FACTORS LEADING TO PROLONGED CAPTURE TIMES FOR BRUCELLOSIS CASE REPORTS LOS ANGELES COUNTY, 2001–2005

BACKGROUND

Brucellosis is a zoonotic bacterial disease found world wide in several animal hosts, occasionally infecting humans. Across the globe there are an estimated 500,000 human infections per year with most reported cases occurring in Syria, followed by Mongolia, Kyrgyzstan, and Iraq [1]. *Brucella* species that are pathogenic for humans are found in cattle (*B. abortus*), goats and sheep (*B. meletensis),* pigs (*B. suis*), and dogs (*B. canis*), with *B. melitensis* and *B. suis* being the more virulent to humans [2]. Routes of infection include inoculation through cuts, ingestion of contaminated food or drink, and inhalation of infectious aerosols. The incubation period can range from 5 to 60 days [3].

B. suis was first weaponized by the American military in 1954 [4]. Accordingly, *Brucella* is currently classified as a category B bioterrorism agent and the timely detection of cases is critical for effective surveillance of this disease. In California, a human case of brucellosis is a reportable disease for both laboratories and health care practitioners. Suspect cases are passively reported to the Los Angeles County Department of Health Services (LACDHS), interviewed with a standardized epidemiological case form, and entered into a database. Only cases with laboratory confirmation are reported to the state. Animal cases of brucellosis are reportable to LACDHS's Veterinary Department. Brucellosis in livestock in Los Angeles County is seldom seen today, but an increasing number of cases in dogs (*B. canis*) are now being reported. The first human case of *B. canis* was reported to the LACDHS in 2005.

The objective of this study was to assess average case "capture times" (defined as the time from symptom onset to report of case to health department case database) and the impact of demographics, symptoms, or risk factors. Reporting practices of clinicians, hospitals and labs for brucellosis were also examined by reviewing the state's hospital discharge database, mortality records, and the LACDHS database.

METHODS

Epidemiological case history forms for brucellosis cases from January 1, 2001 to December 31, 2005 were reviewed. Demographics, risk factors, and symptoms were evaluated for their effect on "capture times." Risk factors for brucellosis that were elicited frequently enough for analysis included consumption of unpasteurized dairy products, occupational exposure to an infected animal, and foreign travel. The LACDHS case database was reviewed to determine reporting sources for brucellosis cases. The California Office of Statewide Health Planning and Development (OSHPD) hospital discharge dataset was reviewed and matched to LACDHS cases in 2003 to determine completeness of hospital reporting.

RESULTS

LACDHS confirmed a total of 41 brucellosis case reports during 2001–2005; 39 case reports containing information on risk factor and symptoms. This represents an average of 8 cases per year (range: 5 to 11) and 7% of cases reported nationally. Brucellosis cases were predominately Latino and evenly divided by gender (Table 1). Overall, the most common risk factors for infection were consumption of unpasteurized dairy products and foreign travel (Table 2); however, most of the risk factors for exposure were either associated with Mexico (i.e., unpasteurized dairy products may have originated in Mexico) or occurred while in Mexico. A few cases (n=5, 18%) did not report a known risk factor for the disease.

Table 1. Characteristics of Brucellosis Cases

Characteristic	%	n
Race:		
Latino	88%	36
White	12%	5
Gender:		
Male	56%	23
Female	43%	18

Symptoms reported by cases were categorized into groups, with flu-like symptoms being the most commonly reported (Table 3), some cases (n=9, 23%) reported solely flu-like symptoms.

Table 2. Risk Factors for Brucellosis Exposure

		Overall		Mexico*	
Risk Factor	**N**	**%**	**n**	**%**	**n**
Unpasteurized Dairy	37	62%	23	91%	21
Foreign Travel	34	80%	25	80%	20
Cattle/ Occupational	36	19%	7	100%	7
At Least 1 Risk Factor	37	82%	32	84%	27
Multiple Risk Factors	37	49%	19	89%	17

* Exposure either associated with or occurred while in Mexico.

