Utility of ICD-9-CM Diagnosis Codes for Public Health Surveillance

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OBJECTIVE

To quantify the positive predictive values of ICD-9 CM diagnosis codes for public health surveillance of communicable diseases.

BACKGROUND

ICD-9-CM codes have been proposed to be used as adjuncts to existing public health reporting systems[1] and are commonly used for public health surveillance and research purposes[2]. However these codes have been found to have variable accuracy for both healthcare billing[3] as well as for disease classification[4] due to both coding and physician errors, and these codes have never been comprehensively validated for their use for surveillance. Quantification of the positive predictive value for ICD-9 CM diagnosis codes is crucial for assessing their utility for public health disease surveillance and research.

METHODS

Patients at two large academic medical centers were selected who had an ICD-9 CM code for a reportable communicable disease (N=71 total disease groups under study) in the year 2003. Cases were stratified by disease group and the greater quantity of 5 charts or 20% of all records were selected for each stratum for chart review. Patient medical records identified with a discharge diagnostic code for a reportable communicable disease were assessed for their concordance to the gold standard criteria of CDC communicable disease case definitions[5] by a review of laboratory records and clinical data in each patient's chart by the Public Health Epidemiologist at each healthcare system. Positive predictive value (PPV) proportions were calculated as the number of patients who were assigned a diagnostic code for a reportable communicable disease and who met the CDC communicable disease case definition criteria divided by the total number of patients who were assigned a diagnostic code for a reportable communicable disease and whose chart was reviewed.

RESULTS

The disease-specific PPV proportions ranged from 0-100% and the overall proportion was 36.7% (65/177). 17 of the 37 disease groups identified with ICD9 codes for a communicable disease had PPVs of 0%; these diseases included rare disease such as paralytic polio and Creutzfeldt-Jakob Disease, but also some common diseases that have complex surveillance case definitions (e.g., Lyme disease, ehrlichiosis). Seven of the 37 disease groups had PPVs equal to or less than 50%, and 13 of the 37 had PPVs greater than 50% including some of the more common and well known communicable diseases such as salmonellosis, pertussis and shigellosis. Reasons for diagnostic codes not being consistent with the CDC case definitions included: (1) patient had a history of disease, but not an acute infection, (2) no data in medical record to support diagnostic code, (3) code was mistakenly assigned for a similar disease, and (4) patient may have had disease but not consistent with specific criteria in CDC case definition.

CONCLUSIONS

Caution should be applied when utilizing ICD-9-CM codes with low PPVs for surveillance of communicable diseases. Quantification of disease specific PPVs may aid in the interpretation of public health surveillance data and design of research studies conducted using diagnostic codes.

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