



**CDC Coffee Break:
Streamlining the Evaluation of
Public Health Surveillance Systems**



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Welcome to today's Coffee Break presented by the Evaluation and Program Effectiveness Team in the Division for Heart Disease and Stroke Prevention at the Centers for Disease Control and Prevention.

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Outline

- ❑ **Defining Public Health Surveillance**
- ❑ **Framework for Evaluating Surveillance Systems**
- ❑ **Ideas for Conducting Surveillance System Evaluations**

A brief outline for today: we're going to define "public health surveillance," walk through the framework for evaluating surveillance systems, and at the end I'm going to talk about a few ideas that I have for conducting surveillance systems within the state or local health departments.

Good surveillance does not necessarily ensure the making of right decisions, but it reduces the chance of wrong ones.

Alexander D. Langmuir , 1963

The first quote from the founder of the Epidemic and Intelligence Service Program here at the CDC: “Good surveillance does not necessarily ensure the making of right decisions, but it reduces the chance of wrong ones.”

Public Health Surveillance

The ongoing, systematic collection, analysis, and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those responsible for prevention and control.

Generic and standard public health surveillance definition is “the ongoing systematic collection and analysis and interpretation of health-related data essential to the planning, implementation, and evaluation of public health practice, closely integrated with a timely dissemination of these data to those responsible for prevention and control.

Uses of Public Health Surveillance

- ❑ Estimate the magnitude of the problem
- ❑ Determine geographic distribution of illness
- ❑ Portray the natural history of the disease
- ❑ Identify cases for follow-up or contact tracing
- ❑ Detect epidemics / define the problem
- ❑ Generate hypotheses / stimulate research
- ❑ Evaluate control measures
- ❑ Monitor changes in infectious agents
- ❑ Detect changes in health practices
- ❑ Facilitate planning

Teutsch SM & Churchill RE (Eds). Principles and Practice of Public Health Surveillance, 2nd(Ed.). Oxford University Press, 2000.

And, as we know, there are numerous different uses of public health surveillance from the determination of geographic distribution of illness to the detection of epidemic, the evaluation of control measures, and the facilitation of planning.

Evaluation of Public Health Surveillance Systems

- **Purpose – why are we doing this**
 - “...to ensure that problems of public health importance are being monitored efficiently and effectively.”
- **Intent – how are the data being used for action**
 - “...evaluation...focuses on how well the system operates to meet its purpose and objectives.”
- **Comparison – not all created equal**
 - “...systems vary in methods, scope, purpose...attributes that are important to one system might be less important to another.”

MMWR, 2001, 50(13)

The evaluation of public health surveillance systems' primary purpose is to ensure that the problems of public health importance are being monitored efficiently and effectively—the real reason behind why we are doing this. The intent of the evaluation is to focus on how well the system operates to meet its purposes and objectives. We'll talk about the purpose and objectives in a little while in the presentation. And, lastly, the comparison of different systems, that different systems aren't all created equally. The systems may vary in method, scope, purpose, and different attributes that are important to one system might be less important to another.

Do You Need to Evaluate Surveillance Systems?

