

Framework and Tools for Evaluating Health Surveillance Systems

**Prepared by
Health Surveillance Coordinating Committee (HSCC)
Population and Public Health Branch
Health Canada**

**for
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Population and Public Health Branch
Health Canada**

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For additional information and/or copies of the document please contact:

Centre for Surveillance Coordination
Population & Public Health Branch
Address Locator: 6503D

Tel: 1-877-430-9995

Fax: (613) 941-6242

E-Mail: health_surveillance@hc-sc.gc.ca

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Population and Public Health Branch Health Surveillance Coordinating Committee

- Dr. David Mowat, Director General, Centre for Surveillance Coordination
- Ms. Deborah Jordan, Acting Director General, Centre for Surveillance Coordination
- Dr. Ora Kendall, Chief, Data Development and Exchange Program, Centre for Surveillance Coordination
- Dr. Catherine McCourt, Director, Health Surveillance and Epidemiology Division, Centre for Healthy Human Development
- Dr. Hajnal Molnar-Szakacs, Chief, Reproductive Health Section, Centre for Healthy Human Development
- Dr. Yang Mao, Director, Surveillance and Risk Assessment Division, Centre for Chronic Disease Prevention and Control
- Dr. Robert Semenciw, Surveillance and Risk Assessment Division, Chronic Disease Surveillance, Centre for Chronic Disease Prevention and Control
- Dr. Margaret de Groh, Senior Policy Analyst, Centre for Chronic Disease Prevention and Control
- Dr. Chris Archibald, Director, Surveillance and Risk Assessment Division, Centre for Infectious Disease Prevention and Control
- Mr. Richard Lemay, Senior Surveillance Officer, Office of Public Health Security, Centre for Emergency Preparedness and Response
- Dr. Amin Kabani, Senior Medical Advisor, National Microbiology Laboratory
- Mr. Jeff Aramini, Senior Epidemiologist, National Microbiology Laboratory
- Dr. Pascal Michel, Epidemiologist, Laboratory for Foodborne Zoonoses (Quebec Region)
- Dr. André Ravel, Epidemiologist, Population and Public Health Branch (Quebec Region)
- Dr. Lucie Dutil, Epidemiologist, Laboratory for Foodborne Zoonoses (Quebec Region)
- Mr. Rick Anderson, IMSD/PPHB SIA/Chief ITMS, Branch Services Division, Management and Programs Service Directorate
- Mr. Greg Sweet, Policy Analyst, Strategic Policy Directorate
- Ms. Charleen Gorbet, Special Project RDO, PPHB Ontario-Nunavut Regions
- Ms. Lisa Camelon, Senior Policy/Research Analyst, Business Integration and Information Services Directorate
- Dr. Elroy Mann, Head, Surveillance, Laboratory for Foodborne Zoonoses (Guelph)

Non-Committee Members:

- Mr. Arnold Love, Consultant
- Dr. Bob Spasoff, Consultant
- Dr. Linda VanTil, Epidemiologist, P.E.I Department of Health and Social Services / National Diabetes Surveillance Strategy Steering Committee
- Ms. Rebecca Irwin, Coordinator, Laboratory for Foodborne Zoonoses (Ontario/Nunavut)
- Ms. Elizabeth Wright, Senior Epidemiologist, Centre for Surveillance Coordination
- Dr. Paula Stewart, Interchange, Centre for Chronic Disease Prevention and Control
- Ms. Catherine Fothergill-Payne, Evaluation Manager, Departmental Program Evaluation Division, Applied Research and Analysis Directorate, Information, Analysis and Connectivity Branch

Mr. Michael King, Epidemiologist, Bureau of Biostatistics and Computer Applications, Food Directorate, Health Products and Food Branch

Mr. Gary Catlin, Director, Health Statistics Division, Statistics Canada

Dr. Michael Goodstadt, Director, Centre for Health Promotion Unit, University of Toronto

Mr. Farouk El-Allaki, University of Montreal, Faculty of Veterinary Medicine

Ms. Nancy Porteous, Senior Policy Analyst, Chronic Disease Prevention, Centre for Chronic Disease Prevention and Control

Ms. Amira H. Ali, University of Ottawa, Faculty of Social Sciences

Dr. Linda Panaro, Program Director, Canadian Field Epidemiology Program, Centre for Surveillance Coordination

Ms. Mandy Weselak, Senior Analyst, Data Development and Exchange Program, Centre for Surveillance Coordination

Mr. Abdul Syed, Manager, Health Surveillance Coordination Division, Centre for Surveillance Coordination

Dr. Michel Bigras-Poulin, University of Montreal, Faculty of Veterinary Medicine

Population and Public Health Branch Health Surveillance Coordinating Committee, Secretariat

Ms. Deborah Jordan, Acting Chair, Acting Director General, Centre for Surveillance Coordination

Mr. Alan Hotte, Manager, Health Surveillance Evaluation, Centre for Surveillance Coordination

Ms. Carol Toone, Project Officer, Health Surveillance Evaluation, Centre for Surveillance Coordination

Ms. Karen McNaught, Project Officer, Health Surveillance Evaluation, Centre for Surveillance Coordination

Contact

Alan Hotte, Project Manager, Health Surveillance Coordination Division,

Centre for Surveillance Coordination, Voice (613) 957-7896, Fax (613) 952-3196,

Alan_Hotte@hc-sc.gc.ca, www.healthsurv.gc.ca

Executive Summary

Framework and Tools for Evaluating Health Surveillance Systems is designed to help managers of health surveillance systems identify and document issues relating to the rationale, implementation and effectiveness of their health surveillance systems. The Framework and tools provide standard approaches that managers can apply in their efforts to identify current practices and to enhance the ability of surveillance to provide relevant information for the review of public health objectives.

The framework outlines six steps in evaluating health surveillance.

- Step 1** Establishing the context of the surveillance system
- Step 2** Developing evaluation questions
- Step 3** Designing the process for data collection and management
- Step 4** Collating and presenting the findings
- Step 5** Reviewing an evaluation report
- Step 6** Following up on the use of findings

These steps outline a process for systematically reviewing the purpose, design, management and operational characteristics of a system within the context of its program. As noted by Klaucke¹, the strength of an evaluation depends on the evaluator's ability to assess a system's characteristics with respect to its objectives.

The ease of implementation and degree of success of an evaluation is closely linked to the maturity of results-based management practices. Results-Based Management and Accountability Frameworks (RMAFs) help managers ensure that:

- Clear roles and responsibilities among partners are described;
- Resources are tied to expected outcomes;
- Appropriate performance measures are determined for ongoing adjustments;
- Evaluation is identified and planned within the overall program life-cycle; and
- Adequate reporting of outcomes is ensured.

¹ Klaucke DN. Evaluating public health surveillance systems. In: Baker EL, Halperin W, Monson RR, editors, Public health surveillance. Toronto: Wiley; 1992. p. 26-41.

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Background and Purpose

Surveillance is to public health as accounting is to a commercial enterprise. Both track the “life-blood” of the flow of information in support of crucial decisions that impact on the lives of many citizens.

Framework and Tools for Evaluating Health Surveillance Systems provides managers of health surveillance systems with a standard approach for assessing:

- The quality of the information that their systems produce;
- The effectiveness of their systems in supporting the objectives of the programs that they serve;
- The effectiveness of their systems in supporting informed decision-making; and
- The efficiency of their systems.

This document has been developed in response to the emerging application of results-based management practices within Health Canada, an Auditor General’s report focusing on the practices of measuring and reporting of performance, and the desire for systemic change in the wake of the recent SARS crisis in Canada. Health Canada mandated its Population and Public Health Branch (PPHB) to initiate the development of an evaluation framework for enhancing the performance of surveillance systems.

In January 2003, the Centre for Surveillance Coordination undertook this project with the guidance of the PPHB Health Surveillance Coordinating Committee, whose membership represents the branch’s Centres, Directorates and Laboratories.

“Health Canada should strengthen its evaluation, performance measurement, and reporting of results of its health surveillance activities.”

Auditor General of Canada,
Recommendation 2.101,
Measuring and Reporting
Performance, National Health
Surveillance (Chapter 2 –
September 2002).

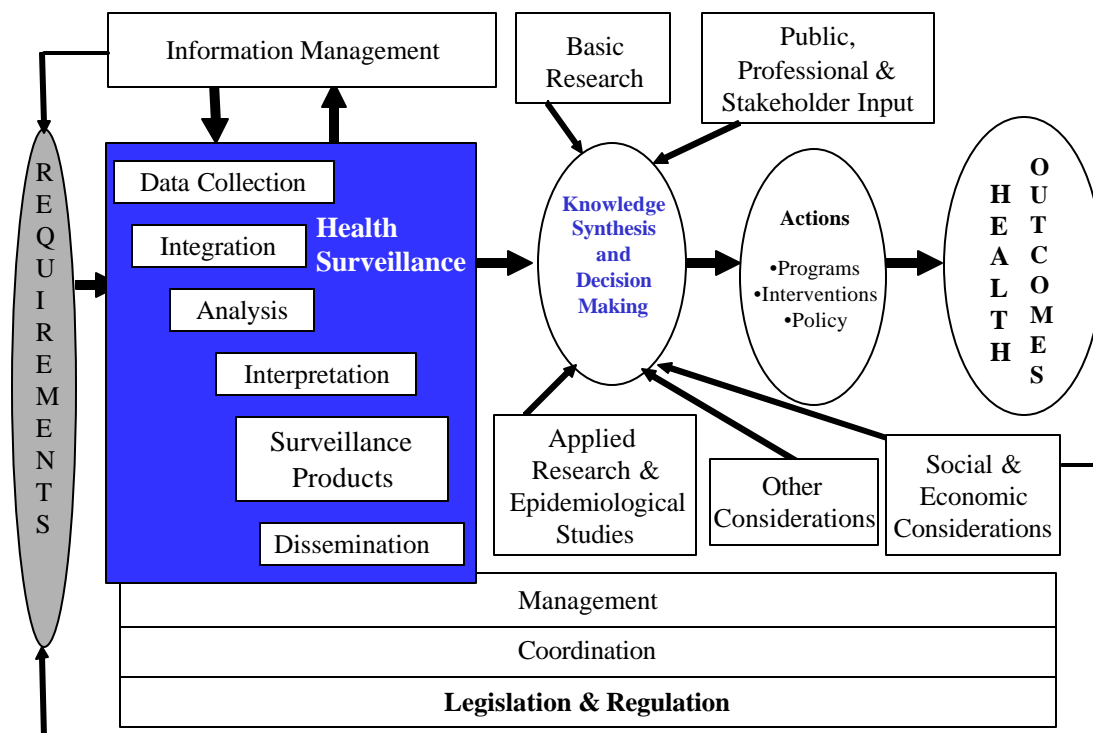
Managing Surveillance Systems

Health Surveillance

Health surveillance can be described as “the tracking and forecasting of any health event or health determinant through the continuous collection of high quality data, the integration, analysis and interpretation of ... data into surveillance products ... and the dissemination of ... surveillance products to those who need to know [to address] a specific public health purpose or policy objective.”² Health surveillance is an essential component of evidence-based decision-making practices.

