How Public Health Information is Used to Inform Regulation Development

Alan Roberson, AWWA
Stig Regli, EPA
TCRDS Federal Advisory Committee
September 18-19, 2007

This Meeting's Presentations

Objectives

How Public Health Information is Used to Inform Regulation Development

Provisions

System compliance

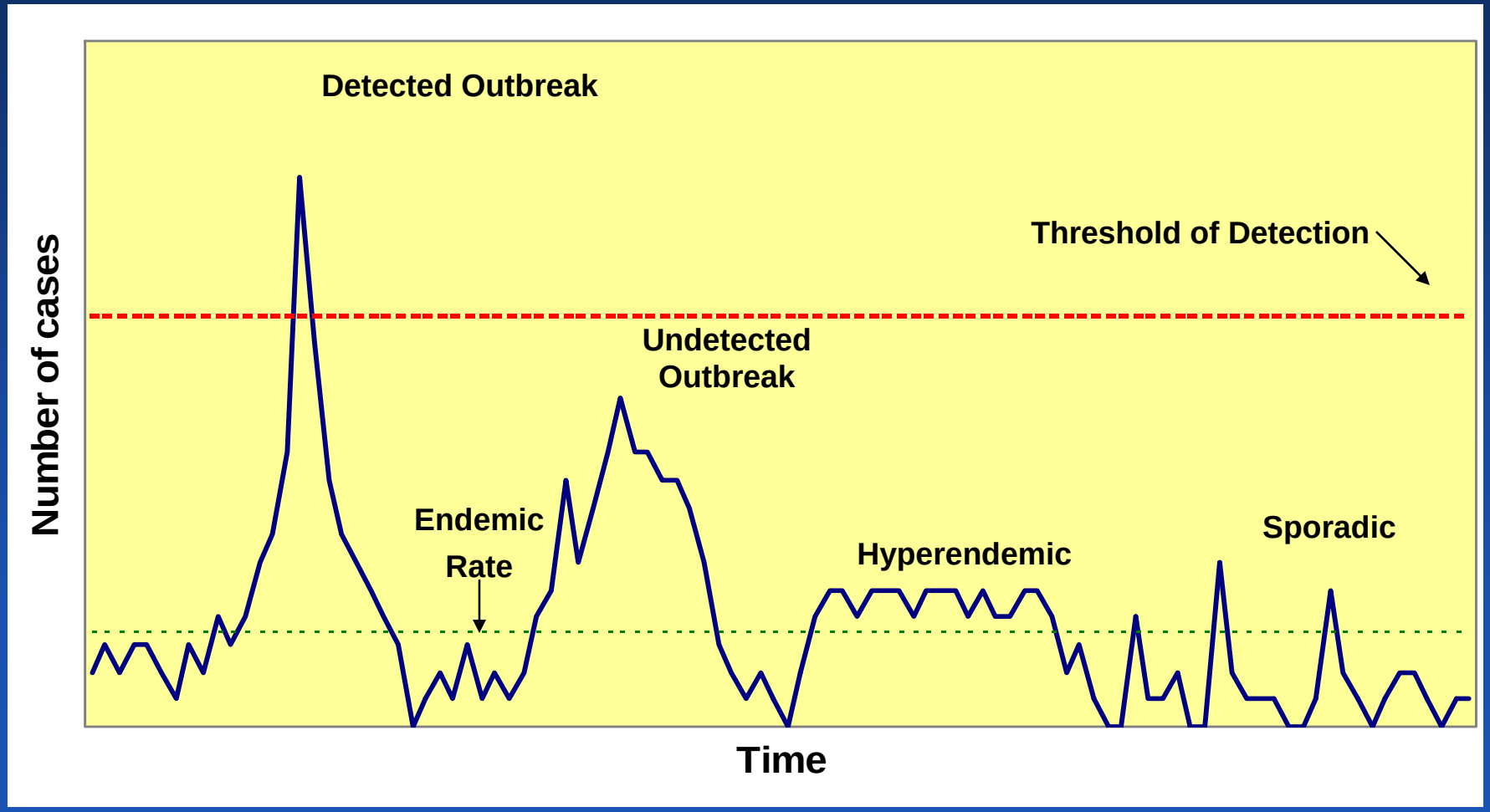
Improvement

Research

Presentation Objectives

- Outbreak versus endemic disease
- How outbreak, endemic disease, and water quality information has been used to support drinking water regulation development
- Available information for revising TCR

Nomenclature of Disease Occurrence



Definition of Outbreak

- A clear increase in illness or other health-related events above that which is normally expected
- The time period and geographic area in which cases occur must be specified

What Makes An Outbreak, An Outbreak?

