



COMMUNICABLE DISEASE ACTIVE SURVEILLANCE PROJECT (CDAS)

INTRODUCTION

The Northridge earthquake on January 17, 1994 caused extensive damage to structures, disruption of lives, and 60 deaths. This event also brought to light the fact that the County's Acute Communicable Disease Control Unit (ACDC) was ill-prepared to make a rapid assessment of actual or potential communicable disease outbreaks in the community. Traditionally, active surveillance in Los Angeles County (LAC) had been conducted for selected diseases on an "as needed" basis or for special studies. The main system for reporting communicable diseases is a passive surveillance system which depends on voluntary reporting of cases.

In 1995, the Centers for Disease Control and Prevention awarded a grant to improve communicable disease surveillance by establishing reporting networks in LAC. Hospital infection control practitioners, laboratories, community-based organizations, and hospital emergency rooms were targeted for study. Three projects originated from this grant: the Active Surveillance project which was the major project, and two sub-projects, the Community-based Organization Sub-project and the Hospital Emergency Room Sub-project.

I. ACTIVE SURVEILLANCE PROJECT

Background

The Communicable Disease Active Surveillance project (CDAS) represents an effort by LAC to create a network of laboratories and hospital infection control practitioners to facilitate case-finding in the event of a Countywide disease outbreak or natural disaster. This project was also designed to improve disease reporting by developing an active surveillance system and to obtain baseline frequencies for previously non-reportable diseases and conditions.

Diseases and conditions were selected based on severity, potential for large-scale outbreaks, prevention of secondary cases, ascertainment of immunization efficacy and target vaccine usage, and tracking of antibiotic resistance patterns. They also represented emerging pathogens or pathogens of urgent public health concern. CDAS requested that five diseases be reported by both laboratories and infection control practitioners. In addition, CDAS requested that laboratories report two more diseases which required laboratory confirmation, and that infection control practitioners report three more conditions which required a clinical diagnosis.

Methods

Study Population: One hundred and eighty-two microbiology laboratories and 127 hospital infection control practitioners were identified. The criteria for selection was any laboratory that provided bacteriology and/or parasitology testing to LAC residents or any acute care hospital (non-psychiatric) in LAC.



Study Period: September 1, 1995, to February 29, 1996.

Educational Packets: Before active surveillance began, educational packets were distributed to the reporting sites. The packets described the CDAS enhanced passive surveillance system and outlined the plan for active surveillance monthly telephone inquiries.

Data Collection: CDAS requested that infection control practitioners and laboratory personnel report certain diseases and conditions by telephone or fax beginning September 1, 1995. Table 5 lists the diseases and conditions, who was required to report, and the criteria for reporting a case. Laboratory personnel or hospital infection control practitioners were contacted monthly by telephone to verify the number of CDAS-reportable diseases and conditions at their facilities.

Evaluation: To determine the efficacy of the CDAS reporting system, records were reviewed from both laboratories and acute care hospital medical records departments in LAC. To evaluate the completeness of reporting for the seven CDAS-reportable organisms, a random sample of 24 laboratories (13%) was selected for the retrospective review of laboratory records. Laboratory records were reviewed to identify organisms cultured from September 1, 1995, to January 31, 1996. To evaluate the completeness of reporting for the CDAS disease-related conditions, 22 hospitals (17%) were randomly selected for the retrospective chart review. The chart review included patients discharged from September 1, 1995, to January 31, 1996, with hemolytic uremic syndrome, streptococcal toxic shock syndrome, streptococcal necrotizing fasciitis, or meningococcal infections.

Results

From September 1995 to February 1996, CDAS received a total of 785 cases. The four diseases most frequently reported were invasive pneumococcal disease (n=445;57%), cryptosporidiosis (n=122;16%), invasive *Haemophilus influenzae* (n=61;8%), and invasive meningococcal disease (n=36;5%) (Table 6). Of these cases (excluding cases found upon evaluation), 74% (551) were first reported by laboratories, 22% (162) by hospital infection control practitioners, 4% (32) by routine health department surveillance, and 0.3% (2) simultaneously reported by both the laboratory and infection control practitioner.

