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The World Trade Center Health Program: Cancer screening and cancer care best practices

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Abstract

The events of September 11, 2001 (9/11) exposed nearly a half million persons to many carcinogenic chemicals and dusts, as well as psychological and physical stressors. Subsequent epidemiologic studies of 9/11-exposed persons have suggested elevated risks for some cancers, e.g., prostate cancer, thyroid cancer, and melanoma. To detect cancer at an early stage, the US Preventive Services Task Force recommends screening certain asymptomatic persons for lung, colorectal, cervical and breast cancer, but not for other cancers. High quality cancer diagnosis and treatment guidelines are available from the National Comprehensive Cancer Network and the National Cancer Institute. For enrolled members, the WTC Health Program provides coverage for cancer screening and diagnosis, and covers medically necessary treatment costs for all types of cancer, assuming 9/11-exposure and minimum latency requirements are met, and a Program-affiliated physician attests that 9/11 exposures were substantially likely to have been a significant factor in aggravating, contributing to, or causing the enrolled WTC member's cancer.

Keywords

9/11; breast cancer; cancer; cancer screening; cervical cancer; colorectal cancer; latency; lung cancer; pulmonary nodule; World Trade Center

Background

The events of September 11, 2001, potentially exposed responders (i.e., those involved in the search, rescue, recovery, service restoration and clean-up efforts following the 9/11 attacks

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Disclaimer

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This activity did not involve human subjects and therefore did not require IRB review.

in New York City [NYC], at the Pentagon and in Shanksville, PA), and survivors (i.e., local building occupants, residents, workers, passersby and students attending schools in the New York City disaster area) to many carcinogenic chemicals and dusts, as well as psychological and physical stressors.[1] Epidemiologic studies suggest that these exposures led to increased rates of prostate cancer, thyroid cancer, melanoma, and other cancers in WTC-exposed persons compared to unexposed populations.[2,3] For enrolled members, the WTC Health Program provides coverage for cancer screening and diagnosis, and covers treatment costs for all types of cancer assuming 9/11-exposure and minimum latency requirements are met, and a Program-affiliated physician attests that 9/11 exposures were substantially likely to have been a significant factor in aggravating, contributing to, or causing the enrolled WTC member's cancer (Title 42, Part 88 of the Code of Federal Regulations [42 C.F.R. Part 88.15]).[4] A detailed explanation for why the WTC Health Program provides treatment coverage for all qualifying cancers is beyond the scope of this paper but is available elsewhere.[5–7] The cancer most commonly certified (i.e., approved for payment of medically necessary treatment expenses) among WTC Health Program members is non-melanoma skin cancer.[8]

This is one of a series of papers to promote the practice of high-quality, evidence-based medicine when diagnosing and treating persons with WTC-related conditions (see Calvert et al[9] for more background details, and for information on Program eligibility and enrollment). The focus of this paper is cancer screening, diagnosis, and treatment. It briefly summarizes key cancer screening information extracted from the US Preventive Services Task Force (USPSTF), and for cancer diagnostic and treatment best practices, it cites two high-quality clinical practice guidelines (CPGs). It also briefly discusses the management of incidental pulmonary nodules.

Screening for cancer

The objective of cancer screening is to detect cancers at an early stage in asymptomatic patients in order to reduce morbidity and mortality. Early cancer detection can improve treatment outcomes. USPSTF recommends screening (i.e., assigns an A or B grade[10]) for cancer at four sites. For those four cancer sites, USPSTF determined that there is at least moderate certainty that the net benefit of the screening is moderate to substantial. Note that these USPSTF recommendations apply only to patients who meet certain criteria (e.g., age and smoking) and have no symptoms related to the screen-targeted cancer. Following is information on the four types of cancer for which USPSTF recommends screening, and a summary of their recommendations (Table 1).

Breast cancer screening—USPSTF recommends biennial screening mammography for women aged 50 to 74 years.[11] Mammography is the only breast cancer screening method currently recommended by USPSTF. Using data from 2015, it was estimated that 72% of US women aged 50 to 74 years received a mammogram within the previous two years.[15] As for other breast cancer screening modalities, USPSTF found that the available evidence is insufficient to assess the balance of benefits and harms for digital breast tomosynthesis (DBT) as a primary screening method for breast cancer. In addition, USPSTF determined that the available evidence is similarly insufficient to assess the benefits and harms of

adjunctive screening (i.e., breast ultrasonography, magnetic resonance imaging, DBT, or other methods) in women identified to have dense breasts on an otherwise negative screening mammogram.[11] Details on the USPSTF recommendations for breast cancer screening can be found at this link: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/breast-cancer-screening.