- Somebody suspects there is an outbreak
- Somebody starts gathering data
- Somebody declares there is an outbreak
- Somebody investigates an outbreak
- Recognize that the chances of an outbreak being detected, recognized and reported depends on many factors coming together in a given time period (availability of resources, communication and coordination among all the “somebodies”)

CDC Definition of Drinking Water Outbreak

- Epidemiologic evidence must implicate water as the probable source of illness
  - Two or more persons must be epidemiologically linked by location of exposure to water, time, and illness
  - Exceptions
    - Single cases of laboratory-confirmed primary amebic meningoencephalitis
    - Single cases of chemical/toxin poisoning if water-quality data indicate contamination by the chemical/toxin

Biennial Waterborne Disease Surveillance Report

- Joint activity between EPA and CDC
- Includes
  - Outbreaks associated with water (drinking and recreational)
- Information source
  - Passive surveillance system
  - States investigate and report outbreaks
  - Report limitations include
    - Under reporting
    - Inconsistency in reporting
    - Tendency for more acute and severe to be reported

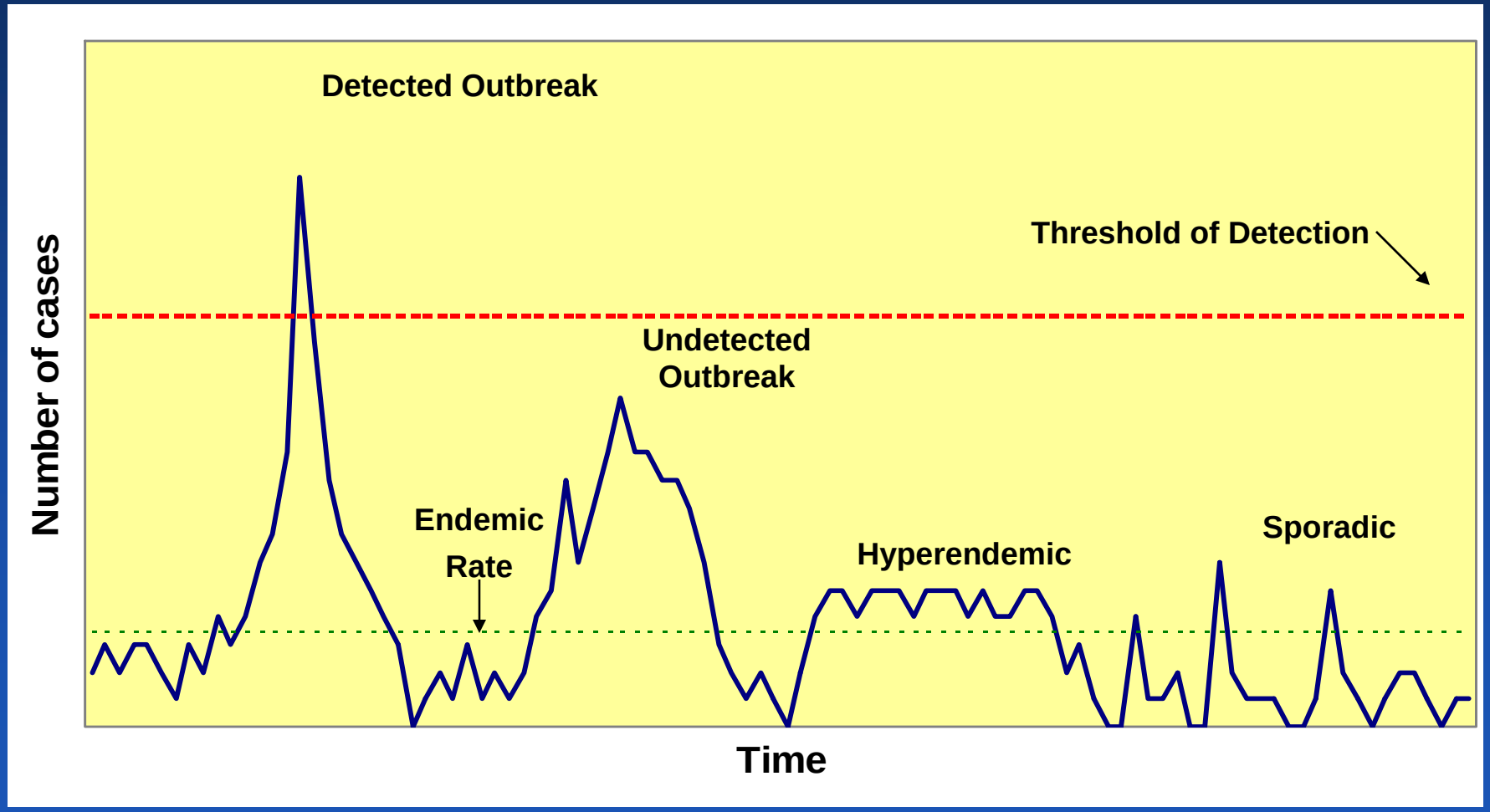
Outbreak Data has Informed Contaminants to be Regulated

