Objectives

- Historical perspective
- Some problems
- Case studies
- Guidelines
- High-value care
- The future

The general issues

- Screening and prevention are "tricky business"
- Two goals: maximizing benefits (in the future) while minimizing harms (in the present and future)—hard to make well people ‘weller’
- Pitfalls: finding abnormalities that are harmless or incurable
- Balancing benefits, harms and costs
- Subtext: US population highly enthusiastic about cancer screening; medico-legal environment rewards vigilance
- Always controversial: age to begin, age to end, tests used and periodicity of screening
In the beginning

National Cancer Act of 1971: “War on Cancer”

Enthusiasm for Cancer Screening in the United States

- 87%: routine cancer screening “almost always a good idea”
- 74%: finding cancer early saves lives “most or all the time”.
- One third believe that an 80-year-old who chooses not to be screened for cancer was “irresponsible”
- 56% want to be tested for “good” cancers (those growing so slowly that they would never cause problems during the person’s lifetime even if untreated).
- 73% would prefer to receive a total-body CT scan instead of receiving $1000.

Public Health Ad: 1990

“If you’re a woman over age 35, be sure to schedule a mammogram…”

Stamps: late 1990s

“Annual check-ups and tests”
5 ground rules for a ‘reasonable’ cancer screening program

1) **High-quality evidence about benefit:** finding disease in asymptomatic people and treating it leads to improved outcomes compared with waiting to treat people with symptoms (experiments)

2) **High-quality evidence about harms:** understanding magnitude of patient-centered adverse outcomes due to screening (including psychological distress)

3) **Making a judgment about net benefit:** benefits must outweigh harms

4) **Patient acceptability:** for both tests and treatments

5) **Reasonable resources required to achieve outcomes:** testing, follow-up of abnormal tests, treatments

**Pitfall**

*Good cancers*
- none becomes symptomatic, none causes death

*Bad cancers*
- all become symptomatic and all cause death, *but* detectable, treatable and curable

*Ugly cancers*
- all become symptomatic, all cause death regardless of detection and treatment

**Find Lee Van Cleef**

*Bad cancers*
- all become symptomatic and all cause death, *but* detectable, treatable and curable
Case studies in cancer screening

Focus on Thyroid Cancer Screening: South Korea experience

- In South Korea, providers frequently offer thyroid cancer screening with ultrasonography ($30 to $50)
- Government and media supported early cancer detection
- Some physicians concerned about overdiagnosis; suggested a screening ban.
- Explaining the harms of inappropriate screening difficult; thyroid-cancer screening continues to grow in popularity.

NEJM 371, 1765-1767, 2014

Focus on Thyroid Cancer Screening: Benefits

No mortality benefit.

NEJM 371, 1765-1767, 2014

Finding Clint Eastwood: the Good
Focus on Thyroid Cancer Screening: 
Harms

- Thyroid cancer now the most common type of cancer diagnosed in South Korea.
- 40,000 diagnosed in 2011: 2/3 radical thyroidectomy and 1/3 subtotal thyroidectomy
- Thyroid-cancer surgery consequences
  - lifelong thyroid-replacement therapy
  - 11% hypoparathyroidism
  - 2% vocal-cord paralysis

Focus on Thyroid Cancer Screening: 
No net benefit

- 1947: thyroid cancer frequently found at autopsy but rarely a cause of death
- About 33% of adults have small thyroid cancers; the vast majority will not pose a problem
- No net benefit
- Screening more harmful than beneficial

Focus on Ovarian Cancer Screening: 
the United States experience

- Ovarian cancer: uncommon, late diagnoses, deadly
- The Prostate, Lung, Colorectal and Ovarian Cancer Screening (PLCO) Randomized Controlled Trial
- Randomized trial of 78,216 women aged 55-74
- Annual screening with CA-125 for 6 years and transvaginal U/S for 4 years (n=39,105) versus usual care (n=39,111)
- 10 US screening centers
- Followed a median of 12 years

Focus on Ovarian Cancer Screening: 
Benefits

- No mortality benefit.
Focus on Ovarian Cancer Screening: The United States experience

What is going on here?

Finding Eli Wallach: the Ugly

Focus on Ovarian Cancer Screening: No net benefit

- Late-stage disease similar between screened and usual care group (77, 78%)
- No benefit
- Screening more harmful than beneficial

JAMA, June 8, 2011—Vol 305, No. 22

Focus on Colorectal Cancer Screening: The United States experience

What is going on here?

Finding Lee Van Cleef: the Bad
Where do evidence-based cancer screening guidelines come from?

