Epidemiology of Lyme disease

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DENNIS J WHITE. Epidemiology of Lyme disease. Can J Infect Dis 1991;2(2):58-60. Investigation of the epidemiology of Lyme disease depends upon information generated from several sources. Human disease surveillance can be conducted by both passive and active means involving physicians, public health agencies and laboratories. Passive and active tick surveillance programs can document the extent of tick-borne activity, identify the geographic range of potential vector species, and determine the relative risk of exposure to Lyme disease in specific areas. Standardized laboratory services can play an important role in providing data. Epidemiologists can gain a better understanding of Lyme disease through the collection of data from such programs. The interpretation of data and provision of information to the medical and general communities are important functions of public health agencies.

Key Words: Data, Epidemiology, Information, Lyme disease, Surveillance

Épidémiologie de la maladie de Lyme

RESUME: L'étude épidémiologique de la maladie de Lyme dépend des données obtenues de plusieurs sources. La surveillance de la maladie humaine peut s'effectuer à la fois par des moyens passifs et actifs auxquels participent médecins, agences de santé publique et laboratoires. Les programmes de surveillance passive et active des tiques peuvent renseigner sur l'activité des tiques, identifier la région géographique des espèces susceptibles de transmettre la maladie, et déterminer le risque relatif d'exposition dans des zones précises. Les services de laboratoire standardisés peuvent jouer un rôle important dans la dissémination des données. Les épidémiologistes peuvent acquérir une meilleure compréhension de la maladie de Lyme en recueillant des données auprès de programmes de ce type. L'interprétation des données et l'information fournie aux communautés médicales et au grand public sont des fonctions importantes des agences de santé publique.
INVESTIGATION OF THE EPIDEMIOLOGY OF LYME DISEASE depends upon information generated from several sources. The medical community must provide public health agencies with clinical summaries of individual patients that must subsequently be reviewed for prevalence or distribution trends in the community. Laboratory investigators must provide qualitative and quantitative interpretations of data generated by a multitude of laboratory tests on samples provided by physicians and other members of the medical community. Ecologists need to provide data attesting to tick infestation and infection rates, as well as determinations of relative risks of exposure to Lyme disease in areas under specific investigation. Only by bringing together all of this and other important information can epidemiologists begin to understand the complexities of Lyme disease in areas within their jurisdiction.

A review of these types of data from a variety of sources in New York State indicates that Lyme disease is continuing to spread into previously unaffected areas, and that the incidence has increased within endemic areas. Human disease surveillance can be conducted by both passive and active means to verify whether similar phenomena are occurring in Canada.

REVIEW OF RESOURCES

Medical community and laboratory investigators: Passive surveillance can include physician reporting in response to voluntary or legally required communicable disease reporting mechanisms. Ideally, such physician reporting will include completion of sufficiently comprehensive surveillance forms to allow epidemiologists to review reported cases and to detect clinical, temporal or geographic trends otherwise inapparent to individual physicians.

In addition to physician reporting of Lyme disease cases, public health agencies may have access to computerized hospital discharge reports using specific ICD-9 disease codes (1). Reports that include these ICD-9 codes are inherently valuable surveillance tools that also serve public health agencies as mechanisms for validating physician-derived case registries.

A third passive reporting mechanism is direct laboratory notification of public health agencies of Lyme disease seropositive and/or culture positive blood or tissue data. Individual patient data from laboratories can be used to supplement information from other disease reporting resources. Centralized laboratory facilities can also fulfill an important role by offering standardized testing procedures, or alternatively, a proficiency testing component to ensure that physicians are able to interpret laboratory data uniformly and consistently, independent of the laboratory facility or test selected.

Active human disease surveillance can be initiated by public health agencies as information from passive disease reporting resources justifies active follow-up of positive laboratory or hospital discharge reports. Special studies, such as serosurveys or the tracking of home intravenous therapy agencies, can help public health agencies to identify the extent of Lyme disease activity in selected communities where other information may support and justify such efforts.

Ecologists: The entomologically or ecologically oriented scientific staff of government agencies or academic institutions can often provide public health agencies with extremely valuable support. Active and passive tick surveillance programs can be developed to document the extent of tick-borne disease activity in several locations, and to identify the geographic range of potential vector species.

Active tick surveillance tools, such as vegetation sampling and ectoparasite surveys of mammalian or avian hosts, can help to identify areas at risk based on tick infestation rates. Furthermore, if laboratories associated with these resources can identify tick-borne pathogens from vectors or hosts, infection rates associated with populations of potential vectors become much more valuable to the overall surveillance effort. The identification of *Borrelia burgdorferi* in populations of specific ticks that are important parasites of humans renders an area of immediate risk for human infection.

In addition to the information gained from active tick surveillance and laboratory documentation of *B burgdorferi* infection, public health agencies can solicit tick specimens from hospitals, interested individuals from the medical community (including physicians or veterinarians), or several groups or associations in the general public. If appropriate information is provided to these general and medical communities, along with pertinent requests for data, including host and location of tick acquisition, they can serve as extremely valuable (and inexpensive) resources to assist in the documentation of the geographic distribution of Lyme disease vectors.

CONCLUSIONS

To document both human infection and geographic areas of risk for human disease exposure, public health agencies must depend heavily upon the services provided by highly qualified and responsive laboratories. Until standardized testing reagents and protocols can be offered to all laboratories, it may be important to use a centralized
laboratory facility for testing. This laboratory must be able to document human exposure to *B burgdorferi* through specific and sensitive serological procedures, and must be capable of culturing or isolating the spirochete. If centralization is logistically difficult, selected facilities must provide laboratory proficiency test services in order to certify any other laboratory offering Lyme disease testing. It is only through the availability of such standardization that the medical community will be able to interpret individual patient and community disease trend data.

To pursue the epidemiology of Lyme disease, public health agencies must combine the information gained from each of the above-mentioned resources. Interpretation of the data and subsequent reporting of the information back to the medical and general communities are of paramount importance to the public health agency fulfilling its role. Until procedures proven safe and efficacious are developed to control the tick vector or to prevent the development of human Lyme disease through the potential use of a vaccine, public health agencies must support preventive health educational campaigns. These educational efforts are immediately justifiable in areas identified as supporting populations of infected ticks or in which definite human infection has occurred in the absence of significant travel histories.

Dissemination of timely and accurate information to the health care community and general public on how to avoid and recognize Lyme disease, may be the most important early and continuous function of concerned public health agencies. Several formats for information exchange exist. Printed media include brochures, posters, diagnostic wall charts and news releases, as well as scientific and/or medical publications. Direct mailing can be used to reach physicians, veterinarians or specific components of the medical or general communities. If sufficient staff can be assigned to the task, speaking engagements to professional or trade associations, local school parent-teacher-student organizations and hospital grand rounds, can be very productive and valuable.

As individual agencies begin to consider Lyme disease educational messages, it is extremely important to ensure that the information provided is as timely and accurate as possible. Agencies must establish their authority early and maintain visibility by providing frequent and varied messages related to both behavioral precautions to enhance disease avoidance and recent scientific knowledge to maintain a flow of current and accurate information to chosen audiences.

REFERENCES