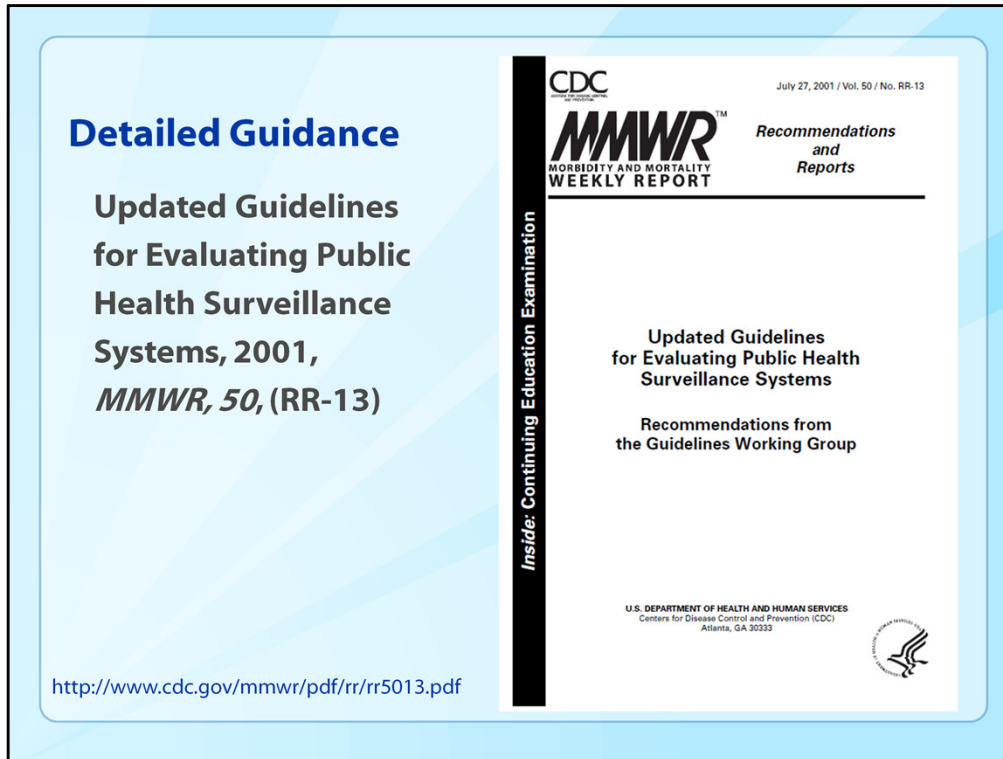
- Are objectives being met?**
- Are objectives still relevant?**
- Is outcome under surveillance still of public health importance?**
- Is the system being used for its intended purpose?**

When you start to get questions like this, it may be time for an evaluation: Are the objectives are being met? Are they still relevant? Is the outcome under surveillance still of public health importance? Is the system being used for its intended purpose?

When Do You Evaluate Surveillance Systems?

- **Response to changes in...**
 - Priorities
 - Information needs
 - Epidemiology
 - Diagnostic procedures
 - Clinical practices
 - Data sources

Really, when do you evaluate surveillance systems? The first is the response to changes in priorities—definitely evident here that we've seen in the division of different activities that have taken a lot of staff time, and it tells us to look at our different surveillance systems as to are they really assessing what we need to asses, and do we need to make changes to these surveillance systems to keep up with our different priorities? One particular example of what we're going to talk about today is sodium surveillance within our division, and its assessment using the national health and the nutrition examination survey, or NHANES.



Today I'm going to have a brief overview of the detail guidance put forth in the evaluation of the Updated Guidelines for Evaluating Surveillance Systems, published in MMWR in 2001. This goes into a very detailed evaluation, and includes a checklist at the end that you can go through, and also just a step-by-step approach. This is the document that I want you to go to and review after the presentation. But I'm going to provide an overview of that today.

Specific Tasks

- A. Engage stakeholders**
- B. Describe system**
- C. Focus evaluation design**
- D. Gather evidence of system's performance**
- E. State conclusions & make recommendations**
- F. Ensure use of findings & share lessons learned**

The guidelines in MMWR focus on six different tasks. Those include engagement of stakeholders, a description of the system, the evaluation design, the gathering of credible evidence, the statement of conclusions and recommendations, and then the use of findings and sharing of lessons learned.

