Cancer Screening

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Objectives

- Identify common cancers in primary care.
- Describe screening measures for common cancers in primary care.
- Propose health promoting and disease preventing strategies to reduce the incidence of cancer.
- Describe cancers which are genetically linked.
- Explore shared clinical decision-making for cancer screening choices.

Morbidity and Mortality Rates

<table>
<thead>
<tr>
<th>Estimated New Cases</th>
<th>Estimated Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td><strong>Female</strong></td>
</tr>
<tr>
<td>Brain</td>
<td>26,520.0 (2.6%)</td>
</tr>
<tr>
<td>Lung</td>
<td>12,720.0 (1.3%)</td>
</tr>
<tr>
<td>Kidney &amp; ureter</td>
<td>8,500.0 (0.9%)</td>
</tr>
<tr>
<td>Other NOS, without site stated</td>
<td>4,250.0 (0.5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>62,940.0</td>
<td>11,340.0</td>
</tr>
</tbody>
</table>

| **Male**            | **Female**       |
| Liver & biliary     | 4,760.0 (0.5%)   | Liver & biliary | 4,740.0 (0.5%)  |
| Skin               | 3,800.0 (0.4%)   | Skin            | 3,760.0 (0.4%)  |
| Other NOS, without site stated | 2,350.0 (0.3%) | Other NOS, without site stated | 2,350.0 (0.3%) |
| **Total**           | **Total**        |
| 14,970.0           | 9,350.0          |
ACS Guidelines: Process of Screening & Rationale

- Disease burden
- Benefits of screening
- Harms associated with screening
- Screening Interval

Mortality by Gender

**Men**
- Lung & bronchus
- Prostate
- Colon/Rectum
- Pancreas

**Women**
- Lung & bronchus
- Breast
- Colon/Rectum
- Pancreas

Common Cancers Screened

- Breast
- Colon
- Lung
- Prostate
- **Gyn:**
  - Endometrial
  - Cervical
  - Ovarian
- Skin
- Testicular
2016 Cancer Statistics

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Incidence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>224,390</td>
<td>158,080</td>
</tr>
<tr>
<td>Prostate</td>
<td>180,890</td>
<td>26,120</td>
</tr>
<tr>
<td>Breast</td>
<td>246,660</td>
<td>40,450</td>
</tr>
<tr>
<td>Colon</td>
<td>134,390</td>
<td>49,190</td>
</tr>
<tr>
<td>Ovarian</td>
<td>22,280</td>
<td>14,240</td>
</tr>
<tr>
<td>Cervical</td>
<td>12,990</td>
<td>4,120</td>
</tr>
</tbody>
</table>

Recent Trends in Screening

- Breast Cancer - increased
- Colorectal (CRC) - increased
- Prostate - decreased
- Cervical - decreased

Genetically Linked cancers

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Genes Involved</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast cancer</td>
<td>BRCA1 on chromosome 17; BRCA2 on chromosome 13</td>
<td>Gene mutation interferes with cell's ability to repair radiation-caused damage in double-strand DNA</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>MSH2 and MSH6 on chromosome 2, MLH1 on chromosome 3</td>
<td>Gene mutation interferes with cell's ability to repair DNA damaged in replication</td>
</tr>
<tr>
<td>Malignant melanoma</td>
<td>CDKN2 on chromosome 9</td>
<td>CDKN2 codes the protein that regulates cell division; mutation results in cell proliferation that result in changes in skin growths</td>
</tr>
<tr>
<td>Pancreatic cancer</td>
<td>DPC4, a tumor-suppression gene on chromosome 18</td>
<td>An estimated 90% of patients are missing the part of chromosome 18 where DPC4 is located</td>
</tr>
<tr>
<td>Chronic Myeloid leukemia</td>
<td>Philadelphia (Ph) chromosome produced from translocation of genetic materials from chromosomes 9 &amp; 22</td>
<td>The resulting 'hybrid' genetic material (BCR/ABL) triggers a series of events that result in uncontrolled cell growth</td>
</tr>
</tbody>
</table>
New Technologies

- Breast
- Colon
- Lung cancer
- Prostate

Screening Common Cancers in Primary Care

- Lung
- Prostate
- Breast
- GI: colon cancer
- GYN cancers: endometrial, cervical
- Skin cancers: SCC, BCC, melanoma

Cancer Risk Factors

- F.H.
- Obesity
- Smoking
- Sun Exposure (> in fair skinned individuals)
- Hormones
- Hyper-coagulable state
Lung Cancer

