Active Influenza Surveillance at the Local Level: A Model for Local Health Agencies

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Laboratory-supported, community-based local surveillance systems for influenza can act as early warning systems in identifying the initial entry points of different influenza strains into the community. Unfortunately, local health departments often have limited resources to implement this type of surveillance. We developed and evaluated an active, local influenza surveillance system in 3 metropolitan Denver, Colo, counties that enabled timely case ascertainment and strain identification at little cost. When compared with Colorado's surveillance system, our system detected cases 7 to 8 weeks earlier than the state's electronic disease reporting system. (*Am J Public Health.* 2008;98:213–215. doi:10.2105/AJPH.2006.106138)

LABORATORY-SUPPORTED, community-based influenza surveillance can allow early detection of epidemics and circulating strains.[1–6] This type of surveillance locally can enhance early strain detection, as seen during the detection of a novel strain in Hong Kong in 1997.[1] Unfortunately, many current sources of locally available influenza surveillance data, such as influenza-like illness and school absenteeism data, lack strain-specific information. Thus, national agencies have emphasized the need for rapidly expandable local surveillance systems to track influenza with strain-specific detail.[7–9]

Resources can be limited locally, and surveillance is often left to state or national programs.[7] For years, the Colorado Department of Public Health and Environment conducted enhanced surveillance through mandatory reporting of all confirmed and probable influenza cases, which identified an early, more-severe influenza season in 2003. However, the state discontinued this surveillance in October 2004; currently only influenza-related hospitalizations and pediatric deaths are required to be reported to the state.[10] To overcome this gap, the Tri-County Health Department (TCHD), a metropolitan Denver area health department, developed a local surveillance system. The objective was to create a low-cost, laboratory-supported system for early influenza detection and strain identification that could be rapidly expanded to cover the entire influenza season if needed. We describe and compare this system to Colorado's Electronic Disease Reporting System (CEDRS), the state's surveillance system to which notifiable diseases, influenza-related hospitalizations, and pediatric deaths are reported.[10,11]

PROGRAM DESCRIPTION AND METHODS

TCHD developed 2 surveillance systems for comparison, an active system and a passive one. Case definition was laboratory based; a confirmed case had positive cultures or polymerase chain reaction test, and a probable case had positive results for any other test, including rapid antigen, enzyme immunoassay, or direct immunofluorescence antibody tests. For all cases, TCHD obtained demographic, address, and laboratory information.

For the active system, TCHD made weekly phone calls beginning October 1, 2004, to a contact at each of its hospitals. Contacts were mainly infection control practitioners or laboratory professionals. All 8 hospitals in the TCHD jurisdiction agreed to report cases among inpatients and outpatients of emergency departments and clinics. Calls ended after December 31, 2004, when it was determined that influenza A and B were both circulating widely and that surveillance would no longer be useful as an early warning system. TCHD implemented the passive system through its local Health Alert Network, which allows TCHD to fax information to every health professional in its jurisdiction. TCHD sent instructions and report forms to 539 health care providers, nursing homes, and laboratories through the network.

TCHD monitored costs for each system and surveyed hospital contacts' satisfaction with the system. The department monitored both systems for timeliness, completeness, and other attributes and compared them with CEDRS. Periodically, TCHD faxed publications to inform all