Figure 1 identifies the key concepts within the surveillance process and the dynamic relationship between surveillance, risk/hazard/exposure factors and health outcomes. All of these factors play a role within the context within which surveillance functions and should be taken into account in the early stages of planning an evaluation of a surveillance system.

Figure 1 Key Concepts of a Health Surveillance System



² National Health Surveillance Network Working Group. Proposal to develop a network for health surveillance in Canada. Health Canada: Ottawa; 1999. p. 6 Available at: URL: health_surveillance@hc-sc.gc.ca

Evaluation

In the life cycle of every program, project or initiative, evaluation helps owners and stakeholders make informed decisions. Evaluation is a tool for managers to determine the necessary decisions for improving program performance and productivity. Evaluation can also be applied to components within a program that impact on the quality of its deliverables and outcomes.

Evaluation and Surveillance Systems

Evaluation of a surveillance system helps establish the connections between a program's deliverables and public health decision-making. Specifically, it provides an opportunity to take a systematic look at the purpose, design, management and operational characteristics of the surveillance system and its success in serving the requirements of public health action. An evaluation assesses a system's characteristics against its requirements and it can occur at many different points in the development, implementation and review of a surveillance system.

Evaluation helps to answer the following questions:

- What are the successes and deficiencies of the surveillance system?
- Is the surveillance system meeting its public health objective?
- How does surveillance both support and benefit stakeholders?
- What measures could improve performance and productivity of the surveillance system and the program(s) that it supports?

"Because surveillance systems vary widely in their methods, scope, and objectives, characteristics that are important to one system may be less important to another... Thus, the success of an individual surveillance system depends on the proper balance of characteristics, and the strength of an evaluation depends on the ability of the evaluator to assess these characteristics with respect to the system's objectives. In an effort to accommodate these objectives, any approach to evaluation must be flexible."
(Klaucke, 1992)

Results-Based Management

The Government of Canada's Results-Based Management and Accountability Framework (RMAF) provides managers with a map of the broader management practices necessary to support the implementation of evaluation and the use of evaluation products. Results-based management is "the purposeful use of resources and information to achieve measurable progress toward program outcome objectives related to program goals."³

The RMAF model includes five components:

1. **Program Profile:** A description of the program, or system characteristics and objectives.
2. **Logic Model:** A schematic presentation of high-level program and system activities and their link to outcomes. A logic model can be an effective tool for communicating the scope of a program to both internal and external stakeholders.
3. **Performance Measurement:** Ongoing monitoring and reporting of progress toward goals that are measured by proxy performance standards or indicators. Performance measurement functions as an early warning monitoring tool.
4. **Evaluation:** An in-depth investigation into the links between input, activity, output and outcomes. This may occur at any desired interval during program development, implementation or review. Standard criteria must also be adopted for assessing evaluation reports.
5. **Reporting:** Processes for reporting and management review of the findings of ongoing performance measurement and evaluation.

The results-based management approach of an RMAF highlights the importance of preparation, context and documentation. The degree of success of an evaluation is predicated upon an organization's capacity to adopt and meaningfully apply these practices.

In exploring the capacity of organizations to conduct successful evaluations, a series of case studies by the United States General Accounting Office (US-GAO) identified the following contributing factors:

- An organizational ethos of self-examination and improvement;
- Support for policy debates through experimentation; and
- Responsiveness to demands for accountability.

Figure 2 outlines the crucial aspects of successful project management that support managing the evaluation function as a distinct project within the larger context of results-based management. In considering the use of any project management tool or process, parsimony ought to be the governing principle. For example, the sample management plan included as

³ Wholey J. Foundations of program evaluation – theories of practice. In: Shadish WR, Cook TD, Leviton LC, editors. Evaluation for program improvement. Sage: Newbury Park; 1991. p. 225-69.

Appendix A should start life as a project charter, grow into a project plan, and end life as the final evaluation report to close out the project.

Figure 2 Critical Success Factors for the Management of Evaluation as a Project	
1.	Adopt a project management methodology and use it consistently
2.	Implement a philosophy that drives ... toward project management maturity and communicate it to everyone.
3.	Commit to developing effective plans at the beginning of each project.
4.	Minimize scope changes by committing to realistic objectives.
5.	Recognize that cost and schedule management are inseparable.
6.	Select the right person as project manager.
7.	Provide senior management with project sponsor information, not project management information.
8.	Strengthen involvement and support of the project manager.
9.	Focus on deliverables rather than resources.
10.	Cultivate effective communication, cooperation and trust to achieve rapid project management maturity.
11.	Share recognition for project success with the entire project team.
12.	Eliminate non-productive meetings.
13.	Focus on identifying and solving problems early, quickly and cost-effectively.
14.	Measure progress periodically.
15.	Use project management software as a tool - not as a substitute for effective planning or interpersonal skills.
16.	Institute an all-employee training program with periodic updates based upon documented lessons learned.
Adapted from: Kerzner H. Project management - a systems approach to planning, scheduling, and controlling. Wiley: Toronto; 2000.	

Evaluation Framework for Surveillance Systems

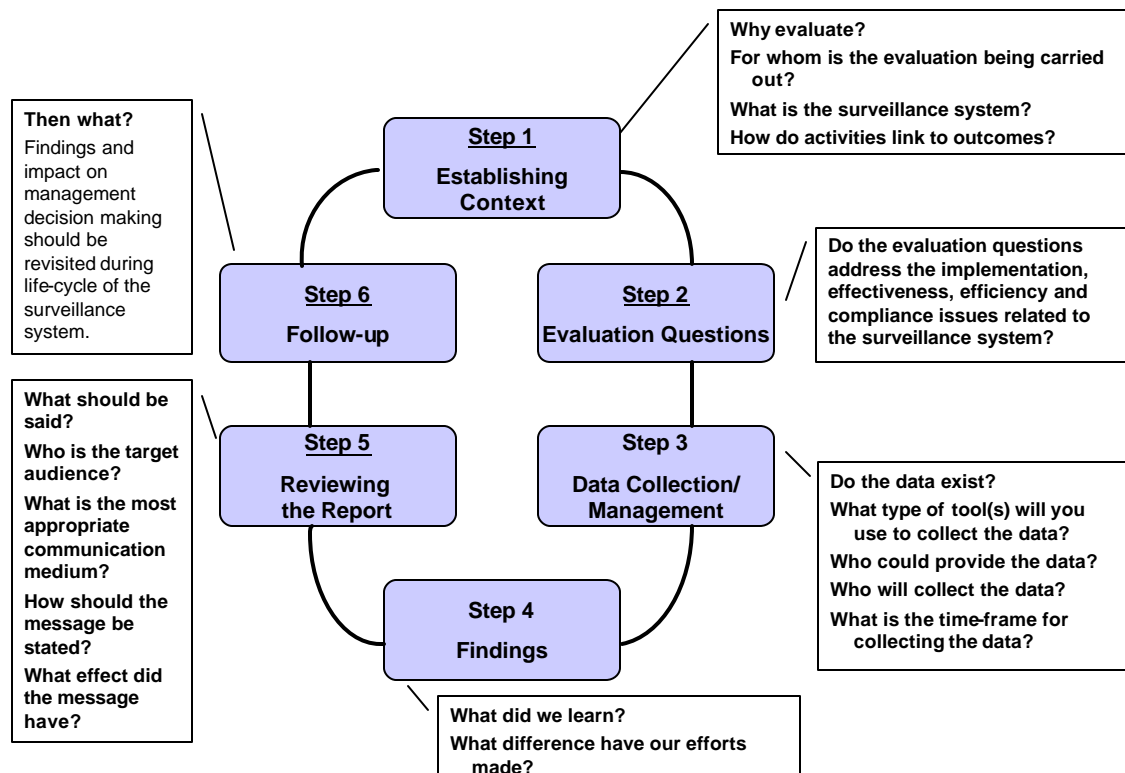
An evaluation is a process for systematically gathering, analysing and reporting information about a program, policy or initiative for use in management decision-making.

Evaluations:

- **Inform specific decisions in specific contexts.** For example, a manager can use an evaluation to assess how a given surveillance system is providing ongoing data in support of a particular mandate or policy. Thus, the scope of evaluation is specific, and while it uses many of the methods of scientific study, it does not include the primary intention of advancing knowledge in a particular field.
- **Address the relevance, degree of success and long-term consequence of a program or system.** For example, a manager can use an evaluation to explore program issues in addition to whether the funds were used appropriately. Hence, it can be said to differ from an audit.
- **Provide in-depth analysis at specific intervals.** Thus, evaluation differs from monitoring solely to identify deviations from operational objectives.

An evaluation framework serves as a guide for developing specific evaluation project plans, aiding in the production of data used for answering evaluation questions for management decision-making. Figure 3 presents the steps and corresponding questions that guide the development of an evaluation framework for surveillance systems.

Figure 3 Evaluation Framework for Surveillance Systems



As a manager contemplates evaluation, concerns may emerge with regard to resource utilization, fear of assessment or other concerns. Figure 4 outlines sample concerns and suggested responses.