Task A: Engage Stakeholders

- ❑ *"...those persons or organizations who use data for the promotion of healthy lifestyles and the prevention and control of disease, injury, or adverse exposure."*
- ❑ **Opportunity to bring together partners inside and outside agencies/institutions**
- ❑ **Potential to build partnerships for future collaboration and use of data collected**
- ❑ **Carefully selected and role or involvement is defined**

First we're going to talk about the engagement of stakeholders. The stakeholders are those persons or organizations who use data for the promotion of healthy lifestyle and the prevention and control of disease, injury, or adverse exposure. This is really a great opportunity to look at those partners that are inside or outside of your institution, and potentially even new partners that you want to bring on for the future. I do want to caution you to be careful of different stakeholders that you bring on board, just because they'll want to have a defined role, likely, when you bring them in to the table.

Task B: Description of the System

Describe the:

- Public health importance of the health-related event under surveillance**
- Purpose and operation of the system**
 - Planned uses of the data
 - Case-definitions* (use standard definition, if available)
 - Legal authority
 - Flow-chart
- Resources used to operate the system**

Next is the description of the system. The public health importance of the health-related event under surveillance is primary to this description. This may include the frequency of certain morbidity or mortality, disparities, cost, preventability of other ideas, but also the purpose and operation of the system, which may include the planned uses of data, the use of case definitions.

I want you to use the most standard definitions that are possibly available. This may include the use of dietary guidelines or other guidelines that are published or recommendations that are standard across agencies. That's good for a comparison later. Also the legal authority that you may have to conduct surveillance, a flow chart of the actual system itself, and the resources that are used to operate, which may include the amount of time to operate the system, the cost, and the potential sources of funding.

Example: NHANES: Purpose and Objectives

- **Overall purpose**
 - "...why the system exists."
 - Monitor the health and nutritional status in the U.S. population.

- **Selected current objectives**
 - "...how the data are used for public health action."
 - Estimate the number and percent of persons in the U.S. population and subgroup with selected disease and risk factors.
 - Monitor trends in the prevalence, awareness, treatment, and control of selected disease.
 - Monitor trends in risk behaviors and environmental exposures.

The example that we're going to use today is in NHANES. And it is a nationally representative survey that is conducted, with data release every two years. This is the actual system itself, a description of the system, and not so much of the specifics of what it's evaluating. The overall purpose of NHANES is to monitor the health and nutrition status of the U.S. population. The selected objectives that we have here today, and those are how the data are being used for public health action, are to estimate the number and percent of persons with selected diseases or risk factors, and to monitor trends and prevalence and risk factors.

Excess Sodium Intake Case Definition

- **2010 Dietary Guidelines for Americans**
- **Limit sodium intake**
 - **All Americans <2,300 mg/day**
 - **Specific populations <1,500 mg/day**
 - African-Americans
 - Hypertension
 - Diabetes
 - Chronic kidney disease
 - Age ≥ 51 years

The case definition that we use for the recent evaluation of the NHANES system for sodium was using the dietary guidelines. And those are standard definitions that include the limiting of sodium intake of all individuals to less than 2,300 mg a day, and in specific populations, to less than that.

Task C: Evaluation Design

- ❑ **Focusing on the specific purpose of the evaluation.**
- ❑ **Identifying stakeholders who will receive the findings (i.e., intended users).**
- ❑ **Considering what will be done with the information (i.e., intended users).**
- ❑ **What question(s) will be answered?**

Up to this point, we've really discussed the background, or the introduction. You could really see it as the introduction or the background section of a manuscript that you're writing. Up until this point you're describing the burden of disease, you're looking at the definition itself, the description of the system, the cost related to that, and then you come to the questions.

Task C focuses on the evaluation design question itself, and you're identifying stakeholders who receive the findings, the intended users; consider what will be done with the information; and also what questions will be asked.

Evaluation Design

The core of the evaluation – the question:

- ❑ **Can current and proposed NHANES measures adequately and effectively monitor excess sodium intake?**
- ❑ **Does the BRFSS adequately monitor self-reported physical activity levels among U.S. adults?**

It's really the core of the evaluation, and the transition point that you're looking at with the evaluation. The first question assesses NHANES: "Can current and proposed NHANES measures adequately and effectively monitor excess sodium intake?" And I just put a second on there, a second evaluation that was done recently that I participated in: "Does the BRFSS adequately monitor self-reported physical activity models among U.S. adults?"

