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states.

Mandatory Reporting of Infectious Diseases by Clinicians

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Harry F. Hull, MD Reporting of cases of communicable disease is important in the planning and evaluation of disease prevention and control
programs, in the assurance of appropriate medical therapy, and in
the detection of common-source outbreaks. In the United States,
the authority to require notification of cases of disease resides
in the respective state legislatures. We examined the laws and
regulations of health departments of all US jurisdictions to
ascertain diseases and conditions currently required to be
reported in each state or territory. We present herein the state

reporting requirements for infectious diseases and infectious disease-related conditions. To obtain additional information regarding time frames for reporting, agencies to which reports are required, persons required to report, and specific conditions under which reports are required, the reader is referred to the statutes and health department regulations of the respective states. Reporting of cases of infectious diseases and related conditions has been and remains a vital step in controlling and preventing the spread of communicable disease. These reports are useful in many ways, including assurance of provision of appropriate medical therapy (eg, for tuberculosis), detection of common-source outbreaks (eg, in food-borne outbreaks), and planning and evaluating prevention and control programs (eg, for vaccine-preventable diseases). The epidemic of the acquired immunodeficiency syndrome, the recent increase in tuberculosis in young adults, the reemergence of malaria as a health threat to travelers, and the potential spread of dengue fever to the continental United States have all contributed to the renewed interest in the surveillance of infectious diseases.

The control and prevention of infectious disease has traditionally been a primary health mandate. Systematic reporting of various diseases in the United States began in 1874 when the State Board of Health of Massachusetts inaugurated a plan for the weekly voluntary reporting of prevalent diseases by physicians (1). A sample postcard was designed to "reduce to the minimum the expenditure of time and trouble incident to the service asked of busy medical men (2)." In 1883, Michigan became the first US

jurisdiction to mandate the reporting of specific infectious diseases. By 1901, all states required notification of selected communicable diseases to local health authorities. However, the poliomyelitis epidemic in 1916 and the influenza pandemic of 1918 heightened interest in reporting requirements, resulting in the participation of all states in national morbidity reporting by 1925. Today, all states and territories of the United States participate in a national morbidity reporting system and regularly report aggregate or case-specific data for 49 infectious diseases and related conditions to the Centers for Disease Control (CDC) in Atlanta, Ga (3). In the United States, the authority to require notification of cases of disease resides in the respective state legislatures. In some states, authority is enumerated in statutory provisions; in other states, authority to require reporting has been given to state boards of health; still other states require reports both under statutes and under health department regulations. Variation among states also exists among conditions and diseases to be reported, time frames for reporting, agencies receiving reports, persons required to report, and conditions under which reports are required. In many states, local health departments provide epidemiologic services; as a consequence, health care providers in many states are encouraged to report diseases directly to local health departments rather than to the state health department. Compilations of disease-reporting requirements in the United States were last published by the US Public Health Service in 1933 (4) and 1944 (5). To ascertain diseases and conditions

currently required to be reported in each state, we examined the laws and regulations of health departments of all the states, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and the US Virgin Islands (hereafter referred to as states). This information was provided by the Council of State and Territorial Epidemiologists (CSTE) through the respective state epidemiologists. Among reportable diseases identified at the outset of this project were more than 160 infectious diseases or infectious disease-related conditions, 90 diseases caused by occupational exposures, 23 other environmental diseases, 29 congenital or noninfectious childhood conditions, and 6 diseases of unknown etiology. In addition, the laws relating to morbidity in some states specify that cases of certain classes of disease shall be notifiable, eg, "diseases which are known or suspected to be related to environmental exposure to toxic-hazardous material" (Alaska) or "the occurrence of any increase in incidence of disease of unknown or unusual etiology" (Hawaii). The Table summarizes the infectious diseases and infectious disease-related conditions reportable (or in process of being made reportable) in at least 10 states for physicians and other health care providers as of March 1, 1989. Diseases are presented in the nomenclature used by the majority of states or, where appropriate, in the nomenclature recommended by the American Public Health Association (6). Where appropriate, eponymic terms have been changed to internationally accepted format. Consequently, there is variation between the terms used in this

Table and those used in some state statutes or regulations. Diseases reportable in fewer than 10 states are not included unless nomenclature used in some states could be interpreted to denote diseases or conditions for which different nomenclature was used in other states (see Table footnotes). A semicolon (;) is provided to demarcate separate reporting requirements for conditions described by the same nomenclature. For example, Ohio's reporting requirements for streptococcal disease, site unspecified, are presented as "NZ;n," denoting a reporting requirement for streptococcal B infections in newborns and a reporting requirement for total numbers of streptococcal infections. Many states also have infectious disease-reporting requirements for laboratories, but these are not presented herein. In addition, the National Childhood Vaccine Injury Act of 1986 requires that health care providers who administer certain vaccines and toxoids are required by law to record permanently certain information and to report to the US Department of Health and Human Services selected adverse events occurring after vaccination. Events occurring after receipt of publicly purchased vaccines are reported through local, county, and/or state health departments to the CDC on its Report of Adverse Events Following Immunization (CDC form 71.19). Events occurring after receipt of a privately purchased vaccine usually are reported directly to the Food and Drug Administration (FDA) on its Adverse Reaction Report (FDA form 1639) by the health care provider or the manufacturer; this form, which may be duplicated, can be obtained directly from the FDA and is also printed in the FDA Drug