Figure 4 Common Concerns about Evaluation

- 1. Evaluation diverts resources away from the program and therefore impacts on outcomes.**
As evaluation helps to determine what does and does not work in a program, it actually has a beneficial impact on outcomes. Without an evaluation, you are providing services and/or products with little or no evidence that they actually work!
- 2. Evaluation increases the burden for program staff.** Often program staff are responsible for collecting evaluation information because they are most familiar with and have the most contact with program participants. Despite this potential for increased burden, staff can benefit greatly from evaluation because it provides information that can help them improve their work, learn more about program needs, and validate their successes. The burden can be decreased somewhat by incorporating evaluation activities into ongoing program activities.
- 3. Evaluation is too complicated.** Managers often reject the idea of conducting an evaluation because they do not know how to do it or whom to ask for help. Although the technical aspects of evaluation can be complex, the evaluation process itself simply systematizes what most program managers already do on an informal basis — figure out whether the program's objectives are being met, which aspects of the program work, and which ones are not effective.
- 4. Evaluation may produce negative results and lead to information that will make the program look bad.** An evaluation may reveal problems in accomplishing the work of the surveillance system as well as the successes. It is important to understand that both types of information are significant. The discovery of problems should not be viewed as evidence of program failure, but rather as an opportunity to learn and improve the program. Information about both problems and successes not only helps your surveillance program, but holds the potential to help other programs learn and improve.
- 5. Evaluation requires setting performance standards, and this is too difficult.** Many managers believe that an evaluation requires setting performance standards, such as specifying the percentage of participants who will demonstrate changes or exhibit particular behaviours. Program staff worry that if these performance standards are not met, their project will be judged a failure. However, performance standards can only be set if there is extensive evaluation information on a particular program in a variety of settings. Without this information, performance standards are completely arbitrary and meaningless.

Adapted from: U.S. Department of Health and Human Services. The program manager's guide to evaluation, administration of children, youth and families. Available at: URL: http://www.acf.hhs.gov/programs/core/pubs_reports/prog_mgr.html

Managers often raise a concern regarding the role of internal versus external personnel to conduct the evaluation. External personnel have the advantages of perceived objectivity and credibility by external agencies, whereas internal personnel have better knowledge of the organization and may be in a better position to advocate change based on the evaluation findings.⁴

Figure 5 outlines the key decisions for enhancing evaluation within an organization: decisions on purpose, role, links with management, level of decentralization and the resources applied to this function.

Figure 5 Decisions for Enhancing Evaluation within an Organization

What is the primary purpose and role intended for evaluation in the organization?

- Purposes (central allocation and reporting, departmental strategic planning, departmental program improvement)
- Roles (helping, challenging, controlling)

What link(s) will there be to management and decision-making?

- Clear and recognized link
- Used as appropriate
- Rhetorical link

What level of decentralization will there be?

- Evaluation by the centre
- Evaluation by the departments
- Evaluation by programs

What investment of human and dollar resources does the organization wish to invest in evaluation?

- Type of resources (in-house versus contract)
- Amount of resources (level of evaluation activity expected: limited occasional studies, periodic comprehensive review) – 5-15% of surveillance data collection allocation.

What level of central support and control will there be?

- Advice, guidance, training
- Oversight/ enforcement
- Little or none

⁴ Mayne J. Institutionalizing program evaluation. In: Hudson J, Mayne J, Thomlison R, editors. Action-oriented evaluations in organizations – Canadian practices. Wall & Emerson: Toronto; 1992. p. 21-27.

Step 1 - Establishing the Context

In order to design an evaluation that will provide the required information, the intent of the system must first be articulated. This helps to clarify the context within which the surveillance system functions. To focus the design, specific consideration must be given to the purpose of the evaluation, the stakeholders involved in the evaluation and their roles and responsibilities, the design and scope of the evaluation, and the function of a surveillance system within a given program.

Why evaluate? (Purpose)

Determining the objectives of the evaluation is an important first step in designing the evaluation. All evaluations should commence with a clear statement about which decision(s) will result from the evaluation. Without *a priori* knowledge of the decisions, the evaluation will fail to serve decision-makers.

For whom is the evaluation being carried out? (Roles and Responsibilities)

Stakeholder involvement in the design of an evaluation ensures that evaluation questions are appropriate, pertinent, acceptable and useful for decision-making. Care must be taken to identify both who the 'client' is and his/her role in decision-making. This step is essential for ensuring that the purpose(s) is (are) appropriately prioritized – otherwise, it will be difficult to develop appropriate methodology and scope. Before moving forward with an evaluation, it is important to obtain formal 'sign-off' on evaluation questions by primary, secondary and tertiary stakeholders involved in the evaluation.

What is the surveillance system? (Design and Scope)

Specifications and requirements vary greatly across and between systems. Surveillance systems can include a wide range of stakeholders, from federal, provincial/territorial and regional governments to non-government organizations and research organizations, from those who collect the data, to those who build and support the technology, to those who provide governance support for the system's development and use. This includes the surveillance system's legislative, privacy and security requirements and its context within public health policy.

It is essential that the parameters within which the surveillance system and its overall program operate be established. This includes exploring the following questions:

- What is the purpose of the surveillance system?
- What is the population under surveillance?
- What information is collected and collated?
- Who uses the surveillance system?
- What kind of action is expected from data analysis and interpretation?

Surveillance systems operate in integrated, multi-disciplinary, multi-jurisdictional environments and must achieve compliance with relevant acts, regulations and policies, including privacy, security and confidentiality. Ongoing risk and issues management can, for example, help ensure compliance with privacy impacts assessments.

To identify surveillance system parameters, a specification profile can be developed; this will include scientific, operational and resource considerations, and compliance issues. The specification profile will help 'ground' the scope of an evaluation in the context and stage of development of the surveillance system. Appendix B provides a template for developing a specification profile.

How do the surveillance system activities link to the program outcomes? (Risks and Issues)

A logic model can be useful for linking a surveillance system's activities to outcome. It illustrates the cause-and-effect relationships among program resources, activities and outcomes. This can help to address problems in the design and implementation of a program.

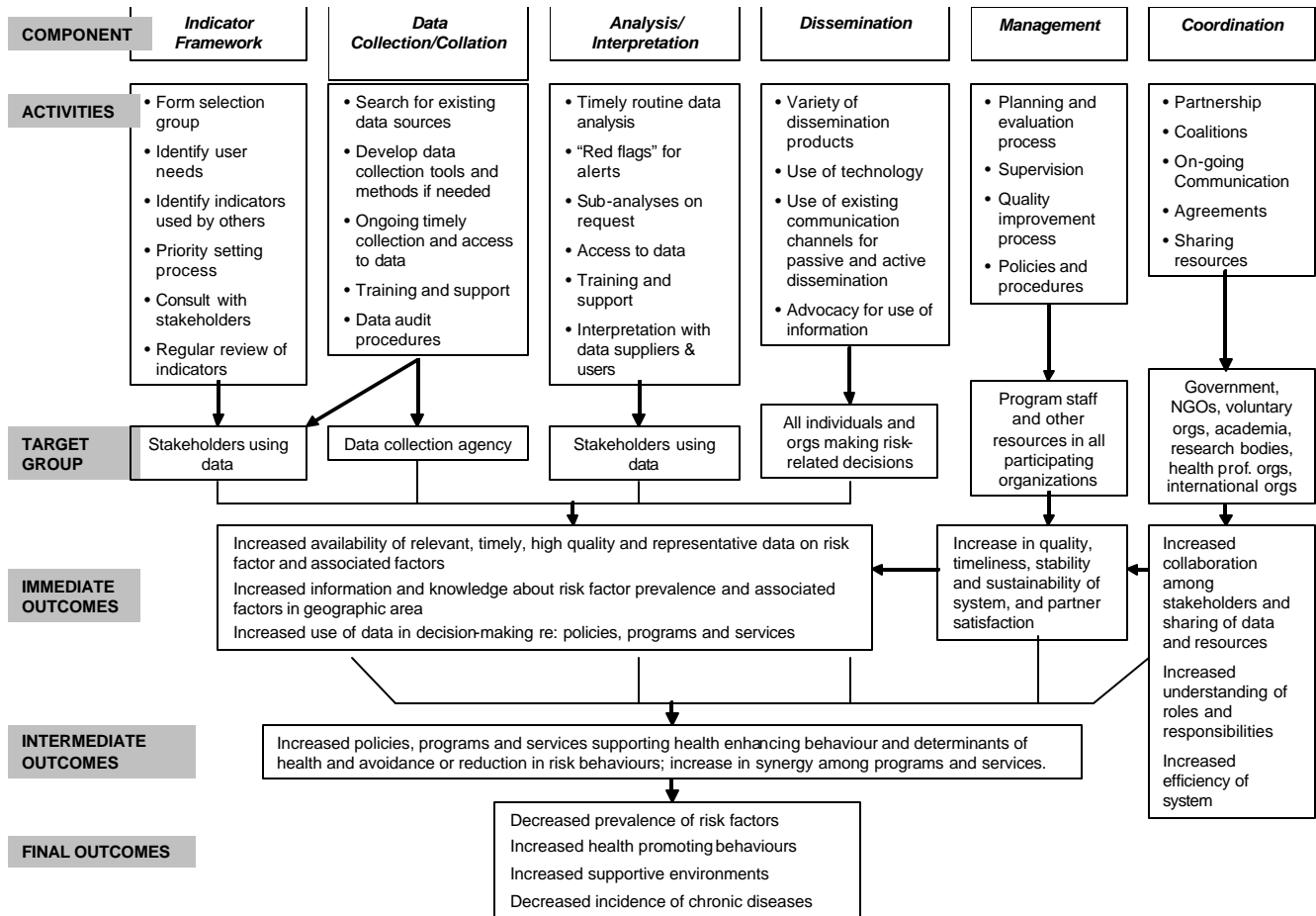
For each key activity, the logic model identifies:

- Objectives – The goals of the program activity and its intended public health action;
- Outputs - The most tangible and immediate product of program activity, often used for accountability and productivity purposes;
- Outcomes – The mid-range results of the program, which can act as indicators that reflect the successes or deficiencies of a program; and
- Impacts – Long-term measures of success and deficiencies.

Figure 6 portrays a sample logic model.

