Improving early detection of lung cancer among construction workers

Lung cancer mortality among construction workers: implications for early detection

John M. Dement, Knut Ringen, Stella Hines, Kim Cranford, Patricia Quinn. Occupational and Environmental Medicine, 2020.

Overview

The Building Trades National Medical Screening Program (BTMed), a service delivery program administered by CPWR, provides screenings for construction workers previously employed at U.S. Department of Energy (DOE) nuclear weapons facilities, where they were exposed to hazards such as asbestos, beryllium, radiation, silica, and welding fumes. Previous studies found these workers face elevated mortality from multiple causes, including all cancers, asbestosis, chronic obstructive pulmonary disease, and mesothelioma. Researchers examined the records of 17,069 BTMed participants—including 352 who died from lung cancer—to identify predictors that would better define eligibility for low-dose CT scans which have demonstrated a 20% reduction in lung cancer mortality. The risk factors considered included age, beryllium sensitization, body mass index (BMI), chest X-ray results, cigarette smoking, a family history of cancer, gender, personal history of cancer, race/ethnicity, respiratory symptoms, spirometry results, and years of trade or DOE work.

Key Findings

- The most predictive risk model included age, smoking, chest X-ray changes, abnormal lung function, respiratory symptoms, body mass index, personal history of cancer, and having worked five or more years at a Department of Energy site or in construction.
- Risk-based, low-dose CT (LDCT) eligibility using the study model demonstrated improved sensitivity, specificity and positive predictive value compared with current guidelines from the U.S. Preventive Services Task Force, an independent panel of experts that make evidence-based recommendations intended to help primary care clinicians and patients decide together whether a preventive service is right for a patient's needs.
- The study found that the risk of lung cancer death from five years of work in the construction industry or at a DOE site was comparable with the risk from a personal cancer history, a family history of cancer, or a diagnosis of COPD.
- BTMed LDCT eligibility criteria used for DOE construction workers, which includes factors beyond age and smoking, identified 86% of participants who eventually would die from lung cancer, compared with 51% based on age and smoking alone
- Results support inclusion of risk from occupational exposures and non-malignant respiratory clinical findings in LDCT clinical guidelines.

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Read the article:
https://bit.ly/3aYyJqY

Read more about the health of BTMed participants:
https://bit.ly/3aZVwD1
https://bit.ly/2VhbIOZ

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ORIGINAL RESEARCH

Lung cancer mortality among construction workers: implications for early detection

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ABSTRACT

Objectives This study examined predictors of lung cancer mortality, beyond age and smoking, among construction workers employed at US Department of Energy (DOE) sites to better define eligibility for low-dose CT (LDCT) lung cancer screening.

Methods Predictive models were based on 17 069 workers and 352 lung cancer deaths. Risk factors included age, gender, race/ethnicity, cigarette smoking, years of trade or DOE work, body mass index (BMI), chest X-ray results, spirometry results, respiratory symptoms, beryllium sensitisation and personal history of cancer. Competing risk Cox models were used to obtain HRs and to predict 5-year risks.

Results Factors beyond age and smoking included in the final predictive model were chest X-ray changes, abnormal lung function, chronic obstructive pulmonary disease (COPD), respiratory symptoms, BMI, personal history of cancer and having worked 5 or more years at a DOE site or in construction. Risk-based LDCT eligibility demonstrated improved sensitivity, specificity and positive predictive value compared with current US Preventive Services Task Force guidelines. The risk of lung cancer death from 5 years of work in the construction industry or at a DOE site was comparable with the risk from a personal cancer history, a family history of cancer or a diagnosis of COPD. LDCT eligibility criteria used for DOE construction workers, which includes factors beyond age and smoking, identified 86% of participants who eventually would die from lung cancer compared with 51% based on age and smoking alone.

Conclusions Results support inclusion of risk from occupational exposures and non-malignant respiratory clinical findings in LDCT clinical guidelines.

Key messages

What is already known about this subject?

► The National Lung Screening Trial demonstrated a 20% reduction in mortality attributable to three annual screenings using low-dose CT (LDCT) using eligibly criteria based on age and smoking history.

What are the new findings?

► Lung cancer risk among construction workers can be reasonably predicted based on age and smoking history as well as other risk factors including chest X-rays, spirometry, prior cancer history and duration of construction work.

How might this impact on policy or clinical practice in the foreseeable future?

► Application of additional risk factors beyond age and smoking history including predictive risk models for LDCT eligibility has potential for better targeting of those at high risk, resulting in a higher rate of lung cancer detection at an early stage when treatment is likely to be more effective.

INTRODUCTION

Construction workers are occupationally exposed to a number of respiratory carcinogens including asbestos, silica, beryllium and welding fumes. Prior studies have demonstrated elevated risk of lung cancer among these workers.[1–5]

In 2011, the National Lung Screening Trial (NLST) demonstrated a 20% reduction in mortality attributable to three annual screenings using low-dose CT (LDCT).[6] Subsequently, the US Preventive Services Task Force (USPSTF) of the US Public Health Service recommended lung cancer screening, as have other professional organisations, with some (eg, Lung Cancer Alliance) recommending that screening should only be undertaken as a structured programme in centres with considerable expertise in lung cancer care. The USPSTF currently recommends LDCT for individuals 55–80 years of age with at least 30 pack-years of smoking and, for former smokers, no more than 15 years since quitting.[7]

Determining eligibility for lung cancer screening has evolved. The NLST relied on age and smoking history. The most current clinical guideline by the National Comprehensive Cancer Network (NCCN) includes two risk categories: category 1, which is limited to age (55–77 years) and smoking history (current or former smokers with ≥30 pack-years and if former smoker quit within 15 years), and category 2, which includes age (≥50 years), smoking history (≥20 pack-years) and 'additional risk factors'.[8] Additional risk factors include personal history of cancer or lung disease, family history of cancer, radon exposure and occupational exposure to carcinogens. NCCN guidelines suggest that these additional risk factors may be considered through either fixed eligibility criteria or through use of predictive statistical models.

The Building Trades National Medical Screening Program (BTMed) is an occupational medical screening programme for construction trades workers previously employed in USA nuclear weapons facilities. BTMed participants are at significantly increased risk of lung cancer.[3–5] The