Bulletin, the physician's edition of the Physician's Desk Reference, USP Drug Information for Health Care Providers, and AMA Drug Evaluations. Readers are referred elsewhere (7) for details of this surveillance system and requirements for recording and reporting. The accompanying article details state reporting requirements for occupational diseases (8). To obtain additional information regarding time frames for reporting, agencies to which reports are required, persons required to report, specific conditions under which reports are required, and reporting requirements for laboratories, the reader is referred to the statutes and health department regulations of the respective states.

In most developed countries, systems for reporting notifiable diseases have evolved as the basis of infectious disease surveillance (9-11). In the United States, the federal Quarantine Act of 1878 authorized the US Public Health Service to collect morbidity data for use in quarantine measures against cholera, smallpox, and yellow fever. The Quarantine Act of 1893 authorized the US Public Health Service to collect morbidity information each week from state and local public health authorities throughout the United States. Since 1961, the CDC has had the responsibility of operating the National Notifiable Diseases Surveillance System, for the purpose of tabulating and disseminating summary morbidity data. The CSTE determines the list of diseases in collaboration with the CDC, revising it annually as needed; the list includes those infectious diseases for which data can provide a basis for state and local agencies to plan more effective programs for disease prevention and

control. The Table presented herein underscores substantial differences among states as to the specific list of diseases for which reporting is required. Similar differences exist for the lists of reportable diseases in other countries as well, including the various Canadian provinces and territories (12). These different reporting requirements merit examination in light of the public health significance of the diseases, other states' reporting requirements, and the potential for use of alternate data sources (13). In addition, the lack of uniformity among states regarding the case definitions for many diseases has made comparisons between states difficult. For example, some states have required any person with a culture positive for Salmonella to be reported, whereas other states have required reporting of culture-positive individuals only if they were symptomatic (14). To facilitate comparison of surveillance data among states, standardized case definitions for the nationally notifiable diseases have been developed by the CDC and the CSTE and were approved by the CSTE in May 1989 (15). It is hoped that these definitions will also facilitate interstate reciprocal notification of disease; in agreement with the CSTE, the CDC provides forms to state health departments for reciprocal notification for (1) cases of all diseases having onset in one state but hospitalized or transferring to another state; (2) cases of reportable diseases having onset within the state but presumably infected in another state; and (3) cases regarding which epidemiologic information or other public health action may be needed, eg, contact tracing (3). Most infectious disease surveillance systems rely primarily on

receipt of case reports from physicians and other health care providers. These data are usually incomplete and may not be representative for certain populations; completeness of reporting has been estimated to vary from 6% to 90% for many of the common notifiable diseases (16). However, if the level of completeness is consistent over time, these data usually are the best source of information regarding the temporal and geographic trends and the characteristics of the persons affected. Clinician-based surveillance has also been useful in identifying common-source outbreaks of diseases, eg, hepatitis A (17), hepatitis B (18,19), and hepatitis non-A, non-B (20). To encourage partnership with those physicians or other health professionals who report, most state health departments use newsletters to provide feedback of data to the health care professionals who contribute to the database. The CDC reports surveillance data weekly in the Morbidity and Mortality Weekly Report and annually in its Summary of Notifiable Diseases. Media coverage, driven by community and medical interest in newly emerging diseases or conditions, may also improve reporting. For example, a significant increase in reporting of toxic shock syndrome was observed after media publicity first appeared (21). Surveillance activities are often strengthened when the disease is given a high priority, such as when primary prevention of most or all cases is feasible (eg, measles), or when the disease is severe and newly emerging (eg, the acquired immunodeficiency syndrome, toxic shock syndrome). These activities frequently include working closely with hospitals to identify cases,

reviewing hospital discharge records, and working closely with clinicians who are likely to diagnose and treat patients. Examples of such increased surveillance activities include those to estimate rates of occurrence and to describe the epidemiology of toxic shock syndrome (22) and hepatitis non-A, non-B (23), to determine the adequacy of treatment of gonorrhea in a community (24), and to monitor the occurrence of Reye's syndrome following public warning to avoid use of salicylates in young febrile children (25). Some surveillance systems are unique, being designed to fit the specific needs of the disease or condition; for example, nationwide surveillance for Guillain-Barre syndrome following the initiation of the National Influenza Immunization Program in October 1976 was accomplished through a network of neurologists (26). Generally, there has been growing interest in surveillance systems for infectious diseases that need not be based (or rely completely) on mandatory reporting by clinicians; many states have developed reporting requirements for laboratories and/or hospitals, especially for those diseases requiring specific laboratory results for confirmation. Others have used provider-based surveillance systems (9,27), periodic reviews of hospital discharge summaries for selected infectious diseases (28), laboratory-based surveillance systems (14,29,30), and other non-provider-based systems (31,32). However, none of these systems have proved completely successful either. Provider networks may provide more detailed information, but the provider's patients may not be representative of the general population. Also, although existing databases such as