#1 Cancer of both sexes

Most common in smokers

Lung Cancer: Risk Factors

- Smoking
- Exposure to secondhand smoke
- Exposure to radon gas
- Exposure to asbestos and other chemicals
- Family history of lung cancer
- Excessive alcohol use
- Certain smoking-related lung diseases

OK...so maybe it's more than just a "bad habit!"
Lung Cancer: Dx

- Following incidental CXR & Chest CT
- Dx via needle bx/bronchoscopy

Lung Cancer: Signs & Symptoms

- Usually detected by incidental CXR
- A new cough that doesn't go away
- Changes in a chronic cough or "smoker's cough"
- Hemoptysis
- Shortness of breath
- Chest pain
- Wheezing
- Hoarseness
- Unexplained weight loss
- Bone pain
- Headache

Lung Cancer

Case study:
- JT, 66 y/o male, former smoker, lives in an apt with mold on walls.
  - Presents w/sx of sinusitis, yellow-green mucous production X1 week. Tx with Clarithromycin.
  - Returned 1 week later, with dry cough. Lives in apartment with mold. CXR→suspicious, Spiral CT→mass, +bx
Eligibility Criteria for the National Lung Screening Trial

<table>
<thead>
<tr>
<th>Age</th>
<th>55-74 y, with no signs of symptoms of lung cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking history</td>
<td>Active or former smoker with a 30 pack-year history (a pack-year is the equivalent of 1 pack of cigarettes per d per y; 1 pack per d for 30 y or 2 packs per d for 15 y would both be 30 pack-years).</td>
</tr>
<tr>
<td>Active smoker</td>
<td>If active smoker, should also be vigorously urged to enter a smoking-cessation program.</td>
</tr>
<tr>
<td>Former smoker</td>
<td>If former smoker, must have quit within 15 y.</td>
</tr>
<tr>
<td>General health exclusions</td>
<td>Metallic implants or devices in the chest or back; requirement for home oxygen supplementation; prior history of lung cancer or other lung cancer symptoms.</td>
</tr>
</tbody>
</table>

Key Discussion Points for the Process of Shared Decision Making Related to Screening for Early Lung Cancer Detection With Low-Dose Helical Computed Tomography

**Benefit:**
- Screening with LDCT has been shown to substantially reduce the risk of dying from lung cancer.

**Limitations:**
- LDCT will not detect all lung cancers or all cancers early, and not all patients who have a lung cancer detected by LDCT will avoid death from lung cancer.

**Harms:**
There is a significant chance of a false-positive result, which will require additional periodic testing, and, in some instances, an invasive procedure to determine whether or not an abnormality is lung cancer or some nonlung-related, incidental finding; less than 1 in 1000 patients with a false-positive result experience a major complication resulting from a diagnostic workup; death within 60 d of a diagnostic evaluation has been documented but is rare and most often occurs in patients with lung cancer.
Key Discussion Points for the Process of Shared Decision Making

• Helping individuals clarify their personal values can facilitate effective decision making:
  o Individuals who value the opportunity to reduce their risk of dying from lung cancer and who are willing to accept the risks and costs associated with having a LDCT and the relatively high likelihood of the need for further tests, even tests that have the rare but real risk of complications and death, may opt to be screened with LDCT every year
  o Individuals who place greater value on avoiding testing that carries a high risk of false-positives and a small risk of complications, and who understand and accept that they are at a much higher risk for death from lung cancer than from screening complications, may opt not to be screened with LDCT

LDCT, low-dose helical computed tomography.

Prostate Cancer

Prostate Cancer: Screening

Screen all men age 50 or > annually; 45 if first degree relative had prostate cancer.

• DRE
  • If positive for abnormal DRE
  • PSA
  • Free PSA

*DRE & PSA > effective in identifying cancer vs DRE or PSA only
Prostate Screening

• PSA with/without DRE

• Screening intervals for men with PSA levels:
  • <2.5 q2years
  • 2.5 or > annually
  • 4.0 or> referral to urologist for evaluation and bx

US Preventative Services Task Force

Risk Factors for Elevated PSA

Increase PSA
• Age
• BPH
• Prostatitis
• DRE
• Meds: Finestride
• Bike riding
• Herbals
• 1st degree relative w/prostate cancer

