

# Awareness of overdiagnosis in cancer screening among post-doctoral students enrolled in a cancer screening course

Danielle D. Durham MPH, PhD, Cancer Prevention Fellow, Division of Cancer Control and Population Sciences, National Cancer Institute

Srini Krishnamoorthy MA, PhD, National Center for Health Statistics

Emily DeVoto PhD, Deputy Editor, The Journal of Epidemiology

Pamela Marcus MS, PhD, Epidemiologist, Division of Cancer Control and Population Sciences, National Cancer Institute

# Background

- Disagreements exist and people have varying definitions
- Overdiagnosis in cancer screening has been and continues to be controversial, given that cancers have the potential to kill
- Lay persons and patients may have a peripheral awareness of overdiagnosis
- Individuals in clinical and public health settings may not be aware of how overdiagnosis can occur in cancer screening
- Poses a potential problem since they are often the main interface with patients at clinical care and clinical decision-making

# Research Objective

- Continuing education courses devoted to theory that underlies assessment of cancer screening data may pose a solution
- Objective: Can an introductory course on cancer screening impact knowledge and understanding of overdiagnosis?
  - Interested in what the answer was and what it became after the course, not whether or not they have a correct definition

# Methods

- Moynihan's study of overdiagnosis understanding as a model
  - Australian adults, lay population
  - Not cancer specific
- Self-administered survey via SurveyMonkey
- Pre/Post test design
- Study population: US National Cancer Institute post-doctoral fellows registered for a 1-credit introductory cancer screening course (n=10)
- Descriptive and thematic analysis of individual and paired responses

# Survey Questions

Q1	Please enter your name
Q2	Have you seen or heard of the term 'over-diagnosis' before today?
Q3	What do you understand the term 'over-diagnosis' to mean?
Q4	(if no to Q3) What do you think the term 'over-diagnosis' means?
Q5	A generally accepted view is that over-diagnosis happens when people are diagnosed with a disease that would never have harmed them. This could be due to the condition being so slow developing or them displaying only very minor symptoms. Given this explanation, have you ever seen or heard of the term or concept of 'over-diagnosis'?
Q6	Has a doctor ever told you that healthy people can be over-diagnosed as a result of being screened for cancer?
Q7	Routine screening means testing healthy people to find signs of diseases such as cancer. Do you think routine cancer screening tests for healthy people are almost always a good idea?
Q8	Do you agree or disagree that routine cancer screening tests for healthy people are important for their health?
Q9	When healthy people are considering having a routine cancer screening test, along with being told about the potential benefits of the routine cancer screening test, do you agree or disagree that they should be informed about the potential risk of over-diagnosis?

# Pre-Test Results

Question	Pre (n=7)	
	Yes N (%)	No N (%)
Q2. Have you heard of overdiagnosis before today?	7 (100)	0 (0)
Q5. Given definition, have you heard of overdiagnosis?	7 (100)	0 (0)
Q6. Doctor said healthy people can be overdiagnosed?	2 (28.57)	5 (71.43)
Q7. Is routine cancer screening a good idea?	2 (28.57)	5 (71.43)
	Response	N (%)
Q8. Routine cancer screen tests healthy for most?	Completely agree	0 (0)
	Mostly agree	5 (71.43)
	Slightly agree	0 (0)
	Slightly disagree	2 (28.57)
Q9. Should patients be informed of risk for overdiagnosis?	Completely agree	5 (71.43)
	Mostly agree	1 (14.29)
	Slightly agree	1 (14.29)

### Q3: What do you understand the term 'over-diagnosis' to mean?

ID Pre

- 1 A person is diagnosed with a disease that may not have caused them a problem, possibly causing unnecessary treatment or some other harm.
- 2 Over diagnosis is when people who would not have presented with any clinical symptoms for cancer in their lifetime are diagnosed of cancer by a screening test.
- 3 The idea that cancer screening not only captures malignant tumors early, but also tumors that might not have ever developed into cancer or required treatment. Thus, catching a number of people who are diagnosed through screening, but may never have reached the point for a clinical diagnosis.
- 4 Detection of "disease" via screening that would not have progressed to symptomatic disease in the patient's lifetime.
- 5 Diagnosing cancer-like growths which otherwise would have gone undiagnosed without any clinical manifestations, if not for increased screening.
- 6 A physician making a extrapolated decision on diagnosis with less evidence in terms of signs and symptoms
- 7 Disease diagnosis based on screening tests where the biological measurements or radiological imaging would never result in clinical symptoms of the disease.

8 .

# Course topics

- Formal and informal methods, 6 weeks
  - Overdiagnosis as a bias
  - How overdiagnosis behaves in study designs
  - Seminal trials, various cancer sites, discussions

## Stop-screen design and overdiagnosis

- Refer back to the counterfactual principle and lead time
- In the absence of overdiagnosis, each screen-detected cancer has a counterpart in the control arm
- Need to wait for those counterparts to be diagnosed due to symptoms

## Overdiagnosis bias

- Screening detects cancers that would never have been diagnosed otherwise during a person's lifetime
  - Disease is so innocuous (slow-growing; may regress; no lethal potential) that symptomatic presentation will never occur
    - Extreme form of length sampling bias
    - No need to diagnose and treat
  - Death due to other causes
    - Prior to hypothetical symptomatic diagnosis
    - After symptomatic diagnosis but before cancer would be lethal
    - These do not have to be innocuous cancers
    - Example on next slide