- Outbreaks caused by *Giardia*, viruses, and *Cryptosporidium*:
  - Prompted regulatory focus and collection of additional data to inform risk assessment
    - SWTR (*Giardia* and viruses)
    - IESWTR, LT1, (*Cryptosporidium*)
    - GWR (viruses)
  - Supported basis for having MCLGs
    - SWTR (Giardia and viruses)
    - IESWTR, LT1, LT2 (Cryptosporidium)

Outbreak Data Have Informed Assumptions on Systemic Causes and Mitigation Opportunities

- Outbreak incidence in unfiltered versus filtered surface water systems supported specific control measures for unfiltered systems (SWTR)
- Outbreaks related to treatment inadequacy and reliability in filtered surface water systems supported additional treatment technique requirements (SWTR, IESWTR, LT1)
- Outbreaks in systems supplied by ground water due to source/treatment deficiencies supported SWTR, TCR and GWR
- Outbreaks attributed to distribution system contamination supported TCR

Nomenclature of Disease Occurrence



Definition of Endemic Disease

- Persistent low to moderate level or the usual ongoing occurrence of illness in a given population or geographic area
- Difficult to distinguish between food-borne, waterborne, and person-to-person sources for endemic disease

Use of Endemic Disease Estimates in Regulation Development

- Informs decision to regulate
- Supports benefit-cost analysis and selection of regulatory options
  - Pre-rule baseline disease incidence
  - Disease incidence avoided is the main benefit for different regulatory options
  - National and sub-population disease estimates

Endemic Epidemiology Studies Have Not Been Used to Support Regulations Controlling Pathogens

- To date, limited availability of endemic epidemiology studies on microbial contaminants / infectious disease
- For chemical contaminants, epidemiology studies have been used to:
  - Inform disease incidence attributed to exposure from drinking water (Arsenic)
  - To develop hypothesis about disease etiologies (Stage 1 and 2 DBPR)
  - Characterize risk and test specific hypothesis (Stage 2 DBPR)

Use of Pathogen Specific Data to Inform Endemic Risk in Regulation Development

- Information about specific pathogens and their effect on humans has been used in risk assessments (*Giardia, Cryptosporidium* and viruses)
  - Pathogen occurrence and treatment efficiency for pathogens
  - Human dose response studies
  - Consumption information
  - Morbidity rates relative to infection
  - Mortality rates relative to disease incidence
- Estimating pathogen occurrence for TCR will be challenging

Indicator Data Can Be Used to Inform Potential Public Health Concerns, Mitigation Strategies

- Indicators can be microbial or operational
- Under SWTR, analysis of linkages between water quality parameters and pathogens were used to inform potential public health concerns and mitigation strategies, including:
  - Turbidity – filtration and interference with disinfection
  - Disinfectant concentration and contact times (CTs) – primary disinfection
  - Disinfectant residuals – secondary disinfection

Available Public Health Information

- Types of available information
  - CDC/EPA waterborne disease outbreak surveillance
  - Epidemiology studies informing endemic risk
  - Pathogen specific information (e.g. dose response, morbidity/mortality)
  - Studies relating indicator data to public health data
- SDWA requires EPA to make decisions based on the best available peer-reviewed science
- Each type of public health information has strengths and weaknesses

What would the FAC like the TWG / public health task group to focus on?