Decrease PSA
• Obesity
• Aspirin
• Statins
• NSAIDs
Prostate Cancer: Symptoms

- Symptoms may be consistent with BPH, infection or asymptomatic:
  - Difficulty starting urination.
  - Weak or interrupted flow of urine.
  - Frequent urination, nocturia >2x/ night.
  - Difficulty emptying the bladder completely.
  - Pain or burning during urination.
  - Blood in the urine or semen.
  - Pain in the back, hips, or pelvis that doesn’t go away.
  - Painful ejaculation.
- Diagnosis: Bx; Tx: hormonal tx; green laser; seed implant; RT, robotic surgery

Case Study:
82 year old man with a PSA of 6.4

- Hx of CAD, T2DM, HTN
- Patient asks your recommendation about a prostate biopsy.
- What are the issues and how should you facilitate the conversation

Breast Cancer
Breast Cancer: Epidemiology

- 1989 mortality rate 33.2 per 100,000
- 2007 mortality rate ↓ to 22.8 per 100,000
- The above → 75,000 fewer women dying of breast cancer in 2007
- 2012 Projection: reduce mortality rate 50% if ↓ continues
- 2012, 190 (men) 226,870

Breast Cancer: Risk Factors

- Hormone therapy
- Ionizing radiation
- Obesity
- Alcohol
- Major inheritance susceptibility: BRCA1 and BRCA2: Need for Cancer Risk and Genetic Testing
- Late menarche or menopause
- Nullipara

Breast Cancer: Symptoms

- A breast lump or thickening of tissue
- Bloody discharge from the nipple
- Change in the size or shape of a breast
- Skin changes: dimpling, redness or pitting; peeling, scaling or flaking of the nipple or breast skin
- Inverted nipple
Breast Cancer Guidelines

• Annual mammogram & CBE with routine screening:
  – after age 45, unless history of breast cancer/disease
  – 45-54: annual screening
  – 55 and older: biennial screening, or continue annually

• CBE
  – periodic screening for women under 40
  – annually for women 40 or older

• Women who obtain mammography less frequently have:
  – less education
  – lower socioeconomic status

Breast Cancer Screening

• Mammography
  Women who obtain mammography less frequently have:
  – less education
  – lower socioeconomic status

• Ultrasound

• MRI

• CBE

Case Study:
94 year old woman in good health

• Should this patient continue to receive a mammogram?

• Rationale
Case Study:
43 year old woman with DCIS

- Negative medical history
- Options provided by her breast surgeon:
  - Watchful waiting
  - Lumpectomy

- What are the issues?
- Would the options be different for a 65 year old woman?
Endometrial Cancer: Risks

- Age
- Obesity
- Early menstruation
- Nulliparity
- Ovarian diseases, e.g. polycystic ovaries
- Family history
- Tamoxifen use
- Hormone therapy, e.g. Unopposed estrogen

Endometrial Cancer: Symptoms

- Irregular menses for women >40
- Abnormal vaginal bleeding, e.g. heavy, in between menses, menses that is longer or heavier than usual
- Abdominal pain or pressure

Endometrial Cancer: Diagnosis & Treatment

- Diagnosis:
  - Endometrial biopsy or
  - D&C
- Treatment
  - Hysterectomy
  - 99% cure without recurrence in 5 years if surgically treated early, and no mets beyond the corpus of the uterus
Cervical Screening: Risk Factors

**KNOWN RISK FACTORS**
- Multiple partners - High Risk
- Early ages at first intercourse - High Risk
- Exposure to HPV

**SUSPECTED RISK FACTORS**
- # of Sexual partners & frequent intercourse, r/t repeated exposure to an infectious agent
- Cigarette smoking
- Oral contraceptives
- Nutritional deficiencies

Cervical Cancer Screening

**Begin screening and continue as follows:**
- Age 21 w/liquid-based
- Age 21-29 every 3 years
- Age 30-65 every 5 years
  - Cytology and HPV testing
  - Cytology alone
- Age 65 and > No further testing after
  - 3 consecutive cytology or 2 cotests within a 10 year period

Ovarian Cancer

- Incidence is low compared to breast cancer or cervical cancer, ovarian cancer is the most lethal gyni cancer.
- Screening: Transvaginal US, CA 125, pelvic exam are poor predictors
- Women with 1st degree relative w/ovarian cancer may have a genetic ovarian syndrome & have a 3% chance of being + for hereditary ovarian syndrome.
  - Include 0.05% of women, have a 40% lifetime risk of O.C.
- Prophylactic oophorectomy
Vaccination against HPV

Initiate: 3 dose series

**Females**
- As early as age 9, otherwise,
- Age 11-12
- 13-26 females

**Males**
- 13-21 males
- 22-26

Testicular Cancer

- Occurs in males 15 - men 59 years
- Aggressive cancer
- Treatable if identified early
- Self testicular exam
  - Teach male teens as part of annual physical exams with return demonstration

Testicular Cancer Awareness
Testicular Cancer Awareness

Talking Testicles - YouTube
www.youtube.com/watch?v=3ZzsGivp4tc
Dec 13, 2015 • Lets talk testicles! Self-checking is a great way of detecting possible symptoms of testicular cancer. Get to know how your balls look and feel normally.