Figure 6 Example of Logic Model from Chronic Disease Risk Factor Surveillance

(From Working Group on Surveillance Systems for Chronic Disease Risk Factors, Advisory Committee on Population Health and Health Security, January 2004)



Step 2 - Identifying Evaluation Questions

Negotiating and prioritizing evaluation questions is an essential step for focusing the evaluation and for determining its feasibility. It has been suggested that evaluation questions be SMART⁵:

- **Specific**;
- **Measurable** (Can the question be answered?);
- **Actionable** (Does it directly support decision-making?);
- **Relevant** (“Nice-to-know” versus “need-to-know”); and
- **Timely** (Is it important to ask now?).

Evaluation questions should have sufficient breadth to reflect both the processes and outcomes of a surveillance system. Applying the criteria for common surveillance system characteristics as outlined below can help to ensure this breadth. The characteristics include examples of potential evaluation questions. Managers of surveillance systems, in conjunction with stakeholders, must formulate questions relevant to the goals of their particular surveillance system, but this must include consideration of all appropriate system characteristics. A more detailed glossary of surveillance terms is included in Appendix C.

Surveillance System Characteristics

Acceptability

The willingness of persons and organizations to participate in the surveillance system.⁶

- Are the surveillance system data collected within the normal course of operations?
- Are data linked to decision-making?
- Is there a mutual understanding of jurisdictional mandates, addressing security, confidentiality and privacy?

Simplicity

The system’s structure and ease of operation.⁷

- Are processes in place to monitor both the functioning of the system, from collection to dissemination, and the quality of information being generated?
- Is there an appropriate standardization of data processes and technologies among stakeholders?
- Does the system use industry-accepted (software) standards, such as messaging standards, proven technologies and open architectures?

⁵ Porteous NJ, Sheldrick BJ, Stewart PJ. Program evaluation tool kit – a blueprint for public health management. Ottawa-Carleton (Ont.) Health Department: Ottawa; 1997.

⁶ Centres for Disease Control. Updated guidelines for evaluating public health surveillance systems. Morbidity and Mortality Weekly Report July 27 2001;50-RR13.

⁷ Ibid.

Flexibility

The ability of the surveillance system to accommodate changes in operating conditions or information needs.⁸

- Can the system respond to new diseases, health conditions, changes in case definitions and variations across data sources?
- Can the system accept, process and forward another system's information?

Data Quality

The completeness and validity of the system data.⁹

- Does the surveillance system correctly describe the health event it was designed to measure?
- Is the quality of the data suited to the surveillance purpose?
- Are there mechanisms and processes in place to monitor errors?

Positive Predictive Value

The proportion of cases reported to the system that actually have the health event.¹⁰

- What proportion of individuals with the diagnosis are reported to the surveillance system?
- What is the likelihood that a person with the health event will seek medical care?
- How much does the diagnosis depend on the skill of the care provider?

Sensitivity

(1) The proportion of cases of a health event detected by the surveillance system; and

(2) The system's ability to detect outbreaks, including the ability to monitor changes in the number of cases over time.¹¹

- What is the proportion of total cases being detected by the system?
- Can the system detect clusters or outbreaks in a time frame that is appropriate to the health event?

⁸ Declich S, Carter AO. Public health surveillance: historical origins, methods and evaluation. *Bulletin of the World Health Organization* 1994;72 (2):285-304.

⁹ Owston, R. Evaluation plan for i-PHIS implementation. 23 August 2002. Health Canada.

¹⁰ Centres for Disease Control. Op. cit.

¹¹ Ibid.

Representativeness

The extent to which a surveillance system accurately portrays the incidence of the health event in the population by person, time and place.¹²

- Does the surveillance system reflect the population characteristics that are important to the goals and objectives of the system?
- Are cases under-reported for identifiable sub-groups in the population?

Timeliness

The interval between the occurrence of an adverse health event and (1) the report of the event to the appropriate health agency, (2) the identification by that agency of trends or outbreaks, or (3) the implementation of control measures.¹³

- On average, how many days after the onset of a health event is the information reported to the surveillance system and action taken?
- Is the time interval appropriate for the health intervention?

Stability

The reliability and availability of the system. Stability can be measured by the amount of time required to manage and disseminate the information to decision makers.¹⁴

- Are the data and reports available for those who need to know and when they need to know?
- Do data owners, managers and users form partnerships creating opportunities for each to benefit from the others' expertise and resources?
- Does the management of the system promote a culture in which decisions are based on surveillance information?

¹² Declich and Carter. Op. cit.

¹³ World Health Organization. Protocol for the evaluation of epidemiological surveillance systems. 1997. Available at: URL: <http://www.who.int/emc>

¹⁴ Centers for Disease Control. Op. Cit. (WHO Evaluation of epidemiological surveillance systems, February 1997.

Compliance

Before a surveillance system can become operational, it must first satisfy a Privacy Impact Assessment.

- Does the surveillance system comply with all relevant law and/or policy?
- Does it safeguard against the privacy of individuals? Is the system secure?

While not a common term for evaluations, compliance is an important and necessary component in the evaluation of surveillance systems. It is necessary to identify and demonstrate a surveillance system's compliance in order to validate and legitimate the results of the collection, analysis, interpretation and dissemination of the surveillance system information and products.

Compliance can be divided into four key areas: privacy, security, confidentiality, and ethics. Each of these four areas can then be divided further and examined in terms of legislation, regulations, policies, and agreements.

Approaching Data Quality

Data can be said to be of high quality "if they are fit for their intended uses ... in operations, decision-making and planning." (Redman, 2003) Data quality improvement methods must therefore emphasize aspects of both data measurement and processes used in the management of data. Challenges for systematically approaching data quality improvement arise from the interdisciplinary nature of data quality and the low priority that data quality issues often have within organizations (e.g., limited perceptions of the costs associated with low data quality, perception of data and information as highly volatile and intangible).

Data quality is a multifaceted concept, with potentially dozens of associated dimensions, characteristics and criteria, and little agreement on the definitions of these. Redman (2003) identifies clusters associated with data models (definitions, standards, relevance), data values (accuracy) and data presentation (ease of interpretation among users).

Common data quality problems are identified by Mathieu and Khalil (1998) as:

1. Data corruption due to incorrect conversion;
2. Historical and current data having different meanings;
3. The same data having more than one data definition;
4. Missing data;
5. Hidden data;
6. Missing granularity; and
7. Violation of integrity rules.

The literature also identifies process, system, policy and procedure, and data design problems as root causes of poor data quality. Hence, data quality is impacted by surveillance system characteristics, data models, system management and communication issues.

System Performance Characteristics

Effectiveness

The measure of how well a surveillance system can achieve its intended results. In order to measure this, the specifications and functioning of the surveillance system must be documented and well known among the contributors and stakeholders.¹⁵

- Does the system do what it is supposed to do?
- How well does the system produce its intended outcome?
- Is information generated from the system and is it used?

The concept of effectiveness must always address the issue of “compared with what?” Evaluating the effectiveness of a surveillance system can include comparing its impact on the program’s functioning to decision-making in the absence of the surveillance system, or with the conditions of generating fewer or more surveillance products.

Concerns regarding effectiveness include a focus on outputs, but also on immediate, intermediate and final outcomes. As outcomes become less directly related to the program, the impact of external factors becomes more important in interpreting the strength of the relationship between outputs and outcomes.

Approaching Effectiveness

As research perspectives are often modelled on laboratory science, those who undertake evaluation may consider “the effectiveness question to be quintessentially evaluation” (Berk and Rossi, 1990). This points to the importance of establishing, through the evaluation design, a means to compare between target groups, settings, level of input / output, or measurement over time to answer the “*compared with what*” question. Care must be taken by those mandating an effectiveness evaluation to understand the importance of pre-requisite goals, identified levels of performance, relevant design and expertise, and associated financial requirements. Use of results-based management practices and attention to preliminary steps (as outlined in this framework), are key to improving performance of surveillance system.

¹⁵ Love AJ. Internal evaluation: building organizations from within. Sage Publications: Newbury Park, California; 1991. p. 109.

Efficiency

Inputs (resources), activities and outputs largely under the control of the organization; assessments of efficiency (cost-benefit, cost-effectiveness) provide a frame of reference and a discipline for relating costs to program results. By using estimates, efficiency assessments can be produced at all stages of program development, from the planning through implementation to modification phases. Efficiency brings into consideration the amount of resources involved to support resource allocation, either *a priori* or *post hoc* to guide future investments.

- Are cost metrics collected as an aspect of operations and outcome information?
- What is the relationship between outcomes and resources consumed?
- How efficient is the surveillance system in terms of direct and indirect costs relative to benefits?
- How cost-effective is the system in communicating information to stakeholders?

A methods worksheet is a tool to help managers identify the broad range of surveillance system attributes and their application to the specific context of a surveillance system. It supports the overall focus of the evaluation and provides a consistent review of how evaluation questions and the surveillance system attributes that they explore become mapped to the evaluation design and the collection of evaluation data. Appendix D and Appendix E each provide an example of a methods worksheet.

Usefulness

An assessment of the usefulness of a surveillance system with respect to program objectives.

- Does the system detect epidemics?
- Does the system provide estimates of the magnitude of morbidity and mortality related to the health problem?
- Does the system stimulate epidemiological research likely to lead to control or prevention?
- Does the system detect trends signalling changes in the occurrence of disease?
- Does the system identify risk factors associated with disease occurrence?
- Does the system permit assessment of the effects of control measures?¹⁶

¹⁶ Adapted from: World Bank. Public health surveillance toolkit. Part A Annexes: How are surveillance systems evaluated? Available at: URL: <http://survtoolkit.worldbank.org/section.php?heading=6>

Step 3 - Data Collection / Management

Once the evaluation questions are confirmed, it is important to select and verify both the indicators for each evaluation question and the methods for gathering the information. Considerations such as cost, time and data availability can influence the selection of data collection methods. The following questions can help to guide the selection process.

- *Do the data exist?*
- *What type of tool(s) will you use to collect data for the evaluation?*
- *Who could provide the data?*
 - i. Administration
 - ii. Primary data collection
 - iii. Secondary data collection¹⁷
- *Who will collect the data?*
- *What is the time-frame for collecting the data from the evaluation?*

Further information on methodology and the implementation period for this step is provided in the sample methods worksheets in Appendix D and Appendix E.