Four CDAS diseases have been State-reportable (cryptosporidiosis, invasive *Haemophilus influenzae* disease, listeriosis, and invasive meningococcal disease). Comparison of the CDAS data to the previous five-year averages for a four-month period (September to December) revealed a 14% decrease in invasive meningococcal disease, a 28% decrease in listeriosis, a 45% increase in invasive *Haemophilus influenzae* disease, and a 74% increase in cryptosporidiosis.

Baseline data is limited for *E. coli* O157:H7, hemolytic uremic syndrome (HUS), invasive pneumococcal disease, and group A invasive streptococcal disease. These diseases and conditions are either not State-reportable or only recently became State-reportable.



Comparing data from 1994 and 1995 for the same four-month period (September to December), *E. coli* O157:H7 increased from four to seven cases in 1995 and HUS increased from no cases to two in 1995. Group A streptococcal invasive disease increased threefold from 1994 to 1995. Only in 1986 was data collected on invasive pneumococcal disease in LAC. The 1986 and 1995 incidence rates for the same four-month period were equivalent (2.9 per 100,000 population).

During the retrospective review of records, CDAS audited 20 laboratories (four excluded) and 22 hospital medical record departments. Overall, CDAS missed 15% (39/264) of the cases collected.

An audit of laboratory records identified 38 additional cases that were not reported to CDAS: one case (5%) of *L. monocytogenes*, 36 cases (8%) of *S. pneumoniae* and one case (1%) of *S. pyogenes*. Two laboratories failed to report 44% (16/36) of all the *S. pneumoniae* cases found. At least one additional case was found in 70% (9/13) of the hospital laboratories reviewed as opposed to only 17% (1/7) in non-hospital laboratories. There was no statistically significant association between hospital laboratories and finding an additional case (Fisher's exact test, two-tail, $p = 0.06$). Within hospital laboratories, bed-size capacity had no significant influence (Chi-square test for linear trend = 0.08, $p = 0.77$).

Of the 22 hospitals selected for evaluation of reporting of CDAS conditions, nine had no CDAS-reportable conditions and 13 had at least one patient with one of the requested conditions. Of the 106 charts reviewed, CDAS identified one previously unreported case of hemolytic uremic syndrome.

Conclusions

A laboratory- and hospital infection control practitioner-based active surveillance system for selected diseases and disease-related conditions in LAC was developed and implemented. Utilizing the previously mentioned methodology to evaluate the surveillance system, it is estimated that CDAS was able to capture 85% of all the cases in LAC. Also, CDAS collected baseline frequencies for previously non-reportable diseases and observed noted increases in two of four previously reportable diseases. The impact of educational packets and active surveillance telephone calls was most likely responsible for increasing awareness and reporting of these diseases.

Collecting baseline information is essential for CDAS diseases and conditions previously non-reportable to the State such as *E. coli* O157:H7 and invasive pneumococcal disease. Since limited information is available, continuing surveillance is critical to understand the trends and epidemiology of these diseases in LAC.

The results demonstrated that laboratory surveillance was an effective mechanism to collect communicable disease information. The timeliness of reporting by laboratories was demonstrated by the fact that 74% of first case reports originated from laboratories. With limited public resources available for communicable disease reporting, efforts should focus



on improving laboratory reporting. A CDAS survey revealed that 70% (124/176) of the laboratories in its reporting network had at least part of their results computerized. The development of software for reporting communicable diseases that is compatible with commonly used laboratory information systems is essential to facilitate the immediate reporting of disease and to improve the compliance of laboratories with State and County regulations.

Continuation of Project Activities

As active surveillance activities could not be maintained in their entirety after the grant ended, only 118 sites (38%) were retained as sentinel surveillance sites in March 1996.

II. COMMUNITY-BASED ORGANIZATION SUB-PROJECT

The goal of this sub-project was to identify and establish liaisons between community-based organizations and the LAC Department of Health Services, thereby establishing a reporting network for unusual occurrences of communicable disease.

Two hundred and ninety-three community organizations were selected based on their ability to provide food, shelter, health care services and referrals, or first aid, routinely or in times of crisis. Each organization received an educational booklet and poster containing guidelines for reporting unusual illness, a list of State reportable diseases, and the local public health center phone listing. The poster provided a visual reminder of where to call to report suspected or confirmed communicable diseases. District-specific public health nurses were enlisted to distribute the materials.