Task D: Credible Evidence

- ❑ Usefulness
- ❑ **Simplicity**
- ❑ **Flexibility**
- ❑ **Data Quality**
- ❑ **Acceptability**
- ❑ **Sensitivity**
- ❑ **Predictive value positive**
- ❑ **Representativeness**
- ❑ **Timeliness**
- ❑ **Stability**

Credible evidence determines the usefulness of the system itself. And each of these really go into great detail in MMWR about the pros and cons of the depth of different credible evidence to choose here. Each attribute will be reviewed for the system. We don't really have time to go into each detail today, each detail and attribute today, but I'm going to provide an overview of a few just to give you an example.

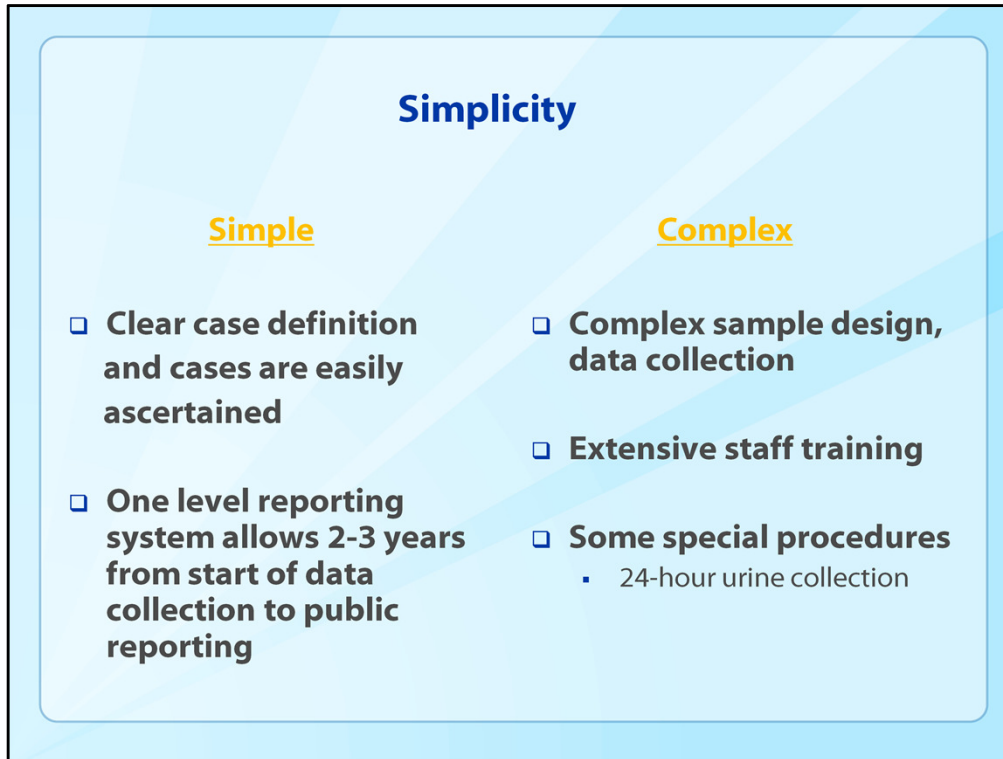
Usefulness

- **Sodium intake from 24-hour dietary recalls**
 - Effective tool to monitor the dietary patterns of the U.S. population
 - Estimate the prevalence of excess sodium intake