Step 4 - Findings

Once the analysis, synthesis and interpretation of the gathered evidence are completed, findings on what was learned from the evaluation should be presented. It is important that stakeholders agree that the conclusions drawn from the findings are justified. Developing evaluation teams with representation from various stakeholder groups can enhance the perception of justified conclusions.

When documenting findings, it is important to know and understand the target audience. Findings must be specific, flexible and simple. As well, findings should include information on both successes and deficiencies of the system. Criteria for writing an evaluation report can be found in Appendix F.

¹⁷ **Administrative data:** data that is already being collected for the surveillance system, or could be collected with adjustments to the regular collection process.

Primary data collection: the collection of new information through focus groups, expert panels or surveys.

Secondary data: data that has already been collected for other purposes that could also be used to answer the evaluation questions (Guide for Development of Results Based Management Accountability Frameworks. Treasury Board of Canada. August 2001).

Step 5 - Reviewing the Report

The evaluation report, including the summarized findings and recommendations, must be accepted and signed off by the stakeholders who will be implementing the recommendations at either the system level or the program level, or both.

Appendix F presents a useful tool, approved by Health Canada's Audit and Evaluation Committee, for reviewing surveillance system evaluation reports.

After completing the review of the report, a formal plan for the dissemination and communication of the results should be drafted. The following steps can help guide the development of a communication plan¹⁸:

1. Establish the message: *What should be said?*
2. Define the audience: *Who is the target audience?*
3. Select the channel: *What is the most appropriate communication medium?*
4. Market the information: *How should the message be stated?*
5. Evaluate the impact: *What effect did the message have?*

Communication is a collaborative process that is only completed when the targeted audience acknowledges receiving and understanding the information.

Step 6 - Follow-up

Studies that have examined the successful implementation of evaluation findings into management of programs and activities in the federal government highlight the following as necessary to ensure appropriate organizational capacity:¹⁹

- Allocation of resources;
- Creation of a policy;
- Provision of technical assistance; and
- Highly visible audit reporting.

It is important that system be reviewed within a defined time period following an evaluation to assess the implementation of some of the proposed changes and the reasons why others were not. Evaluation is a continuous process and should be undertaken at several points in the lifecycle of the surveillance system.

¹⁸ Teutsch SM, Churchill RE. Principles and Practice of Public Health Surveillance. Oxford University Press: New York; 2000.

¹⁹ Mayne J. Op. cit.

Summary

Evaluation helps to improve and support a health surveillance system by providing managers with a framework for systematically examining the purpose, design, management and operational characteristics of a system. Because surveillance systems vary in their objectives and characteristics, *Framework and Tools for Evaluating Health Surveillance Systems* is intended as a guide for planning.

Using results-based management to establish a system's profile and performance measurement indicators will set the stage for a successful evaluation - for systems at all stages of development and review.

Appendix A - Example of Evaluation Planning Documents

Centre for Surveillance Coordination, Health Surveillance Coordination Division Population and Public Health Branch (PPHB)

DRAFT Evaluation Plan

Project Purpose

The evaluating health surveillance systems project will provide the Population and Public Health Branch with the opportunity to apply a standard framework for reviewing public health surveillance systems and identify the quality of the information produced and how effective each surveillance system is in supporting intervention and policy decision making.

The purpose of the Evaluation Framework for Surveillance Systems Project is to respond to the recommendation of the Auditor General that "Health Canada should strengthen its evaluation, performance measurement, and reporting of results of its health surveillance activities."²⁰ Due to report to the Auditor General in December 2003, the evaluation framework project will provide a standard approach for addressing the efficiency, effectiveness and compliance with privacy, confidentiality and security standards.

The evaluation framework will provide an initial step toward documenting and communicating the quality of the information produced by health surveillance systems within the branch. This initial activity is the launch of a separate project which will address data quality specifically in response to the recommendation that "Health Canada should adopt... a common quality assurance framework and standards that would outline quality requirements for its health surveillance systems."²¹ This related project addressing data quality is schedule to report to the Auditor General in December 2004.

Project Scope

The scope of the Evaluation Framework for Surveillance Systems Project involves the following:

FY2002-2003

- Development of consultation process via PPHB Health Surveillance Coordinating Committee

- Review all health surveillance documentation provided to the Auditor General

- Collate and review all known evaluations and evaluation plans for surveillance systems

- Initial draft of a framework to evaluate public health surveillance systems

- Inventory of all public health surveillance systems and staff contacts within PPHB

²⁰September 2002 Auditor General's Report: Chapter 2: National Health Surveillance; Recommendation 2.101.

²¹December 2002 Auditor General's Report: Chapter 6: Health Statistics, Recommendation 6.83.

FY2003-2004

Select two PPHB surveillance systems as case study applications of the framework as a means of refining and further developing the framework

Completion of a draft framework for evaluating surveillance systems

Completion of PPHB case studies

Present case studies to Audit and Evaluation Committee to support approval of framework

Present case studies to Branch Executive Committee to support approval of framework

Promoting cultural change within the Branch to secure an ongoing commitment to the evaluation process

Project Operating Assumptions/Risks

That there is a common set of general principles that apply to evaluating public health surveillance systems;

That the concepts of a typology can be constructed and communicated which will interpret the general principles for evaluating surveillance systems across specific health surveillance content areas; and

That there is perceived merit in communicating a common approach for evaluating and documenting health surveillance systems within the branch.

Project Management

The project will be managed in the following manner:

PPHB Health Surveillance Coordinating Committee - Project steering committee led by Dr. David Mowat, Director General.

Centre for Surveillance Coordination - HSC Division - Secretariat support to the Health Surveillance Coordinating Committee led by Alan Hotte, Project Manager. The Centre for Surveillance Coordination will provide the resources necessary to lead this initiative.

Estimated Resource Requirements (Calendar Year 2003)			
FTE	Salary and Benefits	OandM	TOTAL COST
1.33(1.0 ES-03; 0.33 ES-05)	xx	0	xx

DATE	KEY DELIVERABLES	LEAD	COMPLETE
7 January 2003	PPHB HSCC Meeting	David Mowat	?
24 January 2003	Project Plan and Schedule FY2002-2003	Karen McNaught and Alan Hotte	?
4 February 2003	PPHB HSCC Meeting	Catherine McCourt	?
21 February 2003	Web Page design	Karen McNaught	?
3 March 2003	Draft Outline Evaluation Framework	Karen McNaught and Alan Hotte	?
7 March 2003	Project Plan and Schedule FY2003-2004	Karen McNaught and Alan Hotte	?
11 March 2003	PPHB HSCC Meeting	David Mowat	?
11 March 2003	Draft Evaluation Framework Version 1	Karen McNaught	?
1 April 2003	PPHB HSCC Meeting	David Mowat	?
1 April 2003	Revised Draft Evaluation Framework Version 2	Karen McNaught and Alan Hotte	?
1 April-4 November 2003	Consultations with experts re: development of framework	Karen McNaught and Alan Hotte	ongoing
6 May 2003	PPHB HSCC Meeting	David Mowat	?
6 May 2003	Revised Draft Evaluation Framework Version 3	PPHB HSCC	?
6 May 2003	Identification of Surveillance Systems for pilot of framework	PPHB HSCC	?
30 June 2003	PPHB HSCC Meeting	David Mowat	
30 June 2003	Revised Draft Evaluation Framework Version 4	PPHB HSCC	
2 September 2003	PPHB HSCC Meeting	David Mowat	
2-26 September 2003	Pilot Framework	Alan Hotte and Abdul Syed	
7 October 2003	PPHB HSCC Meeting	David Mowat	
7 October 2003	Preliminary results of pilot (before evaluation by external experts)	Alan Hotte and Abdul Syed	
20-21 October 2003	2003 Health Canada Research Forum: From Science to Policy	Alan Hotte	
4 November 2003	PPHB HSCC Meeting	David Mowat	
4 November 2003	Final results of pilot (after evaluation by external experts)	Alan Hotte and Abdul Syed	
4 November 2003	Approval of finalized evaluation framework (Version 6) for presentation to PPHB Audit &	PPHB HSCC	

DATE	KEY DELIVERABLES	LEAD	COMPLETE
	Evaluation Committee and BEC		
4 November 2003	Preliminary tool kit design (Version 1)	Alan Hotte and Abdul Syed	
November 2003	Present case studies and evaluation framework to BEC for approval	David Mowat	
2 December 2003	PPHB HSCC Meeting	David Mowat	
2 December 2003	Revised Draft Tool Kit Version 2	PPHB HSCC	
December 2003	Present case studies and evaluation framework to Audit & Evaluation Committee for approval	David Mowat	
December 2003	Translation of Evaluation Framework	Alan Hotte	
December 2003	Dissemination of Evaluation Framework	Alan Hotte and David Mowat	

Appendix B – Surveillance System Specification Sheet

COMPONENT	TOPIC/ISSUE	OPTIONS/CONSIDERATIONS	COMMENTS
OBJECTIVES	Aims Objectives of the surveillance system		
	Length of Operation		
	Size of the database (records/year)		
	Stakeholders <ul style="list-style-type: none"> • Owners/sponsors • Others and their interests 		
	Location of surveillance system <ul style="list-style-type: none"> • Why there? 	Availability of data/resources/utilization of data/ownership	
	Type of surveillance system	Active/Passive	
	Population under surveillance Total or not? If not, how selected?	Geographic/Ethnicity/Age group/Other; National/Regional/Local; Census/Sample	
	SCIENTIFIC	Target <ul style="list-style-type: none"> • Case definition • Categories and their definitions 	
Focus <ul style="list-style-type: none"> • How determined? 		General (all categories)/Focused (specific categories) Burden/Political expediency/Amenable to intervention/Potential for impact/External influence	
For each surveillance target type <ul style="list-style-type: none"> • What data elements are collected? • How defined? • Response categories, level of detail, definitions 		Core – Minimum Data Set/Optional Data Set Supplementary Modules (MDS/ODS) Basic/Expanded/Other	
Data sources, if other than above			
Data Collection Instrument(s)		Open-ended/Closed and pre-coded/Mixed	

