Electronic Laboratory Reporting for Public Health

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Communicable disease surveillance is essential for protecting public health[1,2]. Public health surveillance has long relied on paper reporting methods that are unreliable and slow. Previous evaluations of notifiable disease surveillance in Hawaii and elsewhere have found that reports are often submitted late and that communicable illnesses are substantially underreported[3,4]. Most disease reports received by State health departments originate from clinical laboratories[5-8]. The Centers for Disease Control and Prevention, Council of State and Territorial Epidemiologists, and Association of Public Health Laboratories are proposing that laboratory information systems transmit electronic laboratory results to appropriate public health agencies. This approach is expected to improve the reporting efficiency, reduce data entry, and increase the timeliness and utility of the data[9,10].

One component of the Indianapolis Network for Patient Care (INPC) handles electronic laboratory reporting. The INPC is a fully functional, Web-based system for sharing data among the majority of acute care hospitals in Indianapolis. The participants are Clarian Health (three hospitals), Community Hospitals (three hospitals), St. Francis Hospitals (two hospitals), St. Vincent's Hospitals (two hospitals), and Wishard Memorial Hospital (one hospital). These hospitals account for more than 95 percent of the hospital beds and emergency department visits in Indianapolis, a city of over 1 million people.

Each participant in the INPC contributes a variety of data, including patient registration and laboratory data. These data are received as HL7 messages, but considerable preprocessing is required to standardize the way HL7 is used and to normalize representations of various results, particularly microbiological information. The software recodes the results reported in these messages into Logical Observation Identifier Names and Codes vocabulary[11,12]. These result identifiers are then compared with Dwyer tables[13] to determine whether the result might potentially be reportable. If the result could identify a reportable condition, the HL7 message is passed to a secondary processor that examines the value of the result by evaluating the abnormal "flag" sent by the laboratory, comparing organism names with those in the Dwyer tables and comparing the numeric values with cutoffs we have defined locally for various serologic tests. Any reportable results are stored in a secure database that the software replicates to county and State health departments that evening. These data are then available to review online by public health users, or they can be accessed using a report defined for the purpose. The system also accumulates denominator data about the number of the various kinds of tests that are performed.

During an outbreak of *Shigella* in Indianapolis in the first half of 2000, the electronic reporting system notified the public health officials earlier and with more complete information. In addition, there was substantial underreporting by at least one of the participant institutions. These data suggest that electronic reporting may provide the desired benefits.

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