



**Evaluation of Colorado Foodborne Illness and Outbreak Response
Using the Council to Improve Foodborne Outbreak and Response (CIFOR)
Proposed Performance Measures**

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Background:

The Council to Improve Foodborne Outbreak Response (CIFOR) was established in 2006 to improve methods at the local, state, and federal levels to detect, investigate, control, and prevent foodborne disease outbreaks. In 2009, CIFOR released “Guidelines for Foodborne Disease Outbreak Detection and Response” (Guidelines)¹. Chapter 8 of the Guidelines lists over 100 performance measures for foodborne disease programs. These measures are divided into foodborne disease program objectives and indicators (short-term, intermediate, and long-term) and major performance measures and metrics for program evaluation (for local and state communicable disease, environmental health, and laboratory programs).

In preparation for a revision of the Guidelines, the CIFOR Metrics Working Group identified 20 key performance measures from Chapter 8 and suggested target ranges for the measures. These were sent to state epidemiologists in April 2013. States were asked to assess which metrics could be calculated with available state data, the difficulty of obtaining and calculating data, and value of the performance measures in evaluating foodborne disease programs performance. Based on feedback from thirteen states, the CIFOR Metric Working Group eliminated some performance measures and updated the remaining 16 measures and their target ranges. This evaluation uses the updated performance measures that are included in the second edition of the Guidelines and is an update to the evaluation conducted in 2013.

Methods:

To evaluate Colorado performance on the 16 performance measures, the following data was used:

- Reportable condition data- *Salmonella*, *E. coli*, and *Listeria* case data were extracted from the Colorado Electronic Disease Reporting System.
- Outbreak Data- Microsoft Access database of all foodborne outbreaks reported in Colorado.
- Colorado Demographers Office- population data used for rates of outbreaks.
- Cluster tracking spreadsheets- google drive spreadsheets maintained by the staff at CDPHE.

- National Outbreak Reporting System (NORS)—managed by the Centers for Disease Control and Prevention (CDC). NORS contains some different data elements than the Outbreak Database.
- BioNumerics—developed by Applied Maths, BioNumerics is used by CDC PulseNet as an unbiased and reproducible way of describing Pulsed Field Gel Electrophoresis (PFGE) patterns.

Multi-state outbreaks were excluded if Colorado had only 1 case reported to be ill. Enteric disease case data from 2011-2015 were analyzed unless otherwise noted. NORS data from 2011-2015 were analyzed. No additional data were collected for the purpose of evaluating the CIFOR performance indicators.

Results:

Below, table 1 describes the 16 revised CIFOR performance measures, the target ranges suggested by the CIFOR Metrics Working Group, Colorado findings, and the target range(s) achieved by Colorado.

Table 1: CIFOR Performance Measures and Colorado Performance

CIFOR Performance Measures		Colorado Performance	
Performance Measure	Target Range	Findings for Each Performance Measure	Target Range Achieved
<p>1. Foodborne illness complaint reporting system: 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.</p>	<p>Preferable: database Acceptable: system to log complaints</p>	<p>Paper registry of complaints*</p> <p>* Most foodborne illness complaints received by local public health agencies.</p> <p>Foodborne illness complaint reporting systems vary by local public health agency. The CDPHE Division of Environmental Health and Sustainability has a paper system. However, the various systems used throughout the state do not “communicate” to each other across jurisdictional boundaries.</p>	Acceptable
<p>2. Outbreaks detected from complaints: Number of outbreaks detected as a result of foodborne illness complaints. Rate of outbreaks detected per 1,000 complaints received.</p>	<p>Preferable: > 20 outbreaks / 1,000 complaints Acceptable: 10-20 outbreaks/ 1,000 complaints</p>	<p>Unable to calculate at the state level because there is no unified complaint system.</p> <p>Individual local public health agencies (LPHAs) are encouraged to calculate this using their data.</p>	