Common Skin Cancers

• Basal Cell Carcinoma (BCC)
• Squamous Cell Carcinoma (SCC)
• Melanoma - genetic component

“I don’t care what the TSA guy at the airport told you, it’s not cancerous.”
BCC & SCC: Histology

Both are keratinocyte derived tumors

- An epidermal cell that produces keratin.
- BCC:
  - Slow growing, locally invasive, rarely metastasize
- SCC:
  - Faster growing, locally invasive, has metastatic potential

Basal Cell Carcinomas

- Overexposure to UV Radiation, sun, tanning beds
- Failure to wear protective clothing
- Fair Skin basal cell carcinoma
- Personal History of Skin Cancer
- Exposure to Industrial Compounds
- Weakened Immune System
- Age

Diagnosis: Biopsy  Treatment: Wide excision

BCC
Squamous Cell Carcinoma: Risk Factors

- Overexposure to UV Radiation; using tanning beds -> 2.5 X greater chance of SCC
- Fair Skin, light hair, and blue, green, or gray eyes
- Personal History of Skin Cancer
- Precancerous Skin Conditions
- Exposure to Industrial Compounds
- Weakened Immune System
- Age
- Diagnosis: Bx
- Treatment: Wide excision

Melanoma: Risk Factors

- Atypical moles
- Personal or FH of skin cancer
- Exposure to UV light
- Light complexion or fair
- Weakened immune system

DX: biopsy
Treatment: Wide excision
Melanoma: **Cutaneous Melanoma**

- **Superficial spreading melanoma:**
  - Most common form of melanoma
  - About 70% of cases
  - Usually starts in a pre-existing mole

- **Nodular melanoma:**
  - 2nd most common type
  - 15% to 30% of cases
  - More aggressive and usually develops quicker than superficial melanomas

Melanoma: The A,B,C, D’s

- A - asymmetrical
- B - border
- C - variegated color
- D - diameter, ≥ 1cm

Prevention of Skin Cancers

- Use of sunscreen and protective clothing
- Limit time in direct sunlight
- Counsel adolescents as to the cumulative effect of sun damage
- Maintain hydration
- Total body skin exam (TBSE)

*Note:* Increased use of sunscreen has ↑ the incidence of Vitamin D deficiency
Oral Cancers

- >30,000 new cases of cancer of the oral cavity and pharynx
- >8,000 deaths/year
- Since 2000: HPV DNA detected in oropharyngeal tumors
- 1999 to 2008: rate of HPV related oropharyngeal tumors
  - Increased 4.4% in white men, 1.9% white women


Mortality:
- 5-year survival rate ~50%
- 2X > in black males vs whites

Methods of treatment:
- Surgery, radiation, and chemotherapy, which are disfiguring & costly.

Prevention: preventing high risk behaviors:
- Tobacco use or any kind
- Unprotected sex - oral, vaginal, rectal

Cancer Prevention in Primary Care

- Adults:
  - Exercise: 150 minutes of moderate or 75 minutes/wk
  - Healthy diet
  - Age appropriate screening
  - Attention to F.H. of cancer
  - Safe sex practice
  - Tobacco cessation

- Children and teens:
  - Exercise: at least 1 hour of moderate or vigorous activity daily, with vigorous activity 3 days/wk
  - Educate r/t sun/UV exposure
  - Sex education
  - Tobacco education and cessation
Dietary Changes

Meat
- Limit the amount of processed and red meat, e.g. bacon, lunchmeat
- Eat fish, poultry, or beans
- Bake and broil meat
- Eat small portions

Vegetables & Fruits
- Eat at least 2.5 cups of vegetables and fruits daily
- Include in every meal and as snacks
- Limit use of creamy sauces, dressings, & dips

Alcohol
- One drink =
  - 12 ounces of regular beer
  - 5 ounces of wine
  - 1.5 ounces of 80-proof distilled spirits.
- Drink no more than:
  - 1 drink/day for women
  - 2 drinks/day for men
- Alcohol increases the risk of:
  - breast, mouth, throat, larynx, esophagus, liver, colon, and rectum cancers

The Future: Genomics
References


References, Continued


Thanks