- Professional societies: American Cancer Society, American College of Obstetricians and Gynecologists, American College of Physicians
- The US Preventive Services Task Force

US Preventive Services Task Force

- Congressionally mandated (Title IX of the PHS Act)
- 16 experts in primary care, prevention, research methods
- Government support but independent
- Family medicine, internal medicine, pediatrics, obstetrics/gynecology, nursing, preventive medicine
- Scientific support from an Evidence-Based Practice Center (EPCs)
- Does not consider costs, medical-legal issues or insurance coverage in deliberations

Cancer screening currently discouraged by the US Preventive Services Task Force

- **Prostate cancer:** recommends *against* prostate-specific antigen (PSA)-based screening
- **Pancreatic cancer:** recommends *against* screening
- **Ovarian cancer:** recommends *against* screening
- **Testicular cancer:** recommends *against* screening
  
  All: harms outweigh benefits

Cancer screening currently recommended by the US Preventive Services Task Force

- **Colorectal cancer:** ages 50-75 using fecal occult blood testing, sigmoidoscopy or colonoscopy
- **Lung cancer:** ages 55-80 (who have a 30 pack-year smoking history and currently smoke or have quit within the past 15 years) with low-dose CT annually
- **Cervical cancer:** ages 21-65 with a Pap smear every 3 years or, age 30-65, screening with Pap plus human papillomavirus testing every 5 years
- **Breast cancer:** ages 50-74 biennial screening mammography; ages 40-49 biennial screening based on preferences and values
Challenge: balancing benefits, harms, costs

- When to begin?
- When to end?
- How often?
- Which tests to use?
- What should be done in people with abnormal tests but no evidence of disease?
- What is both cost-effective and affordable?

The Breast Cancer Story

- Observation: late cancer diagnoses, high mortality
- Bright idea: self-exams, X-rays
- Experiments: mammograms save lives
- Public health campaigns

The story gets political: screening women aged 40-49

- **January 23, 1997:** NIH Consensus Conference (evidence-based). Draft resolution: “Data mixed, no blanket recommendation, informed decision making”
- **February 5:** Chair of the Senate Appropriations Committee that oversees National Cancer Institute funding (Senator Arlen Specter) presses NCI Director Klausner to disavow Consensus Panel conclusions
- **March 11:** Specter: NCI funding decision will “await final guidelines”
- **March 27:** National Cancer Advisory Board recommends (17 to 1) annual screening for women age 40-49

"In short, so small would be the payoff of regular mammograms at this age [less than age 50 years] that the risk of driving the car to get them might well outweigh the benefits of the test."

Marcia Angell, executive editor of *NEJM*

The story continues: 2009

- The USPSTF again questions age to begin
- Better evidence of the magnitude of benefit for women 40–49
- Better evidence of magnitude of harm for all women
- Clearer: benefit outweighs the harms in all women, but the balance is delicate

---

Balancing benefits and harms, per 1000 women

<table>
<thead>
<tr>
<th>Strategy, by frequency and age to begin</th>
<th>Total mammograms</th>
<th>Breast cancer deaths averted</th>
<th>False-positive test results</th>
<th>Unnecessary biopsies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-69 y</td>
<td>27,583</td>
<td>8.3</td>
<td>2,250</td>
<td>158</td>
</tr>
<tr>
<td>50-69 y</td>
<td>17,759</td>
<td>7.3</td>
<td>1,350</td>
<td>95</td>
</tr>
<tr>
<td>Every 2 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-69 y</td>
<td>13,865</td>
<td>6.1</td>
<td>1,250</td>
<td>88</td>
</tr>
<tr>
<td>50-69 y</td>
<td>8,944</td>
<td>5.4</td>
<td>780</td>
<td>55</td>
</tr>
</tbody>
</table>

---

The story gets national attention

**November 2009:** USPSTF changes its recommendation for breast cancer screening from “every 1-2 years in women over age 40 years” to recommending against routine screening of women aged 40-49.

“The decision to start regular, biennial screening mammography before the age of 50 years should be an individual one and take patient context into account, including the patient's values regarding specific benefits and harms.”

---

The story ignites a firestorm

- Headlines read: “governmental panel recommends against mammograms in women under age 50”
- Confusion, fear, anger ensue
- Politicization: USPSTF = the Palin “death panel”
- “harbinger of the future of health care: rationing”
- USPSTF co-chairs called to testify before Congress: message “fumbled”
- Professional societies (e.g., Society for Breast Imaging) respond vigorously and with “pendulum” guidelines
- US Senate passes an amendment to require insurers to provide free preventive services for women including screening for breast, ovarian and lung cancer (NYT 12/8/09)

---

http://www.uspreventiveservicestaskforce.org/

---

The story gets personal

2/12/10 Contra Costa Times

Three years ago, [patient], then 42, rushed to a San Francisco clinic after finding a hard, rough-edged lump in her breast.

A mammogram… and a subsequent biopsy confirmed… breast cancer. They caught the disease just before it spread further and, today, her cancer is in remission.

When [she]… heard that a federally appointed task force now recommends against routine mammograms for women in their 40s, she shook her head in dismay.