Framework and Tools for Evaluating Health Surveillance Systems

COMPONENT	TOPIC/ISSUE	OPTIONS/CONSIDERATIONS	COMMENTS
	Administration of the Instrument	Self/Interview/Abstraction	
	Data Processing	Manual/Electronic/Combination	
OPERATIONS	Was the surveillance system piloted? For how long?		
	Obstacles to introduction <ul style="list-style-type: none"> • What were they? • How were they overcome? 		
	What factors facilitated the implementation and operation of the system?		
	Products <ul style="list-style-type: none"> • What products? • Disseminated to whom? • How used? 		
	Evaluation <ul style="list-style-type: none"> • Are they conducted? • With what frequency? 		
RESOURCES	Resources required and how procured <ul style="list-style-type: none"> • Personnel • Hardware • Software • Supplies • Financial 		
	Assignment of responsibilities <ul style="list-style-type: none"> • Training – Local &/or Central • Data Entry – Local &/or Central • Validation – Local &/or Central • Immediate supervision • Overall administration • Monitoring/Evaluation – Local &/or Central 		
	Training <ul style="list-style-type: none"> • Who was trained? • To what level? 		
	Maintenance of Resources <ul style="list-style-type: none"> • Staff • Supplies • Hardware • Other 		

Framework and Tools for Evaluating Health Surveillance Systems

COMPONENT	TOPIC/ISSUE	OPTIONS/CONSIDERATIONS	COMMENTS
COMPLIANCE	Compliance with: <ul style="list-style-type: none">• relevant laws• regulations• policies addressing privacy security confidentiality• privacy impact assessments		

Appendix C - Glossary of Surveillance Evaluation Framework Terms

(Sources adapted from glossary based on work by Farouk El-Allaki's PhD study on a Meta-model for health surveillance, University of Montreal; 2004.)

Acceptability

Willingness of persons and organizations to participate in the surveillance system. (CDC updated guidelines for evaluating public health surveillance systems. MMWR July 27, 2001;50 NO RR-13)

Accessibility

Ease with which statistical information can be obtained from the Agency. This includes the ease with which the existence of information can be ascertained, as well as the suitability of the form or medium through which the information can be accessed. The cost of the information may also be an aspect of accessibility for some users. (Statistics Canada, Quality Assurance Framework, 2002 <http://www.statcan.ca:8096/bsolc/english>)

Accuracy

Degree to which a measurement or an estimate based on measurements represents the true value of the attribute that is being measured. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001.); also, "How well information derived from the databases and registries reflect the reality they are supposed to represent." (Canadian Institute for Health Information, www.cihi.com)

Adherence/ Compliance

Health-related behaviour that abides by the recommendation of a doctor, other health care provider, or investigator in a research project. The word *adherence* is used to avoid the authoritarian associations of *compliance*, formerly used to describe this behaviour in medical practice and clinical epidemiology. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001.)

Agreements

(Refers to adherence/compliance component)

Attribute

Qualitative characteristic of an individual or item. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001)

Availability

Ability of the public health surveillance system to be operational when it is needed. (source unknown)

Coherence

Degree to which statistical information can be successfully brought together with other statistical information within a broad analytic framework and over time. The use of standard concepts, classifications and target populations promotes coherence, as does the use of common methodology across surveys. Coherence does not necessarily imply full numerical consistency. (Statistics Canada, Quality Assurance Framework, 2002 <http://www.statcan.ca:8096/bsolc/english>)

Comparability

Ideal of 'a comprehensive and integrated health information system' - where all parts have to work together as one." (Canadian Institute for Health Information www.cihi.com)

Compatibility

Extent to which an innovation is consistent with existing values, experiences, and needs of adopters. (Rogers E. Diffusions of innovations. 4th ed. New York: The Free Press; 1995.)

Completeness

Proportion of all expected data reports that were actually submitted to the public health surveillance system. For example, if of 30 hospitals in a reporting system, 20 submit data, the completeness is 66.6%. (*source?*)

Compliance

Degree to which a system complies with all relevant legislation, regulations and policies. (Dr. A. Ravel. Laboratory for Foodborne Zoonosis. Guelph, Ontario)

Confidentiality

The obligation not to disclose information; the right of a person to withhold information from others. Information in medical records, case registries, and other data files and bases is generally confidential, and epidemiologists are required to obtain permission before being given access to it. This may be informed consent of the person to whom the records relate or the permission of an institutional review board. Epidemiologists have an obligation to preserve confidentiality of information they obtain during their studies. See also PRIVACY. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001)

Cost

Indirect and direct costs, measured in relation to the benefits obtained. (Declich S, Carter AO. Public health surveillance: historical origins, methods and evaluation. Bulletin of the World Health Organization 1994;72(2):285-304.)

Cost-effectiveness Ratio

How much it would cost if the health event were to be managed without the current public health surveillance system; i.e., increase in number of cases, increase in treatment costs, increase in indirect costs. (Dr. A. Ravel, Laboratory for Foodborne Zoonosis; Guelph, Ontario)

Data Quality

Completeness and validity of the data in the system. (Owston R. Evaluation plan for *i*-PHIS implementation. Health Canada, Centre for Surveillance Coordination: Ottawa; August 23, 2002.)

Ease of Use

Simplicity of the surveillance system for users.

Effectiveness

Measure of the extent to which a specific intervention, procedure, regimen, or service, when deployed in the field in routine circumstances, does what it is intended to do for a specified population; a measure of the extent to which a health care intervention fulfills its objectives. To be distinguished from efficacy and efficiency. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001.)

Efficiency

Goes beyond effectiveness by bringing in a reference to the amount of resources involved. It implies the absence of wastage for a given output; it can be increased by increasing the output for a given input. It does not guarantee that the results are of any useful size. (Scriven M. Evaluation thesaurus. 4th ed. **Publisher: City;** 1991)

Ethics

(Refers to adherence/compliance component)

Evaluation

Process that attempts to determine, as systematically and objectively as possible, the relevance, effectiveness and impact of activities in light of their objectives. Several varieties of evaluation can be distinguished, e.g., evaluation of structure, process and outcome. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001); it is a periodic assessment of a policy, program, initiative or function's rationale, implementation, effectiveness, outcomes (intended and unintended), and alternatives with the intent of improving success in achieving stated objectives and meeting the needs or target group(s)." (Health Canada Policy Manual –Evaluation Policy –Context for Evaluation.). Mayne, Hudson and Thomlison (1992) have focused on the characteristics of the "assessment" with their description of evaluation as entailing a systematic "gathering, analyzing, and reporting information about a program, service, or intervention for use in decision-making. The distinguishing characteristics of ...evaluation are systematic analysis, reporting and decision-making."

Formative Evaluation

Typically conducted *during* the development or improvement of a program or product and it is conducted, often more than once, for the in-house staff of the program *with the intent to improve*. (Scriven M, Evaluation thesaurus. 4th ed. **Publisher: City;** 1991)

Summative Evaluation

Part of the evaluation that is conducted *after* completion of the program (for ongoing surveillance systems that means after stabilization) and for the benefit of some external audience or decision-maker, though it may be done by either internal or external evaluators or a mixture. (Scriven M. Evaluation thesaurus. 4th ed. **Publisher: City;** 1991.)

Evaluation Framework

Plan for conducting a future evaluation focusing on the issues to be addressed and, by implication, identifying the data needed to support the evaluation. (Health Canada Policy Manual –Evaluation Policy –Context for Evaluation)

Flexibility

Ability of the surveillance system to accommodate changes in operating conditions or information needs. (Declich S, Carter AO. Public health surveillance: historical origins, methods and evaluation. Bulletin of the World Health Organization 1994;72(2):285-304.)

Health Event

- (1) Instances in which persons have a particular health problem or risk factor;
- (2) a more narrowly defined subset of (1), e.g., deaths; or
- (3) an epidemic of a particular event. (WHO Evaluation of epidemiological surveillance systems, February 1997)

Information

Detailed data collected and specific data holdings used to house the data and metadata, as well as the health surveillance information products derived from the analysis and interpretation of the health surveillance data. (Health Canada, Advisory Committee on Health Infostructure, Tactical Plan for Health Surveillance, Ottawa, February 2001)

Integration

Ability of the public health surveillance system to integrate with other activities and/or surveillance systems to enhance effectiveness or to reduce cost. (Dr. A. Ravel, Laboratory for Foodborne Zoonosis, Guelph, Ontario)

Interoperable

In general, denotes the ability to operate in conjunction (Canadian OED, 1998). More specifically, it refers to the "... capacity of different information or communication systems to accept, process and forward each other's information. It has also been defined as (a) the ability of knowledge-based systems to function together in a symbiotic manner and (b) the capacity of different system components and platforms to work together smoothly and predictably." (Canada Health Infoway Inc. – Available at: URL: www.canadahealthinfoway.ca)

Interpretability

Availability of the supplementary statistical information and metadata necessary to interpret and utilize it appropriately. This information normally covers the methodology of data collection and processing, and indications of the accuracy of the statistical information. (Statistics Canada, Quality Assurance Framework, 2002 <http://www.statcan.ca:8096/bsolc/english>)

Laboratories

Provide public health professionals with timely surveillance for infectious disease threats, actively participate in infectious disease prevention programs, and responds effectively and quickly to infectious disease outbreaks. Specific functions include: diagnosis of infections; characterizations of infections; reference services to improve and standardize testing for pathogens; support epidemic investigation, environmental surveillance, and applied and fundamental research. (Adapted from Learning from SARS - Renewal of Public Health in Canada, A report of the National Advisory Committee on SARS and Public Health (October 2003) pp.113-121.

Legislation

(Refers to adherence/compliance component)

Objective

The precisely stated end to which efforts are directed, specifying the population outcome, variable(s) to be measured, etc. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001.)

Observability

Degree to which the results of the innovation are visible to others. (Rogers E. Diffusions of innovations. 4th ed. New York: The Free Press; 1995.)