Cervical cancer screening—USPSTF recommends screening for cervical cancer every 3 years with cervical cytology alone in women aged 21 to 65 years.[13] For women aged 30 to 65 years, there are two other USPSTF-recommended alternative strategies for cervical cancer screening, both of which extend the screening interval to 5 years (Table 1). One of these alternative strategies for women aged 30 to 65 years is to screen every 5 years with high-risk human papillomavirus (hrHPV) testing alone. The second alternative strategy for women aged 30 to 65 years is to screen every 5 years with hrHPV testing in combination with cervical cytology (cotesting). As explained earlier, when hrHPV testing is not undertaken, women aged 30 to 65 years can simply be screened every 3 years with cervical cytology alone. USPSTF recommends against screening for cervical cancer in women younger than 21 years, in women older than 65 years who have had adequate prior screening and who are not otherwise at high risk for cervical cancer, and in women who have had a hysterectomy with removal of the cervix and who do not have a history of a high-grade precancerous lesion or cervical cancer. Details on the USPSTF recommendations for cervical cancer screening can be found at this link: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cervical-cancer-screening. Using data from 2015, it was estimated that 63% of US adult women aged 21 to 65 years received a Papanicolaou test (i.e., cervical cytology) within the past three years.[15]

There is convincing evidence that cervical cancer screening can detect high-grade precancerous cervical lesions, and treatment of these precancerous lesions can prevent the majority of cervical cancers, thus reducing the incidence of cervical cancer deaths.[13,16] Consensus guidelines are available for women with prior abnormal cervical cancer screening results. These are provided by the American Society of Colposcopy and Cervical Pathology (ASCCP).[17] In addition, the World Health Organization has published practice guidelines for screening and treatment of cervical precancerous lesions for cervical cancer prevention.[18]

Colorectal cancer screening—The 2021 USPSTF update recommends that individuals at average risk and aged 45–75 years of age be screened for colorectal cancer (persons at average risk are those with no prior diagnosis of colorectal cancer, adenomatous polyps, or inflammatory bowel disease, and no personal diagnosis or family history of known genetic disorders that predispose them to a high lifetime risk of colorectal cancer [such as Lynch syndrome or familial adenomatous polyposis]). There are several recommended screening strategies including colonoscopy, flexible sigmoidoscopy, high-sensitivity guaiac fecal occult blood testing, and fecal immunochemical testing (Table 1).[14] Details can be found at this link: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/colorectal-cancer-screening. Using data from 2015, it was estimated that 63% of US adult

women and 62% of US adult men aged 50 to 75 years were up to date for colorectal cancer screening.[15]

An advantage of screening colonoscopy and flexible sigmoidoscopy over fecal tests is that many lesions can be removed at the time of screening colonoscopy and sigmoidoscopy, which means that screening can be diagnostic, therapeutic, and can prevent colorectal cancer deaths.[19,20] Although screening colonoscopy reduces risk of cancer in both the distal and proximal colon, flexible sigmoidoscopy reduces cancer risk only in the distal colon, likely due to its shorter depth of insertion.[21]

In addition to often being used for colorectal cancer screening, colonoscopy is used to follow-up on abnormalities detected in other types of colorectal cancer screening tests. The US Multi-Society Task Force on Colorectal Cancer issued helpful consensus recommendations on the time interval for the next screening colonoscopy based on findings from a prior colonoscopy.[22] These recommendations can be found at this link: https://www.gastrojournal.org/article/S0016–5085(19)41479–0/fulltext?referrer=https%3A%2F%2Fwww.jwatch.org%2F.

Lung cancer screening—It has been demonstrated that annual screening with low dose computed tomography (LDCT) reduces lung cancer and all-cause mortality among current or former heavy tobacco users.[12] However, this screening is also associated with important potential harms such as false-positive LDCT findings, radiation exposure, overdiagnosis, incidental findings, and complications arising from invasive procedures (e.g., percutaneous needle biopsy, bronchoscopy, thoracic surgical procedures) used to investigate LDCT findings. These invasive procedures are considered riskier compared to the procedures used to follow-up on findings from the screening of other cancers.[23]

The USPSTF recognizes the need to increase lung cancer screening (in the US in 2018, screening rates were ~5%[24]). It recommends that patients be assessed for lung cancer risk based on age and pack-year smoking history.[12] If the patient is aged 50 to 80 years and has a 20 pack-year or more smoking history, and currently smokes or quit within the past 15 years, the patient should be engaged in shared decision-making about lung cancer screening. Screening should be offered to eligible persons who express a preference for it. In addition, evidence-based tobacco cessation treatment is recommended for current smokers. These recommendations can be found at this link: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/lung-cancer-screening.