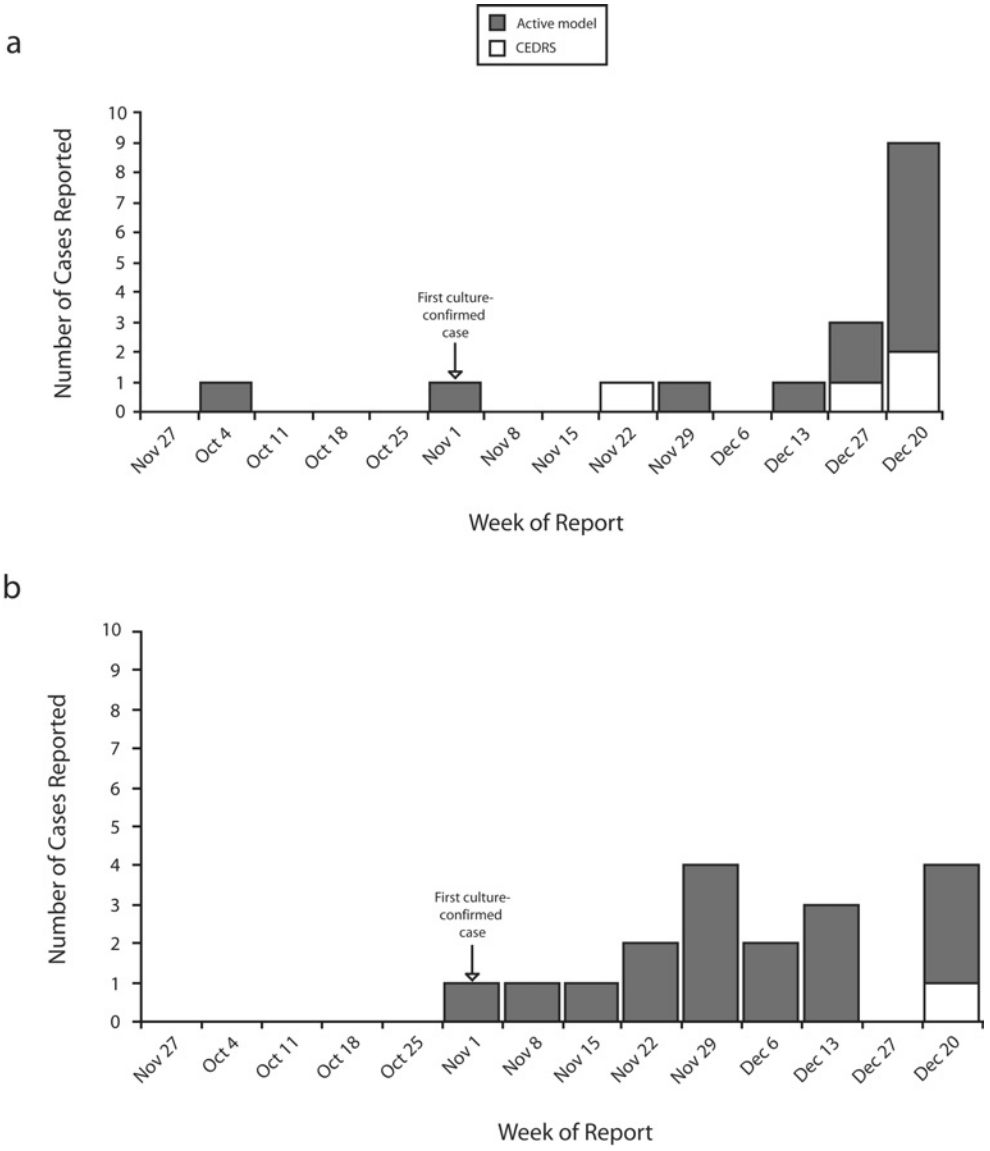

FIGURE 1—Probable and confirmed cases of (a) influenza A and (b) influenza B reported to Tri-County Health Department, by week of first report, through the active model or through Colorado's Electronic Disease Reporting System: Greenwood Village, Colo.

health care providers in the jurisdiction of the number of cases and strains identified.

RESULTS

From October 1 to December 31, 2004, TCHD identified 43 probable influenza cases, 4 of which were confirmed. The active system identified 30 cases, the passive system 8 cases, and CEDRS 5 cases. Seventeen cases were identified as influenza A, 18 as influenza B, and 8 as type unspecified. The active system first detected both types of influenza in the TCHD jurisdiction 7 to 8 weeks before CEDRS (Figure 1).

The active system was well accepted by hospitals. Although reporting was voluntary, 100% of hospitals in the TCHD jurisdiction participated. All data fields were complete for the active system and CEDRS. The passive system had missing information for patients' city of residence (25% missing), date of birth (25% missing), address (50% missing), and zip code (50% missing). On timeliness, median time from lab collection to the report to TCHD was 2 days (range: 0–7 days) for the active system, 1.5 days (range: 0–7 days) for CEDRS, and 1 day (range: 0–20 days) for the passive system.

Start-up expenses were approximately $1600 for TCHD's active system. Maintenance averaged 30 minutes per week for 2 TCHD staff, totaling $26.39 per week. Hospital contact time (phone calls) averaged 7 minutes weekly. For the passive system, the initial Health Alert Network cost was $300, with negligible incremental maintenance expenses.

DISCUSSION

TCHD's active surveillance system was useful in the timely identification of cases and strains. This system overcame gaps in other available influenza surveillance data, such as CEDRS hospitalization, influenza-like illness, and school absenteeism data, which can lack timeliness or specificity. Compared with CEDRS, the active system detected cases 7 to 8 weeks earlier in the TCHD jurisdiction, indicating that surveillance of hospitalized cases alone can be insufficient in early case detection. Subsequent to this study, the Colorado Department of Public Health and Environment initiated enhanced confirmatory testing of outpatients during the early season to improve outpatient tracking.

Furthermore, TCHD's laboratory-supported surveillance enabled greater specificity compared with influenza-like illness or school absenteeism data. The proportion of influenza-like illness patients confirmed with influenza can vary greatly

depending on the prevalence of influenza viruses in the community.[2,12] Laboratory-supported surveillance allows differentiation between influenza and other causes of influenza-like illness.[2,3] Moreover, although school absenteeism can be a useful, nonvirologic indicator of influenza, it can also be nonspecific.[13–15] In 2004, a large pertussis outbreak in the TCHD jurisdiction forced schools to exclude students coughing for more than 2 days, making absenteeism a poor indicator of influenza activity. Thus, TCHD's active system proved more timely and specific than other available data.

The active system facilitated communication between TCHD and its hospitals. Its minimal weekly costs easily allow for expansion to cover the entire influenza season, if needed, with few additional resources. Moreover, the system proved flexible in novel situations, such as the 2004 influenza vaccine shortage, during which the weekly calls were quickly adapted to assess hospital vaccine availability.

The active system had limitations, however. First, the system was implemented only in hospitals and their affiliated clinics, which may not be representative of the entire TCHD population. Second, because of the lack of a gold standard facility for comparison, we were unable to assess the system's sensitivity and specificity.

Despite these issues, we feel the active system can be a viable model for local health departments. Epidemic and pandemic influenza preparedness requires rapidly expandable local surveillance systems that provide timely case and strain identification. We offer a model that will allow such detection at minimal cost. ■

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Contributors

T.S. Ghosh originated the study and supervised its implementation and led the writing. R.L. Vogt helped conceptualize ideas, interpret findings, and review drafts.

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Human Participant Protection

No protocol approval was needed for this study.

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