CIFOR Performance Measures		Colorado Performance	
Performance Measure	Target Range	Findings for Each Performance Measure	Target Range Achieved
		*68% (105 out of 155) of foodborne outbreaks were detected through complaints from either private citizens or from a facility where the OB had occurred.	
3. Foodborne illness outbreak rate: Number of foodborne outbreaks reported, all agents. Rate of outbreaks reported / 1,000,000 population.	Preferable: >6 outbreaks / 1,000,000 population Acceptable: 1-6 outbreaks / 1,000,000 population	2011= 5.3 (27 outbreaks) 2012= 7.1 (37 outbreaks) 2013= 5.5 (29 outbreaks) 2014= 5.2 (28 outbreaks) 2015= 6.3 (34 outbreaks) The population data for 2015 was not available; hence the rate of outbreaks for 2015 was computed using the 2014 population data	2011, 2013 and 2014- Acceptable 2012 and 2015- Preferable
4. Confirmed cases with exposure history obtained: Number and percentage of confirmed <i>Salmonella</i> , <i>Shiga-toxin producing E. coli</i> (STEC), and <i>Listeria</i> cases with exposure history obtained	Preferable: > 75% of cases Acceptable: 50-75% of cases	2011-2015 data <i>Salmonella</i> : 88% (2490/2845) STEC: 91% (805/886) <i>Listeria</i> : 91% (83/91)	Preferable
5. Isolate submissions to Public Health Laboratory: Number and percentage of isolates from confirmed <i>Salmonella</i> , STEC, and <i>Listeria</i> cases submitted to Public Health Laboratory	Preferable: > 90% of isolates Acceptable: 60-90% of isolates	2011-2015 data <i>Salmonella</i> : 94% (2686/2845) STEC: 99% (877/886) <i>Listeria</i> : 93% (85/91) *isolate or other clinical material	Preferable
6. Pulsed Field Gel Electrophoresis (PFGE) subtyping of isolates: Number and percentage of <i>Salmonella</i> , STEC, and <i>Listeria</i> isolates with PFGE information.	Preferable: > 90% of isolates Acceptable: 60-90% of isolates	2011-2015 data <i>Salmonella</i> : 94% STEC: 95% <i>Listeria</i> : 98%	Preferable
7. Isolate submission interval: Median number of days from specimen collection to receipt of <i>Salmonella</i> , STEC, and <i>Listeria</i> isolate at PHL	Preferable: <7 days Acceptable: 7-8 days	2015 data <i>Salmonella</i> : 5 days STEC: 3.5 days <i>Listeria</i> : 7 days	Preferable for <i>Salmonella</i> and STEC and acceptable for <i>Listeria</i>
8. Isolate subtyping	Preferable: ≤4	2011-2015 data	Preferable

CIFOR Performance Measures		Colorado Performance	
Performance Measure	Target Range	Findings for Each Performance Measure	Target Range Achieved
<p>interval: Median number days from receipt of <i>Salmonella</i>, STEC, and <i>Listeria</i> isolates to serotyping or subtyping results</p>	<p>days Acceptable: 5-6 days</p>	<p>Salmonella: 2.5 days STEC: 0 days Listeria: not done at Colorado Public Health Lab, sent to CDC.</p>	
<p>9. PFGE <i>E. coli</i> O157 and <i>Listeria</i> subtyping interval: Percent of pulsed-field gel electrophoresis (PFGE) subtyping data results for <i>E. coli</i> O157:H7 and <i>Listeria</i> submitted to the PulseNet national database within four working days of receiving isolate at the PFGE laboratory</p>	<p>Acceptable: ≥90% of PFGE subtyping results submitted to PulseNet within 4 working days.</p>	<p>2015 Data <i>E. coli</i> O157: 91% (64/70) Listeria: 100% (10/10)</p>	Acceptable
<p>10. Outbreak clinical specimen collections: Number and percentage of outbreak investigations with clinical specimens collected and submitted to PHL from 2 or more people</p>	<p>Preferable: > 75% of outbreaks Acceptable: 50-75% of outbreaks</p>	<p>2011-2015 Outbreak data 61% (94/155 outbreaks)</p>	Acceptable
<p>11. Cluster investigation interval: Median no. days from initiation of investigation to identification of a source.</p>	<p>Preferable: < 7 days Acceptable: 7-21 days</p>	<p>2015 cluster data Unable to calculate. *The date of source identification is not routinely collected and is available only for 6 of the 42 clusters.</p>	
<p>12. Complaint investigation interval: Median no. days from initiation of investigation to implementation of intervention.</p>	<p>Preferable: < 7 days Acceptable: 7-21 days</p>	<p>Unable to calculate. *Colorado does not have a centralized foodborne illness complaint system hence unable to capture an intervention implementation date.</p>	
<p>13. Cluster source identification: Number and percentage of clusters with 5 or more cases in which a source was identified.</p>	<p>Preferable: >20% of clusters with ≥5 cases Acceptable: 10-20% of clusters with ≥5 cases</p>	<p>2015 cluster data 9.5% (4/42 clusters)</p>	Out of range
<p>14. Outbreak etiology reported to NORS: Number and percentage of</p>	<p>Preferable: > 68% of outbreaks</p>	<p>2011-2015 NORS data 67% (103/154 outbreaks)</p>	Acceptable