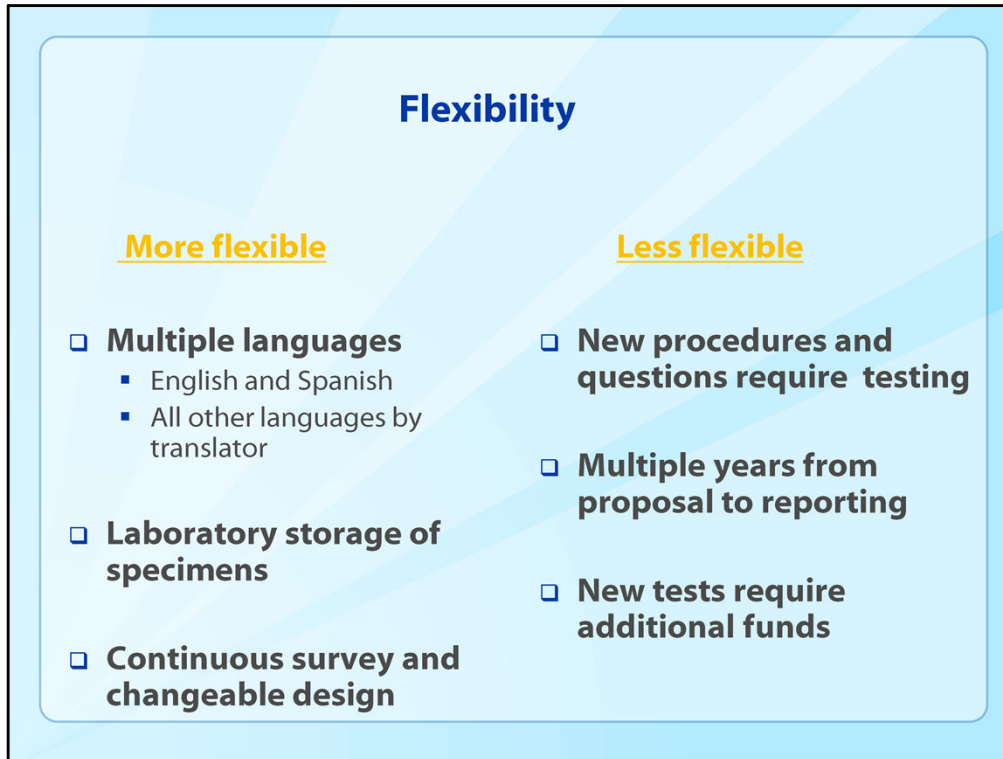
- **Sodium intake from casual urine specimens**
 - Feasible and inexpensive sodium intake biomarker

- **Sodium intake from 24-hour urine specimens**
 - Recommended as the gold standard for sodium intake as 95% of intake is excreted from urine

The first, the public health system is useful if it contributes to the prevention and control of adverse health events, including the improved understanding of the public health implications of such an event. And this looks at the sodium monitoring in NHANES using different metrics. The first is the dietary recall, the second is casual urine specimens, and the third is the gold standard, or the 24-hour urine specimen.



Here is an example of an attribute giving credible evidence of simplicity. It refers both to its structure and ease of operation. Surveillance systems are encouraged to be as simple as possible, while still meeting objectives. I really like the way it's divided here between simple and complex, looking at the different attributes of the system. It allows you to look at both sides of the system.



The ability of a system to adapt to changes or new demands is flexibility. It's generally best evaluated after change is or requested or implemented—so retrospectively. And an example that may be very relevant to you is the state-added questions to BRFF as an example of that system being more flexible.

Acceptability of Sodium Measures

	Response Rate	Years & Studies
Dietary Recall	72 %	2007-2008 (NHANES)
Casual Urine	71%	2007-2008 (NHANES)
24-hour Urine	18-78% (~50 %)	1996-1999 (INTERMAP)

INTERMAP: International Study on Macronutrients and Blood Pressure

Accessibility: Are people willing to participate in the system or in the survey itself? This may be captured by response rates, participation rates, cooperation rates, and others.