Lung cancer screening using LDCT is a covered benefit from the Centers for Medicare & Medicaid Services (CMS). (Note that breast, cervical, and colorectal cancer screening are also covered benefits from CMS.) However, CMS stipulates that for the initial LDCT screening, beneficiaries must first undergo a billable counseling visit for shared decision-making using a patient decision aid (PDA).[25] A shared decision-making visit, including the use of one or more PDAs, must include a discussion of the benefits and harms of screening, the need for follow-up diagnostic testing, the potential for over-diagnosis, the false positive rate, and the radiation exposure risks. As for subsequent LDCT lung cancer screenings, shared decision-making visits are optional per CMS.

Shared decision-making recognizes that individuals differ in balancing the importance of gaining benefits versus avoiding harms. A shared decision-making counseling visit is intended to enable the values and preferences of the informed patient to be elicited and systematically incorporated into the decision-making process. This approach adheres to the principle of respect for patient autonomy. The shared decision-making visit can be competently administered by non-physicians such as nurses, psychologists, and social workers.[23]

An example of a PDA is a 5-minute video titled “Lung cancer screening: Is it right for me?”, which was produced by the University of Texas MD Anderson Cancer Center. It is available on YouTube at this link: https://www.youtube.com/watch?v=IczfHH4_Lfg&t=10s. An earlier 9-minute version of this video PDA was assessed in a randomized clinical trial.[26] It found that smokers who received the PDA were better prepared to make a screening decision, reported lower decisional conflict, and had greater knowledge of the harms and benefits of screening compared with smokers who received standard educational materials. Among those who received the PDA, 24% underwent lung cancer screening within 6 months of receiving the PDA.

Early cancer diagnosis after symptomatic presentation

Although screening can detect cancer at an early, presymptomatic stage, which improves the prognosis, USPSTF recommends screening for only four cancers. It is recommended that diagnostic testing be performed as soon as feasible after a positive cancer screening result.[27] For cancers without recommended screening tests, it has been advocated that efforts should be made to diagnose cancer at the earliest possible stage.[28] However, early cancer diagnosis requires patients to seek medical care soon after symptom onset, and that the cancer be diagnosed soon thereafter. Since cancer-related symptoms are generally nonspecific, most patients who present with these symptoms will not have cancer.[29] More research is needed to optimize early cancer detection through rapid diagnostic testing of nonspecific symptoms.

Management of incidental pulmonary nodules detected on CT Images

In a lung cancer screening demonstration project conducted by the Veterans Health Administration in 2015, 60% of those screened for lung cancer were found to have nodules.[30] This suggests that pulmonary nodule detection is not uncommon in lung cancer screening programs. The cause of incidental pulmonary nodules detected on CT images can be benign or malignant. The Fleischner Society provides guidelines on the follow-up and management of these pulmonary nodules.[31] The Fleischner Society incorporates the opinions of a multidisciplinary international group of thoracic radiologists, pulmonologists, surgeons, pathologists, and other specialists. The recommendations do not apply to patients younger than 35 years, immunocompromised patients, or patients with cancer. Also note that the Fleischner Society supports the use of Lung-RADS, developed by the American College of Radiology, when interpreting results from low-dose CT screening for lung cancer (https://www.acr.org/-/media/ACR/Files/RADS/Lung-RADS/LungRADSAssessmentCategoriesv1–1.pdf). Among other things, the Fleischner Society guideline provides suggested time intervals for follow-up chest CT imaging in asymptomatic

adult patients age 35 years or older. The Fleischner Society guidelines are available at this link: https://pubs.rsna.org/doi/pdf/10.1148/radiol.2017161659.

Cancer diagnostic and treatment recommendations

The National Comprehensive Cancer Network (NCCN) provides high-quality care recommendations for the diagnosis and treatment of cancer. Those NCCN recommendations can be found at this link: https://www.nccn.org/guidelines/category_1 (free registration required).

In addition, the National Cancer Institute (NCI) provides FDA-approved information on cancer diagnosis and cancer management by stage at this link: https://www.cancer.gov/publications/pdq/information-summaries/adult-treatment.

These NCCN guidelines and NCI information were referenced because they are consistent with the quality requirements developed for this series of papers on evidence-based diagnosis and treatment.[9]

World Trade Center Health Program coverage

Cancer screening—Information on Program coverage for cancer screening is available at: https://www.cdc.gov/wtc/ppm.html#medical_cancer. WTC Health Program cancer screening benefits align with A and B grade recommendations from USPSTF.