Of the case reports (64%, 25 of 39) that included the infecting *Brucella* species, *B. melentensis* was the most common (60%), followed by *B. abortus* (36%) and *B. canis* (4%).

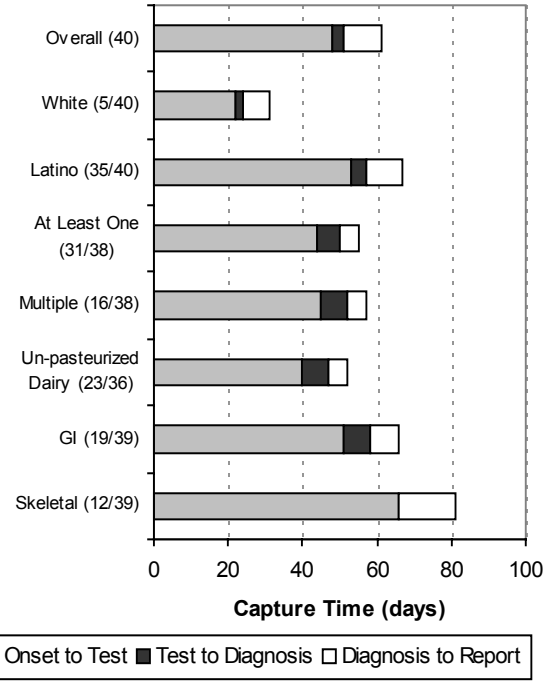
The average "capture time" (time from onset of symptoms to reporting to LACDHS) was 62 days (range: 0 to 264 days, median 44 days, Figure 2). One in-utero case was dropped from the capture time analysis since this case was not symptomatic and "capture time" was included through the mother. Much of the delay was due to the time required to be seen by a physician and have the proper test performed after symptoms onset (average 48 days). Non-Latinos had significantly shorter capture times (average 31 days, p=0.05, Satterwaite t-test). Having a risk factor associated with brucellosis did little to reduce the capture times.

Table 3. Symptoms of Brucellosis Cases (N=39)

Symptoms[a]	**%**	**n**
Flu-Like[b]	87%	34
Gastrointestinal[c]	49%	19
Skeletal[d]	31%	12
Respiratory	8%	3
Rash	3%	1

a. Categories are not mutually exclusive.
b. Fever, chills, sweats, headache, fatigue, body ache, myalgia, cough, malaise.
c. Diarrhea, vomiting, nausea, GI pain, weight loss, decreased appetite.
d. Joint pain, back pain.

Figure 2. Capture Times and Components by Race, Risk Factors, and Symptoms



The sources for brucellosis case reporting included: both physician *and* laboratory (40%), physician only (35%), and laboratory only (25%). Hospital discharge data revealed 13 suspect cases of brucellosis for 2003, compared to N cases reported. Only 6 of these cases (45%) could be matched to reported cases in the LACDHS database. Mortality records revealed one death (2002) with brucellosis listed as a contributing factor. This case was not reported to the health department.

DISCUSSION

Prolonged capture times for brucellosis cases in Los Angeles County may be due to the challenge of diagnosing this rare disease, compounded by the health care access limitations experienced by the Latino population [5]. Having a risk factor associated with brucellosis had little impact on reducing capture times, perhaps because they are very non-specific.

Improving brucellosis capture times involves increasing access to health care, enhancing disease knowledge and recognition by physicians, and timely disease reporting. A clinician's attention to risk factors may lead to an earlier clinical diagnosis of brucellosis cases, and in turn improve capture times. The sooner a disease exposure can be identified (i.e., contaminated food product or intention attack) the quicker an intervention can be set in place to prevent additional cases from occurring.

This study is limited by the small sample size, the use of retrospective data, and incompleteness of case reporting forms.

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