Task E: Conclusions/Recommendations

- ❑ **Conclusions are justified by the credible evidence.**
- ❑ **Evidence from the evaluation should be linked to the evaluation design question(s).**

The next task is the conclusions and recommendations. The conclusions are justified by credible evidence. The evidence from the evaluations should be linked to the evaluation design question itself.

Conclusion (1)

- ❑ **Potential complete surveillance of excess sodium intake from food and biomarkers**
- ❑ **Complex, timely, stable and flexible**
- ❑ **Nationally representative**

Some conclusions that we came to in looking at NHANES as a measurement to track excess sodium intake was a potential complete surveillance of excess sodium intake by certain biomarkers. As you recall, it assessed sodium through 24-hour dietary recall, and also through biomarkers such as casual urine in the pilot testing of the 24-hour collection.

The conclusion should also provide an overview of the system itself looking at NHANES as a complex, timely, stable, and flexible system that produces a nationally representative sample.

Conclusion (2)

- ❑ **24-hour dietary recalls have been used as evidence of excess sodium intake, but the sensitivity and specificity of this measure for excess sodium intake is unknown.**
- ❑ **Casual urine specimens are inexpensive and feasible, but its accuracy for the assessment of excess sodium intake is unclear - studies are ongoing.**
- ❑ **24-hour urine collection is “gold standard”; but the response rate is uncertain.**

In further conclusions, you would go into more detail of the systems, looking at the different attributes that you had set, such as the dietary recalls, the casual urine specimens, and the 24-hour urine selection.

Recommendations

- ❑ **Continue NHANES sodium surveillance by using 24-hour dietary recalls.**
- ❑ **Validate the accuracy of 24 hour dietary recall and casual urine specimens for assessment of excess sodium intake.**
- ❑ **Launch the pilot testing for 24-hour urine collection to assess the acceptability.**

And from that you would make recommendations based on your conclusions and your credible evidence. The recommendations that we had when we looked at sodium in NHANES was to continue NHANES sodium surveillance by using the 24-hour dietary recall.

Is it a historical metric also? Is it a good metric of the assessment of sodium in our diet? But also to look at different things as well, such as the validation of the 24-hour dietary recall and casual urine specimen, and then the launch of pilot testing of the 24-hour urine collection that wasn't currently on the NHANES, but is the gold standard to look at assessing sodium in the population.

Task F: Share Lessons Learned

- ❑ **Lessons from the evaluation regarding the full scope of the system**
 - Stakeholders
 - Feasibility
 - Costs
 - Flexibility
- ❑ **Share with stakeholders, staff, colleagues, etc**

The last task is to look at the sharing of lessons learned, and these lessons may involve some of the initial work and the introduction and background section when you were gathering the burden information or looking at stakeholders, and it also may go all the way across to the credible evidence section, when you're looking at the feasibility, the cost, and the other flexibility in the systems. You will want to share these lessons learned with different stakeholders within and outside your organization, staff, and other colleagues.

