Invited Commentary: Asthma Surveillance in US Children

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Abbreviations: NHANES, National Health and Nutrition Examination Survey; NHIS, National Health Interview Survey.

Asthma is a highly prevalent and disabling disease of childhood. Data from national surveys indicate that 5–11 percent of children and adolescents in the United States—totaling over 4 million persons—have physician-diagnosed asthma (1–4). It is the most prevalent cause of childhood disability, with 1.4 percent of US children having disabling asthma (5). These data leave little room to doubt that asthma is one of the leading public health problems in the United States. Much of our knowledge about the burden of asthma in the US population comes from the data systems of the National Center for Health Statistics.

The National Health Interview Survey (NHIS) has been used to track diagnosed asthma for over 30 years. Prior to 1997, the emphasis of the NHIS was to report the diagnosis of asthma. In 1997, the National Center for Health Statistics redesigns the NHIS. In this issue of the Journal, Akinbami et al. (6) try to make sense of the decline in the prevalence of asthma introduced by this redesign. The authors’ analyses are a credible attempt to correct the artifactual decrease in asthma prevalence due to the NHIS redesign. Still, one cannot help but question why the NHIS—a survey that is so central to our understanding of asthma trends and the allocation of resources to control asthma—was altered in the midst of what appears to be an epidemic.

Updating the structure of surveys is important. Otherwise, our monitoring systems would quickly become obsolete. The redesign of the NHIS appears to be intended to measure asthma control rather than prevalence, as indicated by the change to a question about asthma “attacks” (6). However, without additional information about medication use, data on asthma control can be very misleading (7). For example, an asthmatic person who has not suffered from a recent attack because he or she uses inhaled steroids may not be counted in a survey that focuses on recent wheezing episodes or “attacks.” Thus, any observed decline may largely be a result of redefining asthma prevalence as the prevalence of uncontrolled asthma.

Altering the design of the NHIS uncovered a largely unrecognized problem with our asthma surveillance system: It is a fragmented collection of data sets with no clearly stated roles and little coordination. Data collected in the various surveys conducted by the National Center for Health Statistics form the backbone of our asthma surveillance system. The National Death Index is used to measure rates and trends in asthma deaths (1, 4). The National Hospital Discharge Summary is used to monitor hospitalizations (1, 4, 8–10). The National Hospital and Ambulatory Medical Care Survey is used to monitor emergency room visits and ambulatory care (8, 9). The NHIS and the National Health and Nutrition Examination Survey (NHANES) are used to measure disease prevalence and disability (1–5, 11). These national surveys were not specifically designed for asthma, and they do not collect all the information we need to track asthma.

CHALLENGES TO ASTHMA SURVEILLANCE

There are a number of impediments to conducting asthma surveillance. The lack of a “gold standard” for asthma makes it difficult to measure asthma trends (12). Increasing rates of asthma prevalence have been reported worldwide over the past three decades, particularly for younger children (1, 2, 4, 13). Still, because of the limitations of existing surveys, some scientists doubt whether the reported increase in asthma prevalence represents a “true” increase in disease (14).

The reported prevalence of asthma is subject to influences that are unrelated to the true level of disease (14). Undiagnosed asthma is common at all ages; thus, the well-reported increase could simply reflect previously undiagnosed asthma.

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that now receives a diagnosis (15, 16). Diagnostic shift—the
shift of diagnostic labels over time—may also contribute to
the rise in asthma prevalence. In the past, a child with
“wheezing attacks” who was labeled by a physician as
having bronchitis may now be labeled as having asthma.
Finally, as awareness of asthma increases with expanded
media coverage, parents may be more likely to report a
previously forgotten diagnosis.

Surveys often lack objective measures of asthma that are
critical to understand asthma burden and trends. In the past,
the NHANES examined objective measures that were either
correlated with asthma or measured asthma severity,
including skin test sensitization and pulmonary function
tests. Unfortunately, information on these measures is not
currently being collected in the ongoing NHANES.

Although there were probably reasons for this omission
(such as limited funds), it is still difficult to understand why
information on these biologic measures was not collected
for what is arguably the leading chronic and disabling disease of
childhood.

IMPROVEMENT OF ASTHMA SURVEILLANCE

Surveillance for asthma can and must be improved. To
understand changes in the prevalence of asthma, additional
but easily collected data are necessary. Data on wheeze,
the chief symptom of asthma, should be collected in addition to
physician-diagnosed asthma, so that the ratio of diagnosed to
undiagnosed asthma can be monitored. The NHANES collects
this type of data, but the periodic nature of the survey (before
1999 when NHANES became continuous) and the lack of
compatibility of the asthma data collected in the NHIS and in
the NHANES limit the usefulness of the data. The prevalence
diseases or conditions that mimic asthma should be
collected to measure diagnostic shift. When the NHIS reports
on asthma trends, the trends in other diseases that contribute to
diagnostic shift, such as bronchitis, should be reported (13).

Medication use must be collected so that the level of asthma
control can be understood.

An asthma surveillance system must be designed with
specified goals. The role of each part of a surveillance system
should be clearly defined, and ancillary data should be
collected to maximize the value and interpretation of the data
collected. Ongoing efforts to identify and counter any threats
to these goals should be instituted. Questions should be
included in the NHIS to better ascertain the contribution of
diagnostic shift to trends in asthma prevalence. Moreover, as
new risk factors emerge, surveys and surveillance should be
updated. We could, for example, augment the NHANES by
collecting environmental measures of settled allergens or hair
cotinine to improve our understanding of asthma epidemi-
ology. Unnecessary redundancies between the surveys should
be eliminated but without losing comparability. Data across
surveys, such as the NHIS and the NHANES, should be
compatible, so that the self-reported data in the NHIS can be
augmented by objective data collected in the NHANES. Not
all data relevant to asthma, such as allergen skin testing and
pulmonary function tests, need to be collected every year, but
we must periodically monitor these and other objective
measures of asthma with a predetermined periodicity.

National surveys will always be an essential component of
public health surveillance, but we should also use emerging
information technology to expand and enhance our asthma
surveillance system. An electronic medical record is no
longer a distant goal. Advances in technology allow for
instantaneous availability of data on health-care encounters,
such as hospitalizations, emergency room visits, and drug
purchases. In the near future, individual state-based surveil-
lance systems could form the basis of a national surveillance
system (17).

Surveillance is a fundamental component of the public
health system. Yet, our national surveillance system for
asthma and other chronic diseases inexplicably lags behind
the systems of many other countries. In the absence of a
more comprehensive surveillance system, we have relied
largely on national surveys. Although these surveys have
been and will continue to be essential to our understanding
of chronic disease epidemiology, they can be improved.

Surveys by the National Center for Health Statistics now
routinely monitor numerous diseases, including asthma,
cardiovascular disease, obesity, and diabetes. Increasingly,
data from different national surveys are used to better under-
stand the trends and burden of individual diseases. It is time
for a reassessment of national surveillance for major diseases
and injuries that confront our nation; it is fundamental to
protecting the public’s health.

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