Cancer screening fact sheets—The WTC Health Program website also features fact sheets about the four types of cancer screening currently offered and covered by the Program. Each fact sheet provides details on who is eligible for cancer screening, the screening tests used, and what to do if a screening result is positive or negative. The cancer screening fact sheets are available in English, Spanish, Polish, and Chinese. These fact sheets can be accessed here: http://www.cdc.gov/wtc/cancerfactsheets.html

Cancer diagnostics and treatment—Program coverage for cancer diagnostics and treatment began in 2012. Currently, the WTC Health Program covers the diagnostics for all types of cancer. As for treatment, costs are covered (i.e., no out-of-pocket expenses) for all types of cancer assuming the enrolled member meets exposure and minimum latency requirements, and a Program-affiliated physician attests that 9/11 exposures were substantially likely to have been a significant factor in aggravating, contributing to, or causing the enrolled WTC member's cancer.[4]

Cancer care FAQ's—The WTC Health Program has frequently asked questions (FAQ's) that are posted on the Program website. The FAQ's include additional information about cancer care and coverage, certification, and steps to take if a member is or has been diagnosed with cancer. The FAQs can be accessed here: https://www.cdc.gov/wtc/faq.html under the heading "Cancer in the WTC Health Program."

Minimum latency requirements—The WTC Health Program's policy on minimum cancer latency is available.[32] Briefly, the minimum cancer latency is defined as the minimum time (i.e., latency) that must have elapsed between the date of the individual's

initial 9/11 exposure and the date of the initial diagnosis of the individual's cancer. The minimum cancer latency must be met or exceeded for the cancer to be certified by the WTC Health Program. To establish the minimum latency periods used by the WTC Health Program, NIOSH evaluated available scientific evidence. If multiple and differing estimates of minimum latency were identified, the policy of the Administrator of the WTC Health Program (i.e., "Administrator") was to resolve any uncertainties by selecting the shortest estimated latency period.

The Administrator has selected minimum latencies for the following five types or categories of cancer:

1. Mesothelioma—11 years;
2. All solid cancers (other than mesothelioma, lymphoproliferative, thyroid, and childhood cancers)—4 years;
3. Lymphoproliferative and hematopoietic cancers (including all types of leukemia and lymphoma)—0.4 years (equivalent to 146 days);
4. Thyroid cancer—2.5 years; and
5. Childhood cancers (other than lymphoproliferative and hematopoietic cancers)—1 year.

Several factors that might decrease the latency of cancers were also investigated by NIOSH. These factors included the intensity of exposure, the presence of preexisting medical conditions, and the rarity of the cancer. Based on the best available scientific information, the WTC Health Program determined that the selected latencies are sufficiently member-favorable to account for any potential reductions in latency associated with these three factors. Therefore, the selected latency periods are not adjusted for these factors when determining whether an individual's cancer is eligible for Program coverage.

Conclusion

The purpose of this paper is to promote the practice of high-quality, evidence-based medical care when screening, diagnosing, and treating persons enrolled in the WTC Health Program. Epidemiologic studies of 9/11-exposed persons have found elevated risks for some cancers. To detect cancer at an early stage, the USPSTF recommends screening for lung, colorectal, cervical and breast cancer. Nonpareil cancer diagnosis and treatment guidelines are available from the National Comprehensive Cancer Network and the National Cancer Institute. For enrolled members, the WTC Health Program covers USPSTF-recommended cancer screening, and cancer diagnostic costs. As for treatment, costs are covered for all types of cancer when 9/11-exposure and latency requirements are met, and a Program-affiliated physician attests that 9/11 exposures were substantially likely to have been a significant factor in aggravating, contributing to, or causing the enrolled WTC member's cancer.

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Table 1.

Cancer screening tests recommended for asymptomatic persons by USPSTF (i.e., tests assigned an “A” or “B” grade recommendation).

Cancer Screening Test	Screening Eligibility Criteria	Frequency of screening
Breast Cancer		
Mammography	Women aged 50 to 74 years	Every 2 years
Cervical Cancer		
Cervical cytology	Women aged 21 to 65 years	Every 3 years
High-risk human papillomavirus (hrHPV) testing alone	Women aged 30 to 65 years	Every 5 years
hrHPV and Cervical cytology	Women aged 30 to 65 years	Every 5 years
Colorectal Cancer		
High-sensitivity guaiac fecal occult blood test	Adults aged 45 to 75 years	Annually
Fecal immunochemical test	Adults aged 45 to 75 years	Annually
Stool DNA test with fecal immunochemical test	Adults aged 45 to 75 years	Every 1 to 3 years *
Colonoscopy	Adults aged 45 to 75 years	Every 10 years
CT colonography	Adults aged 45 to 75 years	Every 5 years
Flexible sigmoidoscopy	Adults aged 45 to 75 years	Every 5 years
Flexible sigmoidoscopy with FIT	Adults aged 45 to 75 years	Flexible sigmoidoscopy every 10 y plus FIT every year
Lung Cancer		
Low dose Chest CT	Adults aged 50 to 80 years who have a ≥ 20 pack-year smoking history and currently smoke or have quit smoking within the past 15 years	Annually

Sources: Siu et al[11]; USPSTF et al[12]; USPSTF et al[13]; USPSTF et al.[14] USPSTF US Preventive Services Task Force.

*As stated by the manufacturer.