The distribution of communicable disease educational material was the first step in establishing linkages between the ACDC and community-based organizations. The contacts made by the nurses were intended to ensure the continuity of these newly formed relationships. The development of reporting guidelines for these organizations will facilitate reporting of suspected or confirmed communicable disease routinely and in post-disaster situations.

III. HOSPITAL EMERGENCY ROOM SUB-PROJECT

After the 1994 Northridge earthquake, the ACDC Unit implemented the Emergency Room Survey Study. Pertinent information on illnesses such as gastroenteritis and rash-like illness was obtained from emergency room logs in order to detect increases of infectious disease in the community after the earthquake.

The objective of this sub-project was to facilitate future administration of the Emergency Room Survey by gathering background information from all LAC emergency rooms. With this data, the ACDC Unit would be able to easily access communicable disease information to detect an increase in infectious disease after a disaster or community-wide outbreak.



CDAS staff interviewed emergency room personnel from 127 hospitals. The survey contained questions regarding general emergency department information, average number of patient visits per month, data storage, and the type of emergency communication system utilized after an external disaster.

The response rate for the Emergency Room Survey was 91% (92/101). Contact information was obtained for all emergency room administrators; and telephone and facsimile information was collected for all emergency departments. Of 92 emergency rooms surveyed, the average number of patient visits per month was 1,873, with a range from 89 to 6,600.

Twenty-nine out of 92 (32%) had computerized emergency room logs. In general, CDAS found great variability among hospitals regarding the type of information collected in emergency logs. The seven most commonly collected variables were patient name (100%), arrival time (99%), patient age (98%), arrival mode (97%), chief complaint (89%), patient gender (80%), and disposition (78%). Other variables collected were address, phone number, medical record number, diagnosis, discharge time, service/treatment rendered, treatment time, emergency room physician, and financial class. The average time the emergency room logs were stored on the unit was 2.8 years (median = 2 years) with a range from 1 month to 11 years. Maintaining hard copies of the emergency log (81%) was the most common method utilized to archive the data, followed by mainframe storage (17%), and microfiche (6%).

CDAS staff established a network of hospital emergency rooms to serve as early indicators of an increase in infectious diseases after a disaster. Knowledge of what information is available and how it is stored should facilitate access to pertinent data. Also, having the name and phone number of the emergency room administrator in advance should decrease the time spent trying to contact the appropriate person.

As indicated by information from the emergency logs, the variables would be sufficient to assess what is occurring in the community after a disaster. However, standardization of these logs would greatly facilitate collection and analysis of emergency room data.

**Table 6. CDAS-Reportable Diseases and Disease-Related Conditions by Month of Identification/Diagnosis,
Los Angeles County, September 1995 - February 1996**

Diseases/Conditions	1995 Sept.	Oct.	Nov.	Dec.	1996 Jan.	Feb.	Cumulative Frequency
<i>Cryptosporidium parvum</i>	31	25	20	16	19	11	122
<i>Escherichia coli</i> 0157:H7	0	3	4	0	0	0	7
Hemolytic Uremic Syndrome	2	0	0	0	1	0	3
Invasive <i>Haemophilus influenzae</i> Disease*	6	9	5	14	10	17	61
<i>Listeria monocytogenes</i>	6	4	2	1	2	4	19
Invasive Meningococcal Disease (<i>Neisseria meningitidis</i>)	4	3	5	6	11	7	36
Invasive Pneumococcal Disease (<i>Streptococcus pneumoniae</i>)	21	60	69	102	122	71	445
Group A Streptococcal Invasive Disease (<i>Streptococcus pyogenes</i>)	8	11	22	11	11	16	79
Streptococcal Necrotizing Fasciitis	0	1	0	0	2	0	3
Streptococcal Toxic Shock Syndrome	2	0	0	1	3	1	7
Necrotizing Fasciitis & Toxic Shock Syndrome	0	0	1	2	0	0	3
Total	80	116	128	153	181	127	785

* All serotypes and non-typable H. influenzae cases included.