## Overdiagnosis bias

- Case survival
  - Adding favorable experience (innocuous cancers)
- Stage shift
  - Add early stage cancers without eliminating late stage cancers
    - These would never have been diagnosed in the absence of screening
- Increased yield
  - Appears that more have been found, but there was no need to find them

# Post-Test Results

Question	Pre (n=7)		Post (n=6)	
	Yes N (%)	No N (%)	Yes N (%)	No N (%)
Q2. Have you heard of overdiagnosis before today?	7 (100)	0 (0)	6 (100)	0 (0)
Q5. Given definition, have you heard of overdiagnosis?	7 (100)	0 (0)	6 (100)	0 (0)
Q6. Doctor said healthy people can be overdiagnosed?	2 (28.57)	5 (71.43)	1 (16.67)	5 (83.33)
Q7. Is routine cancer screening a good idea?	2 (28.57)	5 (71.43)	0 (0)	6 (100)
	<b>Response</b>	<b>N (%)</b>	<b>Response</b>	<b>N (%)</b>
Q8. Routine cancer screen tests healthy for most?	Completely agree	0 (0)	Completely agree	1 (14.29)
	Mostly agree	5 (71.43)	Mostly agree	0 (0)
	Slightly agree	0 (0)	Slightly agree	4 (66.67)
	Slightly disagree	2 (28.57)	Slightly disagree	1 (16.67)
Q9. Should patients be informed of risk for overdiagnosis?	Completely agree	5 (71.43)	Completely agree	5 (83.33)
	Mostly agree	1 (14.29)	Mostly agree	1 (16.67)
	Slightly agree	1 (14.29)	Slightly agree	0 (0)

# Results-Paired comparison

PRE-TEST					POST-TEST					
ID1	ID2	ID4	ID5	ID7		ID1	ID2	ID4	ID5	ID7
Yes	Yes	Yes	Yes	Yes	Q2. Have you heard of overdiagnosis before today?	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Q5. Given definition, have you heard of overdiagnosis?	Yes	Yes	Yes	Yes	Yes
No	Yes	No	No	No	Q6. Doctor said healthy people can be overdiagnosed?	No	No	No	Yes	No
No	No	Yes	No	No	Q7. Is routine cancer screening good idea?	No	No	No	No	No
SD	SD	MA	MA	MA	Q8. Routine cancer screen tests healthy for most?	SA	SD	SA	SA	CA
CA	CA	CA	CA	CA	Q9. Should patients be informed of risk for overdiagnosis?	CA	CA	CA	CA	MA

CA=Completely agree

MA=Mostly agree

SA= Slightly agree

SD=Slightly disagree

### Q3: What do you understand the term 'over-diagnosis' to mean?

ID	Pre	Post
1	A person is diagnosed with a disease that may not have caused them a problem, possibly causing <u>unnecessary treatment or some other harm</u> .	Overdiagnosis occurs when people receive a <u>disease diagnosis</u> and associated <u>treatment</u> , use cancer as an example, for a tumor that may not have caused them harm. This hypothetical tumor could be slow growing and/or the <u>treatments could be aggressive</u> and cause harms both physical and financial.
2	Over diagnosis is <u>when people who would not have presented with any clinical symptoms for cancer in their lifetime are diagnosed of cancer by a screening test</u> .	Diagnosis of <u>cancers</u> at an early stage in which that cancer would <u>not have caused problems in the patients</u> , (like symptoms) if the patient had not <u>undergone screening</u> .
3	The idea that cancer screening not only captures <u>malignant tumors</u> early, but also tumors that might not have ever developed into cancer or required treatment. Thus, catching a number of people who are <u>diagnosed through screening, but may never have reached the point for a clinical diagnosis</u> .	.
4	Detection of " <u>disease</u> " via screening that would not have progressed to symptomatic disease in the patient's lifetime.	'Over-diagnosis' means <u>diagnosing cancers (in case of cancer screening)</u> when they otherwise wouldn't have been detected in the normal life <u>span of a person in the absence of cancer screening</u> .
5	Diagnosing cancer-like growths which <u>otherwise would have gone undiagnosed without any clinical manifestations, if not for increased screening</u> .	<u>A diagnosis following a screening test of a disease that would not have been occur to be clinically relevant (symptomatic) if not detected by the screening test</u>
6	A physician making a extrapolated decision on diagnosis <u>with less evidence in terms of signs and symptoms</u>	.
7	<u>Disease diagnosis based on screening tests where the biological measurements or radiological imaging would never result in clinical symptoms of the disease</u> .	<u>Over-diagnosis is the detection of disease that would not have otherwise been clinically detectable</u> .
8	.	Over diagnosis <u>refers to treating for a sign or symptom which otherwise would have not turned in to a actual disease and kill the</u>

# Conclusion

- Students in the course gave responses that represent an appreciation of the concept of overdiagnosis.
  - Screening-specific
  - Harms as a result of diagnosis
- Some changes in response noted on post test
  - An introductory/continuing education course may impact knowledge of overdiagnosis

# Considerations

- Non-scientific/informal survey, a thought piece
- Select group of participants, small numbers
  - Educated
  - Public health/clinical background
  - Interested in/aware of cancer screening
- When does education for overdiagnosis take place
  - Anecdotal experience
- Implications for:
  - Clinicians, public health professionals, patients, coursework