The Occupational Dimension of Lung Cancer Screening

See also Weissman and Howard, p. 1290; Pyenson and Tomicki, p. 1292; Mulshine, p. 1294; and Markowitz et al., p. 1296.

Lung cancer continues to be a significant public health problem in the United States and worldwide. Ever since the increased use of cigarettes decades ago led to an epidemic of this disease, little has been available to alter the abysmal mortality rate, with fewer than one in five individuals surviving five years or more. The study by Markowitz et al. in this issue (p. 1296), which looks at low-dose computerized tomography (CT) screening for lung cancer, highlights this relatively new available technology and gives hope that improved outcomes may result.

DIMENSION OF OCCUPATIONAL EXPOSURE

This carefully done and thoughtfully reported study adds to earlier encouraging results from the expensive but successful National Lung Screening Trial (NLST) and extends the usefulness of this modality.[1] Whereas the NLST considered as a suitable population for testing only those exposed to cigarette smoke with certain criteria, this study, looking at more than 7000 nuclear weapons workers, considers occupational exposures and adds these considerations to the previous unidimensional aspect of smoking. Occupational physicians have known for some time that there are numerous types of exposures beyond cigarette smoking that lead to an excessive risk of lung cancer, ranging from arsenic and asbestos to radiation and silica. This study highlights that adding data on occupational exposure to asbestos and clinical nonmalignant manifestations of such exposure to a cigarette smoking history can be valuable. An added interesting aspect of this study is that it took place in predominantly nonmetropolitan areas where technology, which did not exist locally, was brought to the worker; by contrast, the NLST was almost exclusively done in urban centers. Locale should not be considered a barrier to an increased use of low-dose CT scanning.

The NLST showed that screening based on age and smoking history alone could lower lung cancer mortality by finding lesions at an earlier clinical stage that were much more likely to be cured.[1] In an appropriate set of individuals, some 1% were found to have previously undiagnosed lung cancers, many at stages I or II. This study adds the dimension of occupational exposure using lower smoking levels, but it added the issue of asbestos exposure. The thoughtfulness of the researchers can be found in many ways. All smokers were counseled regarding smoking cessation, something that every physician dealing with a smoking patient should do. Most CT scans were read by the same individual, giving great consistency to the readings. They also considered clinical pulmonary function status, and did not screen individuals whose altered lung function would not allow them to be considered for surgery, even if a lesion was found. On the basis of the NLST study, the US Preventive Services Task Force and insurance companies have recommended testing for appropriate individuals, but to date this testing is based only on cigarette smoking histories.[2]

This study highlights that there is great value in considering occupational exposures as well, and the finding in this study of roughly the same significant percentage of screened individuals with lung cancer, running about 1% of all comers, points to the legitimacy of their approach.

EXPAND THE USE OF LOW-DOSE CT SCANNING?

Given this expanded positive approach to screening for lung cancer and the reduced mortality that it engenders, it might be tempting to greatly expand the use of low-dose CT scanning for almost anyone with a smoking history or occupational exposures to carcinogens. However, this is not something to be recommended; rather, there is a need to determine the optimal point at which testing should be undertaken to maximize the usefulness of testing and the saving of lives. False positives can occur, which might lead some individuals to decide in hindsight that they have undergone significant but unnecessary surgical procedures. There are also the issues of cost, radiation exposure, and anxiety that might be engendered by unclear results. Another issue deserving of further study and refinement is the maximum age for testing. Current guidelines do not call for such testing among those aged 80 years or older, but this study found a significant number of lung cancers in this age group: individuals who still have, actuarially, nine or more years of expected life. Asbestos-related cancers turn up even in nonagenarians.

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NUCLEAR WORKERS

It should also be noted that the funding source for this investigation was relatively nontraditional: the Department of Energy, which has a legal and moral requirement to look after the nuclear workers at many sites around the country. Occupational considerations are grossly underevaluated and underappreciated by the medical community at large. There are some 140 million working Americans, however, and the medical community needs to be better educated about exposures at work and in the environment more generally. Excellent studies such as this one highlight the importance of workplace exposure considerations. AJPH

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The Future of Maternal and Child Health Data in the United States

See also Ghandour, p. 1303; and Shulman et al., p. 1305.

Pregnancy complications and poor birth outcomes are leading causes of morbidity and mortality for mothers and children in the United States. These outcomes account for more than 40% of neonatal deaths[1] and recently have led to significant increases in childhood morbidity.[2]

To ensure the health of mothers, children, and families during and beyond the perinatal period, we must have robust data sources from which we can make inferences to effectively shape policy and promote evidence-based interventions. In this issue of *AJPH*, the article titled "The Pregnancy Risk Assessment Monitoring System (PRAMS): Overview of Design and Methodology," by Shulman et al. (p. 1305), underscores the importance of having public health surveillance systems for monitoring perinatal health outcomes. PRAMS data continue to serve as a critical resource to evaluate public health programs, track trends, and monitor emerging health issues.

Perinatal data sources are commonly limited by incomplete coverage of pregnancies and births, lack information on social determinants, or do not adequately capture critical exposure periods. To propel the field of maternal and child health forward, enhancements are needed in the design, analysis, and applications of perinatal health data sources for research, policy, and practice. Key opportunities for improvement include the application of theory, data linkage, and sound methodological approaches to these data resources (Figure 1).

APPLICATION OF THEORY

Conceptualizing how key determinants accumulate across the life course is necessary to fully operationalize and investigate root causes of perinatal health outcomes. Therefore, the development and enhancement of perinatal data systems should be guided by key theories, including a life course developmental perspective, social-ecological systems theory,[3] the multiple determinants of health perspective, and frameworks of perinatal health.[4]

Notably, PRAMS applies a life course developmental approach to data collection by including questions about the preconception and postpartum periods. However, we must go further upstream; mounting evidence shows that many exposures and experiences that affect birth outcomes occur even earlier in life.[5] For example, researchers may consider how exposures to stressful life events in childhood and young adulthood affect birth outcomes. Similarly, we need to apply a life course approach to understanding child and adolescent health. For instance, to understand the long-term impact of having a low birthweight, we need data sources that follow children beyond the postpartum and early childhood periods.

As informed by social-ecological systems theory and the multiple determinants of health perspective, it is hypothesized that perinatal health outcomes are produced by various determinants, including individual-, family-, and community-level factors. As such, PRAMS and other perinatal data systems should incorporate measures or link to data sets that would allow for examination of multiple domains of determinants (e.g., environmental, psychological, and biological) and time periods in a woman's life (e.g., preconception, including childhood, adolescence, and interconception periods; pregnancy; and postpartum) that are uniquely and cumulatively associated with health outcomes.

These exposures, contexts, and timing all affect women's "health capital" at conception. Health capital is conceptualized as the culmination of biological, psychological, and social experiences, exposures, and resources across the life course and generations. Maternal health capital is viewed as a lens through which exposures contribute to a spectrum of health outcomes, such that women with more positive health capital will be less likely to experience poor obstetric and health outcomes attributable to such exposures.[6]

DATA LINKAGE

Data linkage offers a promising avenue for building the

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