CIFOR Performance Measures		Colorado Performance	
Performance Measure	Target Range	Findings for Each Performance Measure	Target Range Achieved
outbreaks for which etiology was identified and reported to NORS.	Acceptable: 44-68% of outbreaks		
15. Outbreak vehicle reported to NORS: Number and percentage of outbreaks for which a vehicle was identified and reported to NORS.	Preferable: > 60% of outbreaks Acceptable: 48-60% of outbreaks	2011-2015 NORS data 50% (77/154 outbreaks)	Acceptable
16. Outbreak contributing factor reported to NORS: Number and percentage of outbreaks for which contributing factors were identified and reported to NORS.	Preferable: >55% of outbreaks Acceptable: 33-55% of outbreaks	2011-2015- NORS data 63% (97/154 outbreaks)	Preferable

Discussion:

Of the 16 performance indicators, 14 could be evaluated using available data. Of those, preferable target ranges were achieved for 5, acceptable ranges were achieved for 5, 1 was out of range, and 2 had mixed ranges. Three out of 16 indicators could not be evaluated because of data that were not collected.

While isolate submission to the public health lab, percentage of isolates with PFGE subtyping, and subtyping intervals were all thorough and in preferable ranges, specimen collection from 2 or more people was in the acceptable range, and can achieve a preferable range if more specimens are collected from 2 or more people during outbreaks.

Cluster investigation numbers are mixed. The time interval between initiation of an outbreak investigation and identification of a source could not be calculated since the date for source identification is not routinely collected and only 6 out of 42 clusters had this data available and documented in 2015. The number of clusters with more than 5 cases in which a source was identified was out of range and can be improved upon to attain acceptable or preferable target ranges.

There is a discrepancy between the total number of outbreaks in the NORS and Outbreak (OB) databases. One of the outbreaks is present in the OB Database but not entered in NORS, since the CDC still had the outbreak open at the time of this evaluation. Hence the total number of outbreaks in NORS is 154, while it is 155 in the OB database. Indicators #3 and #10 were calculated based on the outbreak database total (i.e.155).

Recommendations:

- Continue thorough investigation of foodborne outbreaks.
- Consider ways to increase outbreak detection around the state.
- Explore a statewide foodborne illness complaint system so that complaint performance measures can be calculated.
- Explore ways to improve collection and submission of clinical specimens to public health lab from 2 or more people during an outbreak.
- Increase documentation to facilitate calculation of cluster metrics. For example, consider adding dates when sources were identified, and when interventions were conducted. Also, work on increasing the number of clusters solved, that is, identifying clusters with 5 or more cases wherein a source was identified.
- Consider merging cluster tracking and outbreak data in a single database to improve data consistency.
- Continue identification and reporting of outbreak etiology, vehicle and contributing factors to NORS.
- Ensure that NORS data entry is complete and updated at the end of each outbreak.

References

¹Council to Improve Foodborne Outbreak Response (CIFOR). Guidelines for Foodborne Disease Outbreak Response. Atlanta: Council of State and Territorial Epidemiologists, 2009