Organization and People

Stakeholders of the public health surveillance system; including those organizations and/or individuals who create the data and information, build the technology supporting the surveillance system and provide governance for the development and use of the system. (Health Canada, Advisory Committee on Health Infostructure, Tactical Plan for Health Surveillance, Ottawa, February 2001)

Policies

(Refers to adherence/compliance component)

Positive Predictive Value

Proportion of reported cases that actually have the health-related event under surveillance. (CDC updated guidelines for evaluating public health systems, MMWR July 27, 2001;50;NO RR-13)

Privacy

State of being undisturbed or free from public attention. Privacy and confidentiality are protected by public interest groups and in some nations by privacy commissioners; the safeguards can affect epidemiological research requiring access to personal, private information. The rules, regulations, and laws governing privacy and access to health-related information vary and change frequently; constant dialogue among the parties concerned is required. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001)

Process

Business processes that data providers, managers, researchers and policy makers use to create surveillance products throughout each phase of the surveillance system. (Health Canada, Advisory Committee on Health Infostructure, Tactical Plan for Health Surveillance, Ottawa, February 2001)

Project Charter

A document issued by senior management that provides the project manager with the necessary authority to apply organizational resources to project activities.

Project Close-Out

A process that provides for acceptance of the project by the project sponsor, completion of various project records, final revision and issue of documentation to reflect the “as-built” condition and the retention of essential project documentation.

Project Management

The art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, quality, time, cost and participant satisfaction. (Project Management Book of Knowledge, 1987)

Quality Assurance

A system of activities whose purpose is to provide assurance that the quality control is in fact being done effectively. For a specific product or service, this involves verification, audits and the evaluation of the quality factors that affect the specification, production, inspection and distribution. See **government quality assurance**. (23/06/94) <http://www.pwgsc.gc.ca/sos/corporate/sm/text/ch12q-01-e.html>

Quality Audit

The monitoring of quality levels at any stage to provide information management. (23/06/94) Available at: URL: <http://www.pwgsc.gc.ca/sos/corporate/sm/text/ch12q-01-e.html>

Quality Control

A range of activities the purpose of which is to ensure and verify for specific quality of the product or service has been met. (23/06/94) Available at: URL: <http://www.pwgsc.gc.ca/sos/corporate/sm/text/ch12q-01-e.html>

Reporting Completeness

Proportion of all expected reports that were actually received. It is usually stated as “% completeness as of a certain date” (e.g., if of 30 administrative units in a reporting system 15 submit reports, the reporting completeness is 50%; if of 50 cases of diarrhoea 40 are reported, the reporting completeness is 80%).(WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Regulations Relative Advantage

(Refers to adherence/compliance component) Degree to which an innovation is perceived as better than the idea it supersedes. (Rogers E. Diffusions of innovations. 4th ed. New York: The Free Press; 1995.)

Relevance

Whether the objectives of the system are relevant to public health concerns and whether the information generated and disseminated by the system are used and/or useful. (Dr. A. Ravel, Laboratory for Foodborne Zoonosis, Guelph, Ontario)

Reporting/Timeliness

Proportion of all expected reports in a reporting system received by a given date (due date). (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Representativeness

Extent to which the surveillance system accurately portrays the incidence of the health event in the population by person, time and place. (Declich S, Carter AO. Public health surveillance: historical origins, methods and evaluation. Bulletin of the World Health Organization 1994;72(2):285-304.)

Robustness

Stability of the surveillance system.

Security

(Refers to adherence/compliance component)

Sensitivity

(1) proportion of cases of a health-related event detected by the surveillance system and (2) ability to detect outbreaks, including the ability to monitor changes in the number of cases over time. (CDC updated guidelines for evaluating public health surveillance systems, MMWR July 27, 2001;50;NO RR-13.)

Simplicity

Structure and ease of operation. (CDC updated guidelines for evaluating public health surveillance systems, MMWR July 27, 2001;50;NO RR-13.)

Specificity

Measure of how infrequently a system detects false positive health events, i.e., the number of individuals identified by the system as not being diseased or not having a risk factor, divided by the total number of all persons who do not have the disease or risk factor of interest. (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Stability

Reliability (ability to collect, manage and provide data properly without failure) and availability (ability to be operational when it is needed) of the public health surveillance system. (CDC updated guidelines for evaluating public health surveillance systems, MMWR July 27, 2001;50;NO RR-13.)

Stakeholder

Individuals and organizations that are actively involved, whose interests affect either positively or negatively and may have influence on the governance or operation of a surveillance system." (adapted from Project Management Institute (2000) A guide to the Project Management Body of Knowledge (PMBOK), PMI: Penn., USA)

Standard

Something that serves as a basis for comparison; a technical specification or written report drawn up by experts based on the consolidated results of scientific study, technology, and experience, aimed at optimum benefits and approved by a recognized and representative body. (Last JM, editor. A dictionary of epidemiology. 4th ed. Oxford University Press: New York; 2001.)

Surveillance

Process of systematic collection, orderly consolidation and evaluation of pertinent data with prompt dissemination of the results to those who need to know, particularly those who are in a position to take action (*Adapted from Report of the Technical Discussions at the twenty-first World Health Assembly on National and Global Surveillance of Communicable Diseases, 18 May 1968 – A21/Technical Discussion/5*). (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Active Surveillance

Surveillance where public health officers seek reports from participants in the surveillance system on a regular basis, rather than wait for the reports (e.g., telephoning each participant monthly). (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Case-based Surveillance

Surveillance of a disease by collecting specific data on each case (e.g., collecting details on each case of acute flaccid paralysis (AFP) in poliomyelitis surveillance). (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Enhanced Surveillance

Collection of additional data about cases reported under routine surveillance. Routine surveillance is a starting point for more specific data collection on a given health event. This information may be sought from the report, the case, and the laboratory from another surveillance data set. (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Passive Surveillance

Surveillance where reports are awaited and no attempts are made to seek reports actively from the participants in the system. (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Routine Surveillance

The regular systematic collection of specified data in order to monitor a disease or health event. (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Sentinel Surveillance

Surveillance based on the collection of data from a sample (random or non-random) of collecting sites as indicator data for the rest of the population, in order to identify cases of a disease early or to obtain indicative data about trends of a disease or health event. Examples are the use of a few hospitals to monitor the composition of influenza virus and check that the vaccine includes the right components, or the use of a network of general practitioners to monitor diseases or health events (e.g., attempted suicide, requests for HIV testing). One instance of sentinel surveillance is the use of a particular population group (e.g., monitoring the serology of syphilis or HIV infection among pregnant women as an indicator of trends in the general population). Sentinel surveillance is inappropriate for those situations where every case requires public health action, e.g., poliomyelitis. (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Surveillance Report

Regular publication with specific information on the disease under surveillance. It should contain updates of standard tables and graphs as well as information on outbreaks, etc. In addition, it may contain information on the performance of participants using agreed performance indicators. (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Sustainability

Ability of the public health surveillance system to sustain itself based on acceptability, simplicity and costs, assuming satisfactory effectiveness. (Dr. A. Ravel, Laboratory for Foodborne Zoonosis; Guelph, Ontario)

Syndromic Report

Notification of a health event under surveillance for which the case definition is based on a syndrome not on a specified disease (e.g., acute haemorrhagic fever syndrome, acute respiratory syndrome). (WHO, Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, Annex 1.0 Surveillance Definitions, Document WHO/CHS/CSR/ISR/2001.2)

Technology

Application and network components that provide the supporting technological framework for the health surveillance system. (Health Canada, ACHI Tactical Plan, Blueprint Components, February 2001)

Timeliness

Interval between the occurrence of an adverse health event and (i) the report of the event to the appropriate health agency, (ii) the identification by that agency of trends or outbreaks, or (iii) the implementation of control measures. (WHO Evaluation of epidemiological surveillance systems, February 1997); also "The variance between planned and actual dates for a product's availability for a particular user audience. Multiple dates, each later one with increasingly accurate information, are possible." (Canadian Institute for Health Information www.cihi.com)

Triability

Degree to which the innovation can be experimented with on a limited basis. (Rogers E. Diffusions of innovations. 4th ed. New York: The Free Press; 1995.)

Usability

"How products, including documentation, format, media, and education, meets the needs of the three user audiences. Users want information products that: 1. exist or can be created, 2. are readily available, 3. are known to the user, 4. have known "fitness-for-use", 5. are easily understood" (Canadian Institute for health Information www.cihi.com)

Usefulness

How helpful the system is to public health staff in taking actions as a result of interpreting and analysing its data. (Owston R. Evaluation plan for *i*-PHIS implementation. Health Canada, Centre for Surveillance Coordination: Ottawa; August 23, 2002.)

Validity

Degree to which statistical information correctly describes the phenomena it was designed to measure. It is usually characterized in terms of error in statistical estimates and is traditionally decomposed into bias (systematic error) and variance (random error) components. It may also be described in terms of the major source of error that potentially cause inaccuracy (e.g., coverage, sampling, non-response, response). (Statistics Canada, Quality Assurance Framework, 2002 <http://www.statcan.ca:8096/bsolc/english>)

Appendix D - Methods Worksheet (Example 1) Supporting the Management of Surveillance System Evaluations

Methods Worksheet									
Evaluation Questions	Expectations of the Program	Data Collection Plan							Logistics (based on <i>Logistics Worksheet</i>)
1.0 Data Collection	"I expect to have..."	Does Data Exist?	Type of Tool	Who could Provide the Data? (Source)	Who Can Get the Data? (Collector)	Design	How Many?	Timeframe	Is This Feasible?
1.1 Are hospitals able to break down the cost of implementing the system in terms, including in kind support, such that BCIRPU can accurately describe the resources and time involved for other agencies to join the Emergency Department Injury Surveillance System?	- A list of annual expenses for data collection, including ongoing training sessions, hiring of additional staff.	X Yes <input type="checkbox"/> No	Financial Summary Form	Administrator for the surveillance system, designated by each participating hospital/health region.	BCIRPU	Descriptive	10 hospitals	March 2002	X Yes <input type="checkbox"/> No
1.2 Have participating hospitals filled all staff positions required for data abstraction and coding and if not, what were the barriers?	- A list of staff positions filled that were required for implementation of data collection. - A statement of problems/barriers associated with inability to fill positions.	X Yes <input type="checkbox"/> No	Health Records Personnel Form	Administrator for the surveillance system, designated by each participating hospital/health region.	BCIRPU	Descriptive	10 hospitals	March 2002	X Yes <input type="checkbox"/> No
1.3.1 Is the training program resulting in more complete charting in the ED? 1.3.2 What is the accuracy of the health records departments in abstracting and coding injury data?	A review of a random samples of hospital records pre-and post-training sessions demonstrating at least a 20% absolute improvement in completeness. A review of a random samples of hospital records demonstrating a 90% level of accuracy for the following elements: <i>Date of Visit, Date of Birth, Sex, Postal Code, Diagnosis, Cause of Injury, Place of Occurrence, Activity When Injured, and Visit Disposition.</i>	X Yes No	Chart Audit Form	Health Records Department	BCIRPU Evaluator	Pre- Post-test of proportions (z-test) Percent Positive Agreement	Random sample of records	March 2001	X Yes <input type="checkbox"/> No