Ideas for Conducting Surveillance System Evaluations

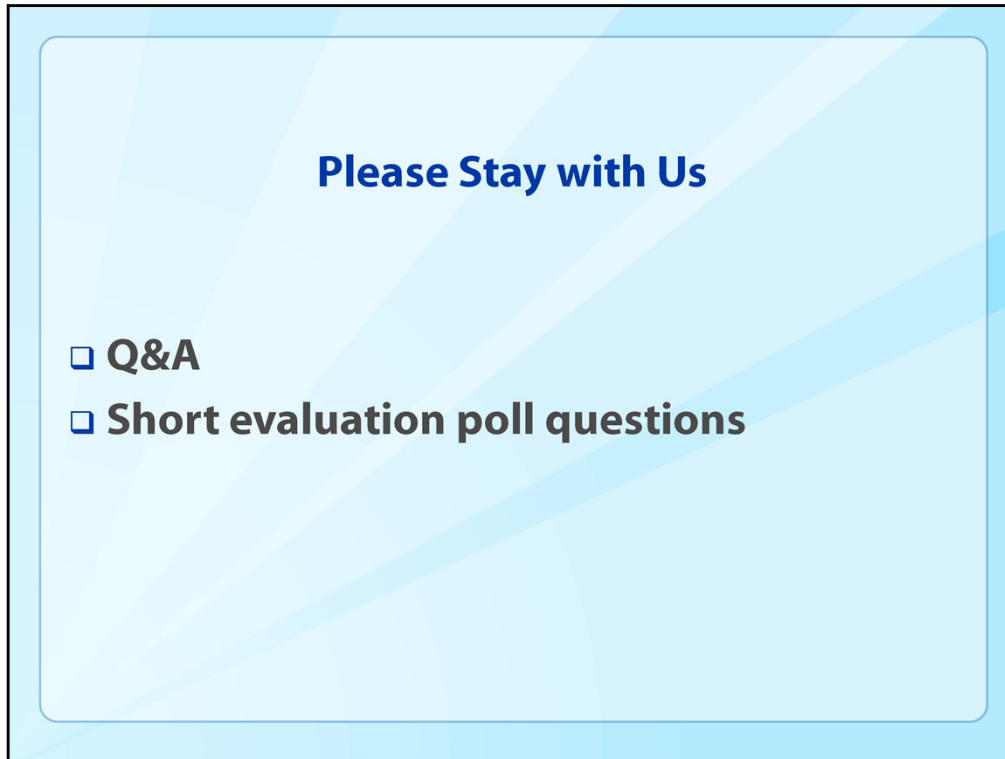
- ❑ **Fellows/Interns**
- ❑ **Students**
- ❑ **Partnerships with Universities**
- ❑ **Support from Stakeholders**

And, lastly, I want to talk about ideas for conducting surveillance system evaluation. I conducted an evaluation during my time as a fellow at CDC, and that's historically the time that we conduct many surveillances and evaluations. We have new fellows come in, it's a great task to learn the surveillance system, but also walk through in detail the different processes. This may be a good model for you to use as well in your organization. They also may be connected by students or partnerships with universities, or even potentially from additional stakeholders.

Additional Resources

- ❑ **CDC. (1988). Guidelines for Evaluating Surveillance Systems, MMWR , 37(S-5) 1-18 .**
- ❑ **CDC. (2004). Framework for Evaluating Public Health Surveillance Systems for Early Detection of Outbreaks, MMWR, 53(RR05);1-11.**
 - <http://www.cdc.gov/Mmwr/preview/mmwrhtml/rr5305a1.htm>
- ❑ **CDC. (1999). Framework for Program Evaluation in Public Health, MMWR, 48(RR11);1-40.**
 - Updated information:
 - <http://www.cdc.gov/eval/framework/index.htm>

And, lastly, it's just the resources that I want to provide to you here. In addition to the updated guidelines that were provided in 2001, there was the original 1988 publication. And then there was the 2004 publication looking at the early detection of outbreaks in public health surveillance systems, and then a program evaluation that was produced in 1999.



Question #1: What challenges have you faced conducting evaluations of public health surveillance?

With each different system being different and each attribute being more or less important within the system, there are numerous challenges that you may face. And one that I can remember in particular was the use of the funding source for the assessment of a funding source within the system. Something that you want to really get the background of, I don't make the direct calls to assessing the surveillance system, so the personnel calls for the cost that goes into cognitive testing and questions, but the potentially indirect costs as well.

How we've located those, it sometimes takes some time to do some background work and background information, and then doing additional calculations based on your findings; that can produce a challenge sometimes.

Question #2: How long do the evaluations usually take to conduct?

What's very similar to the first is that one may take shorter periods of time or longer depending on the scope of the system. I would estimate an average evaluation to take between two and four weeks depending on the scope of the system and the different attributes of the system that are being evaluated.

Thank You

If you have questions, please contact:
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