"That's a disaster. Look at my case. They're trying to save a buck, and the first place they start is with women."

http://www.insidebayarea.com/dailyreview/localnews/ci_14431028

The story gets confusing

March 3, 2010:

Director of [X] University Breast Imaging… disagreed with the Task Force’ s conclusion that the number of lives saved by annual mammography screening for women in their 40s was outweighed by the risks of screening for that age group.

"Women need to know that [with routine mammograms] there may be false positives and a need for biopsies,” she said. "But women should make that choice for themselves, with a doctor’ s help."

(PS: This is what the Task Force said.)

The 35,000 Foot View

• Media frenzy
• Inaccuracy
• Bottom line: “Discuss with your doctor”
• More empowering, less paternalistic
• Reality: lack of time and resources to do good shared, informed decision making

Balancing benefits and harms, per 1000 women

<table>
<thead>
<tr>
<th>Strategy, by frequency and age to begin</th>
<th>Total mammograms</th>
<th>Breast cancer deaths averted</th>
<th>False-positive test results</th>
<th>Unnecessary biopsies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. 40-69 y</td>
<td>27,583</td>
<td>8.3</td>
<td>2,250</td>
<td>158</td>
</tr>
<tr>
<td>B. 50-69 y</td>
<td>17,759</td>
<td>7.3</td>
<td>1,350</td>
<td>95</td>
</tr>
<tr>
<td>Every 2 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. 40-69 y</td>
<td>13,865</td>
<td>6.1</td>
<td>1,250</td>
<td>88</td>
</tr>
<tr>
<td>D. 50-69 y</td>
<td>8,944</td>
<td>5.4</td>
<td>780</td>
<td>55</td>
</tr>
</tbody>
</table>

Which of the 4 strategies would you choose as a recommendation? A, B, C or D
Adding in costs

Simulated, one year (2010)

- Screening every other year beginning at age 50: $2.6 billion
- Screening every year beginning at age 40: $10.1 billion

Does this information affect your vote? Should it?


Who said this?

“My mother died of ovarian cancer at the age of 53, and in those last painful months she was more worried about paying medical bills than getting well.”

An novel approach: deliberative democracy

- New Zealand, 2007
- Citizens given data about mammography screening
- Asked: “Should the New Zealand government offer free screening mammograms to women of their age?”
- 11 women aged 40–49 participated; all believed that screening for cancer was a good thing and they all supported mammography for women of their age.

Health Policy. 2008; 85(3):314–320

An novel approach: deliberative democracy

- Wednesday evening: briefed
- Friday: presentations from cancer screening experts, asking questions, examining evidence
- Friday: deliberation with an independent moderator
- Saturday morning: conferred again with no advisors present and reached a conclusion
- Voted 10 to 1 against recommending government provision of mammographic screening for women aged 40 to 49 years.

Health Policy. 2008; 85(3):314–320
The future: precision medicine

- Genetic markers that predict risk for individuals
- Biomarkers that predict behavior of individuals’ cancers (good versus bad versus ugly)
- Combinations of genetic markers and cancer characteristics that predict outcomes in individuals
- Less population-based screening, more targeted screening
- Higher value care: maximizing quality and patient experience at a lower cost

Closing comments

- Predicting average outcomes in populations of people vastly different that predicting outcomes in individuals
- Hard to make a well person “weller”
- Our oath: “Do no harm”
- Informed consumers: evidence, preferences, values, limitations of medicine

Questions
What does the USPSTF say about prostate cancer screening?

The USPSTF recommends against screening for prostate cancer.

Prostate cancer screening

- Many men are harmed as a result of prostate cancer screening and few, if any, benefit.
- At most 1 man in 1,000 screened will avoid a prostate cancer death over the course of 10 years; in the best and largest study done in the U.S., no benefit was shown.
Prostate cancer screening

- Many men are harmed as a result of prostate cancer screening and few, if any, benefit.
- At most 1 man in 1,000 screened will avoid a prostate cancer death over the course of 10 years; in the best and largest study done in the U.S., no benefit was shown.
- Of the same 1,000 men screened, 2 to 3 will have a serious complication of treatment such as a blood clot, heart attack or stroke, or even death, and up to 40 will have erectile dysfunction, urinary incontinence or both.

About 30 to 40 men in 1,000 will also have less serious but bothersome harms from a prostate biopsy, such as infection.
Which cancers are good, bad and ugly?

Perhaps the proportion that are “good, bad and ugly” varies by organ site. Sites with more bad than good or ugly may be more amenable to screening. Here’s a guess:

- **Mostly Good**: thyroid, prostate (do not screen)
- **Mostly Bad**: colorectal, cervical, breast, lung (screen)
- **Mostly Ugly**: ovarian, pancreatic, esophageal (do not screen)

*considered “screen-able” by the US Preventive Services Task Force