Appendix E - Methods Worksheet (Example 2)²²

Criteria / attribute	Evaluation Questions (from evaluation framework)	Expectations of the Program (from evaluation framework)	Findings	Expectations met?
	a. Content			
Acceptability	a1. Do the partners find the variables in the database useful?	At least 75% of the partners rate that all or nearly all (90%+) of the variables in the database are useful	Database Coordinators - 54% ; PHUs - 20% Suggestions for variables to add: 1. Labour and delivery (indication for caesarean section, episiotomies, augmentation, method of induction) 2. Maternal characteristics (alcohol and substance abuse, nutrition, physical activity, prenatal education and postpartum depression) 3. Neonatal variables and outcomes 4. Length of stay in hospital	No
	a2. Are the partners satisfied with the variable definitions?	At least 95% of the partners who are entering data are satisfied with the variable definitions	Database Coordinators – (11/12) 92% satisfied to very satisfied, (1/12) 8% neutral	No (but no one reported dissatisfaction)
	a. Content			
Representativeness	a3. Is the database capturing all the hospital births as well as the home births occurring in Eastern and Southeastern Ontario?	All women giving birth in Eastern and Southeastern Ontario are to be included	There was discrepancy of 0.1% in the number of hospital livebirths between this Database and CIHI Database. (Independent verification of home births was not feasible)	Yes
	b. Data Collection			
Simplicity	b1. Are data entered into CritiCall Program as intended?	Logbook completed in case room on all births	Sometimes the logbook gets completed later	No
	b2. Are data entry procedures simple and easy to use?	Data entered at birth hospital on all births At least 75% of partners who are entering data, report that data entry is easy or very easy to complete	Data entered at birth hospital on all births Database Coordinators - 73% Data Entry Personnel - 86%	Yes Partially
Timeliness	b3. Are the data entered in a timely manner?	All data to be entered within 2 weeks of the last day of the month	With reminders to close the month sent out by PPEESO, all data get entered within 2 weeks of the end of the last day of the month Data were entered within the specified time frame	Yes

²² From: Ali AH. An evaluation of surveillance systems in eastern and southeastern Ontario. M.Sc. University of Ottawa; 2003.

Appendix F - Guidelines for Reviewing Evaluation Reports

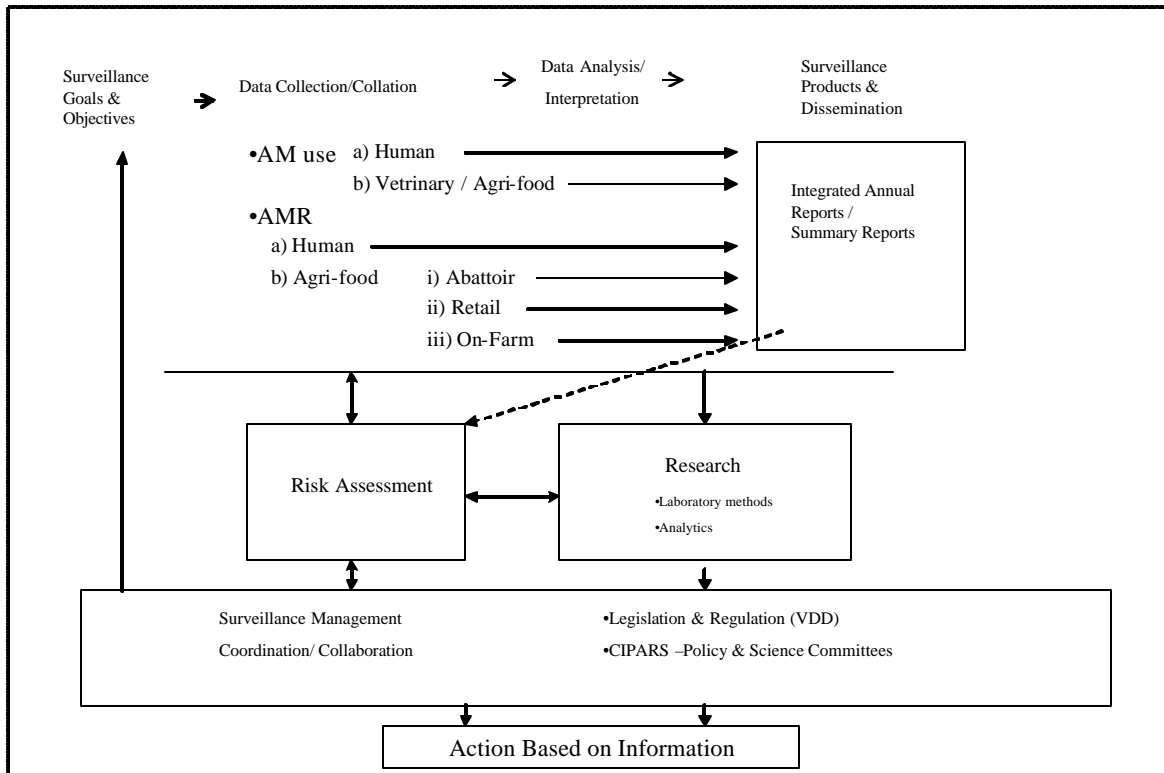
Issues / Requirements	Criteria	Assessment (Good / Met / Needs Improvement)	Improvements Suggested
1. Executive Summary			
	Briefly present the following: <ul style="list-style-type: none"> o description of the policy, program, initiative or function evaluated; o why the evaluation was done; o who the client and intended audience of the evaluation are; o the key evaluation findings, conclusions, and recommendations. Suggestion: The executive summary should be about 3 pages.		
2. Introduction and Context			
2.1 Description	The policy, program, initiative or function evaluated is clearly described, including the logic of cause-and-effect links between inputs, activities, outputs, outcomes, and external factors contributing to success or failure – i.e., policy or program theory and assumptions.		
	The description of program reach (intended beneficiaries) is clearly described.		
	The program resources are clearly described so that the reader can understand how program monies are allocated and have been spent.		
	Depending on the nature, purpose and timelines of a particular evaluation study, the following evaluation questions should be considered for inclusion: <ul style="list-style-type: none"> o Is the program still relevant to the needs of Canadians? o Are the program's resources being used in the most efficient and effective way to deliver appropriate results? o Is it necessary for the federal government to operate this program, or could it be transferred to other levels of government, or to the private or voluntary sector? o Is there scope for considering more effective program structures and service delivery arrangements? o Are departmental management practices appropriate and of sufficient quality? 		
3. Methodology / Design / Data			
3.1 Description of the Methodology / Design	The design of the evaluation is described to the extent that the study can be replicated; e.g., the relationship between the data collection and the analysis is described clearly.		
	The evaluation design is appropriate for the intended objectives of the study.		
	The Data collection is appropriate to the design (the methodology, instruments and sample are described in sufficient detail to make an assessment of methodological rigour); e.g., valid and reliable data.		
	The analysis is appropriate. The data supports the analysis (as determined by, for example, significant tests, response rates).		
3.2 Multiple Lines of Evidence	The evaluation relies on more than one line of evidence and uses a mix of quantitative and qualitative approaches, one of which should be a literature review.		
3.3 Data Quality	The data used in the evaluation are accurate and reliable.		
3.4 Limitations and Impacts	The limitations and trade-offs of the methodologies, data sources and data used in the evaluation are clearly described.		
	Actual and potential biases in and reliability of the data are identified and explained in terms of their impact on stated findings.		
	The constraints of the evaluation and the perspective from which the intervention is evaluated are clear and the reader can assess the validity of the evaluators' judgement.		
3.5 Accuracy	The information in the report is free of errors of fact or logic.		

4. Key Findings			
4.1 Evaluation Issues	The evaluation issues / questions are adequately addressed.		
4.2 Objectivity	All significant findings are presented, testable, and do not go beyond what the evidence will support.		
	Balanced perspective – reflects the range and intensity of the observations and other evaluation input received; e.g., quotes of interviewees should indicate how prevalent the quoted sentiment or opinion is among all interviewees.		
	The results are sufficiently qualified to help readers draw substantiated inferences.		
4.4 Clarity and Conciseness	Used plain language – avoided specialized technical language.		
	Report is not overload with details. Detailed information and analyses are included in technical appendices.		
4.5 Evidence-based Findings	The findings are substantiated by the evidence, as described in the evaluation report.		
5. Key Conclusions			
5.1 Supportable Conclusions	The conclusions address the evaluation questions and are supported by the findings.		
	The conclusions fit the entire analysis.		
6. Recommendations			
6.1 Evidence-based Recommendations	The recommendations are supported by and flow logically from the findings and conclusions.		
	The recommendations address significant issues – i.e., they are not unprioritized “shopping lists”.		
	To the extent possible, an assessment of the potential impact (on the policy, program, etc. evaluated) of implementing a recommendation is provided.		
	The recommendations include proposed timing for management action and some indication of quantity and quality – e.g., a simple statement that “funding should be increased” without some benchmark” objective that provides an idea of “by how much” and what “sufficient” or “good enough” could look like would be insufficient.		
	The recommendations are practical and realistically attainable.		
7. Document Length			
7.1 Length of report	To help bring better focus to the “truly important”, the main body of the evaluation report should be limited to approximately 25 pages. Other information could be provided in appendices and annexes.		
8. Management Action Plan			
8.1 Action Plan	The Action Plan adequately addresses findings and recommendations.		

Appendix G – CIPARS Logic Model

High Level Logic Model (DRAFT v1): Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS)

“.. working toward the preservation of effective antimicrobials for humans and animals.”



Appendix H - Surveillance System Evaluation Reference Materials

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