practices and behaviors which most likely contributed to a foodborne illness outbreak. A CF should be identified only if the investigator has strong evidence that it actually occurred in the investigated outbreak; just because a factor has been cited in similar outbreaks in the past does not mean it was involved in the investigated outbreak.