

10 pitfalls to avoid during an outbreak investigation

Failing to follow a systematic, 10-step approach is the main mistake to avoid during an outbreak investigation. At each stage, however, there are pitfalls to avoid.

Version 3– 9 June 2006

Steps	Specific recommendations	Pitfalls to avoid
1. Determine the existence of an outbreak	✓ Determine whether there is a clustering of cases or a single case of a disease of international importance.	✗ Taking all reported clusters at face value Reported clusters may be pseudo-outbreaks. Check all reports for background rates, changes in surveillance practices and change in the denominator (e.g., population movements).
	✓ Review incidence in the past in the area of the outbreak.	
	✓ Check for recent changes in the surveillance system (numerator).	
	✓ Check for recent changes in the population size (denominator).	
2. Confirm the diagnosis	✓ Make clinical description of a few cases to raise hypotheses in terms of diagnosis.	✗ Failing to obtain a laboratory diagnosis Every effort must be made to obtain a diagnosis as early as possible during the outbreak. This includes obtaining a careful clinical description of the cases and obtaining laboratory confirmation. Ask for assistance with respect to collecting and transporting samples and identifying the correct laboratory for analysis, if needed.
	✓ Collect the right biological samples the right way to confirm the suspect diagnoses.	
	✓ Send the biological samples to the right laboratory.	
3. Define a case	✓ Formulate a time, place and person case definition, using generic case definition if applicable (e.g., WHO, CDC, MoH). Multiple levels are possible, including sensitive case definitions (adapted to the descriptive part and a specific one (more adapted to the analytical stage).	✗ Defining cases poorly Cases must be defined with some attention and precision; otherwise, your case count may too large, too small, or inaccurately defined. A good case definition is essential to hypothesis generation. Have precise criteria, and use time, place and person elements. Seek help if needed.
4. Search for cases	✓ Search for cases within the time and space limits of the case definition.	✗ Conducting a door-to-door case search or a survey upfront Case search does not need to be done through a door-to-door survey all the time. In most cases, you can keep these undertakings for the second part of the investigation (hypothesis testing). For the descriptive initial part, you can (1) search for cases through surveillance and (2) obtain denominator separately. The case search strategy does not need to be 100% exhaustive: it needs to be uniform.
	✓ Compile and update a line listing of cases (e.g., on excel), with at least some information on date of onset, age, sex, and zone of residence.	
5. Generate hypotheses using descriptive findings	✓ Describe the outbreak over time through an epidemic curve.	✗ Merging the hypothesis generating and the hypothesis-testing stages The descriptive stage generates information (1) through epidemiological information organized by (a) time, (b) place and (c) person and (2) through hypothesis generating interviews. Surveys conducted in the absence of a hypothesis clearly defined on the basis of this type of information blur the distinction between the two stages of the investigation and may seriously impair the capacity to formulate a conclusion.
	✓ Draw a spot map, and if possible, a map with incidence / 1000 population by area of residence.	
	✓ Calculate population-based incidence by age and sex groups.	
	✓ Conduct hypothesis-generating interviews with case-patients to try to find out the source of infection.	

Steps	Specific recommendations	Pitfalls to avoid
6. Test hypotheses based upon an analytical study	✓ Write a mini-protocol to spell out the hypotheses to test and the study design to use.	✗ Believing that a questionnaire constitutes a study protocol The analytical step is a careful epidemiological study. It requires a design and an analytical plan before it is initiated. A case control study is not always the answer. Do not rush to the questionnaire but rather follow each of the 10 steps. If you do a study, write a one-page mini-protocol in bullet format.
	✓ Conduct analytical study (case control or cohort).	
7. Draw conclusions	✓ Analyze analytical study.	✗ Having excessive confidence in the conclusions The final conclusion of an investigation is not reached as soon as a p value happens to be under 0.05. Formulating conclusions requires review of causality criteria, examination of the proportion of cases exposed to the suspected source, discussion of other possible explanations and a double check to see whether the source identified or the hypothesis considered explains all the descriptive findings.
	✓ Formulate conclusions and / or gather additional evidence (e.g., environmental laboratory samples).	
8. Compare the hypothesis with established facts	✓ Conduct an environmental assessment guided by the results of the analytical study.	✗ Rushing to conduct an environmental assessment In most cases, your environmental assessment will be guided and focused by the analytical epidemiology findings to further confirm a hypothesis. It is not a fishing expedition conducted at the early stages of the investigation where all kinds of samples are tested in the absence of any hypotheses to try to find an answer.
	✓ Review literature.	
	✓ Discuss conclusions with supervisors.	
9. Communicate findings	✓ Prepare a one-page draft summary report to be written and left in the field before departure.	✗ Failing to communicate the results to decision-makers An investigation is not complete until you have communicated the results to those who need the information to act. A number of target audiences will need to receive the information in an adapted medium in order to engage in what they should do. Sending the report to a supervisor is not sufficient.
	✓ Communicate findings with supervisors, the laboratory and public health authorities.	
10. Execute prevention measures	✓ Formulate clear, specific feasible recommendations on the basis of your findings (Who? What? When?).	✗ Formulating general recommendations that are not based upon findings Recommendations need to focus on those interventions that would have prevented the outbreak or that will control it. They should be guided by the results of the investigation, based upon evidence, focused and feasible. Do not re-formulate all the recommendations of hygiene but focus on the specific ones that are the key issue in the outbreak.
	✓ Ensure implementation of the recommendations.	
	✓ Evaluate the relevance and effectiveness of the recommendations.	