computerized hospital discharge summaries are useful to evaluate the National Notifiable Diseases Surveillance System, a lack of timeliness often precludes the computerized hospital database from being the primary source of such data. In addition, there remain diseases (eg, Lyme disease) for which there is no sensitive and specific laboratory test and that, although serious, may be treated on an outpatient basis and thus could not be identified by many of these alternate data sets. The tools for surveillance are improving. Computer-based telecommunication has improved the efficiency of disease reporting, and databases may be better managed and analyzed. The National Electronic Telecommunications System for Surveillance, formerly the Epidemiologic Surveillance Project, is a computer-based telecommunications system initiated in 1984 for reporting disease surveillance data to the CDC (33). All states now use this system for the weekly reporting of cases of 44 of the 49 nationally notifiable diseases. The computerized system allows more case detail and analytic capability than previously, when only summary reports were available by telephone; disease distribution can be mapped by county, onset dates of disease can be examined more precisely, and comparative information on the distribution of age, race, and sex is available. There is also an increasing sophistication of statistical methods for evaluating surveillance data (eg, to estimate completeness of reporting) and for analysis (eg, to detect spatial and temporal trends) (34). The usefulness of surveillance data and the programs to which the data are applied vary with the disease, but generally such

data are used to monitor short- and long-term trends, to alert health professionals to important changes in trends, and to estimate the magnitude of morbidity and mortality. Surveillance facilitates epidemiologic and laboratory research, both by providing cases for more detailed investigation or a case-control study and by directing which research avenues are most important. More specifically, all individuals reported with selected diseases (eg, tuberculosis, syphilis) are routinely followed up by health departments either directly or through their physician or other health care provider to ensure initiation of appropriate therapy for the individual. Health departments also provide diagnostic tests and prophylactic therapy, as needed, for contacts of persons with infectious conditions such as hepatitis and tuberculosis. Counseling and partner notification activities may be provided to persons such as those infected with human immunodeficiency virus. Reports of unusual clusters of disease are often followed by an epidemic investigation to identify and remove any common-source exposure or to reduce other associated risks of transmission. For example, of 307 domestic epidemic assistance requests received by the CDC in fiscal years 1985 through 1988, a total of 134 (44%) were for problems related to specific diseases reportable in the requesting jurisdictions (CDC, unpublished data, 1989); this does not take into account the majority of epidemics that are handled at a state or county level. Surveillance data also provide the basis for determining public health priorities and for planning and implementing prevention and control programs. Policymakers use these data to determine

overall priorities for resources for public health programs, and, in certain instances, these data may be the basis for geographic distribution of funds for treatment (eg, federal reimbursement to states for zidovidine (azidothymidine, or AZT) therapy in individuals with severe human immunodeficiency virus disease). In addition to directing resources, these data are the basis for evaluating the success or failure of prevention and control programs (eg, initiatives to reduce the incidence of vaccine-preventable diseases). The CDC also provides surveillance data to the World Health Organization in accordance with international reporting standards designed to limit the spread of quarantinable and vaccine-preventable diseases (35). Thus, through participation in disease-reporting systems, physicians and other health care providers are integral to ensuring that public health resources are used most effectively. However, during training of clinicians, little attention has been given to the legal requirements or the importance of reporting. A study of New York City physicians demonstrated that many do not know the requirements or methods for reporting in their state; reasons given by physicians for nonreporting included not knowing which diseases are required to be reported, not knowing how a disease should be reported, concerns regarding confidentiality, and perceptions that the list of reportable diseases is too extensive (36). A more recent study in Vermont concluded that physicians often failed to report because they assumed that the laboratory would have reported the case (37). Certainly, for many diseases, the laboratory is a vital component, but the physician

and other primary health care providers are still integral to disease-reporting systems. Although surveillance systems do not need complete reporting to be useful, underreporting may adversely affect public health efforts by distorting trends observed in the incidence of disease (38,39), distorting attributable risk estimates for disease acquisitions (22,38), preventing accurate assessment of potential benefits or impact of control programs (40), preventing timely identification of disease outbreaks (39,41), distorting observed periods at risk and geographic distribution of cases (39), and undermining the success of prevention and control programs for tuberculosis, sexually transmitted diseases, and other communicable diseases, such as immunization programs (10,24,42). The participation of the clinician is critical in determining the value of a reporting system as a basis for directing prevention and control activities and as an indicator of their success or failure. Thus, the role of the physicians and others providing health care has changed little since it was underscored in a US Public Health Service document 74 years ago:

> Unfortunately many participating physicians have little knowledge of the methods of health administration and . . . frequently expect the health department in some mysterious manner to control disease without placing upon them (the physicians) the burden and privilege of cooperating by the notification of the occurrence of cases. The practicing physician...is essentially an adjunct of the health department, for unless he performs his part the health department is in large measure helpless (1).

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