

Validation of SEER Treatment Data with Medicare Claims

Annie Noone
noonea@mail.nih.gov

Jennifer Lund, Angela Mariotto, Kathy Cronin,
Dennis Deapen, Joan Warren

NAACCR Annual Conference 2012
Portland, OR

Background

- SEER registries collect first course surgery, chemotherapy, radiation and hormone therapy data
- Chemotherapy and hormone therapy data is thought to be of unknown quality and is only available by special data request

Objectives

- Evaluate the completeness and validity of chemotherapy and radiation therapy data collected by SEER using claims from SEER*Medicare
 - Female breast, prostate, colorectal, pancreas, lung, ovary, bladder cancer
- Evaluate hormone therapy data for prostate cancer

Study Cohort

- Inclusion Criteria
 - Diagnosis year 2000 to 2006
 - Age at diagnosis 65+
 - Continuous Medicare Part A/B/FFS from date of diagnosis until 1 year after diagnosis or death
- Exclusion Criteria
 - Patients with multiple tumors
 - Diagnosis on autopsy/death certificate
 - HMO enrollment at any time from diagnosis to 1 year after
 - Patients also in POC (0.6% of all cases)

Treatment Variables

SEER	Yes	Treatment received
	No	None, Not recommended, Not Administered, Refused
	Unknown	Unknown if administered (Omitted from analysis)
Medicare	Yes	Administration or drug codes within 1 st month of diagnosis through 1 year after diagnosis
	No	No claims found

- Medicare codes for administration or drug
- Exception:
 - Chemo admin codes may be used for hormone therapy admin for prostate cancer
 - If hormone therapy and a chemo admin code were on the same day, pt is considered to have hormone tx.

Analysis

- Compared treatment variables (Yes/No)
 - Sensitivity, Specificity, kappa, PPV, NPV
 - Medicare considered gold standard for analysis
 - 95% confidence intervals computed using normal approximation

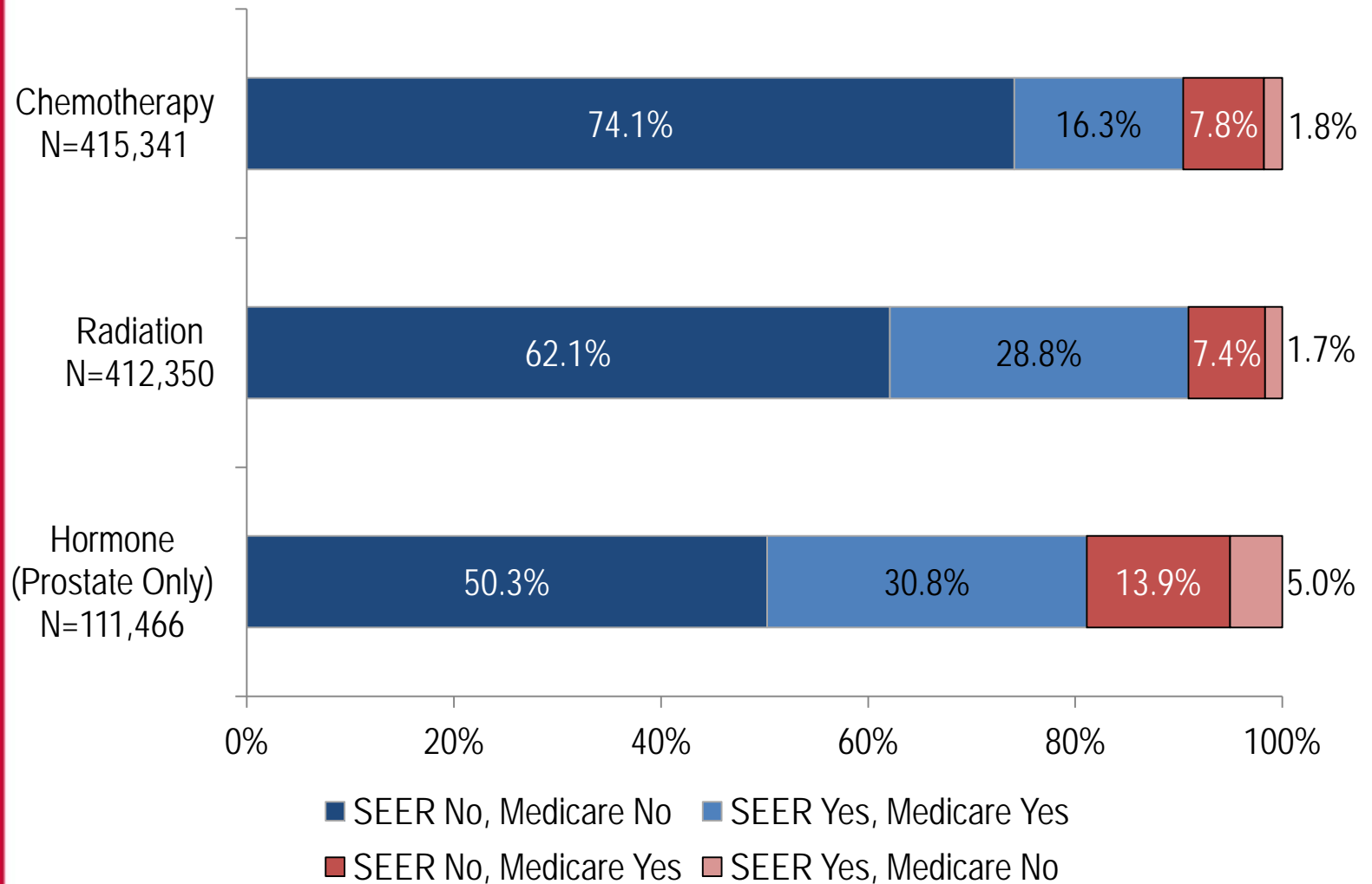
	Medicare		
SEER	Yes	No	
Yes	A	C	PPV=A/(A+C)
No	B	D	NPV=D/(B+D)

Sens=A/(A+B) Spec=D/(D+C)

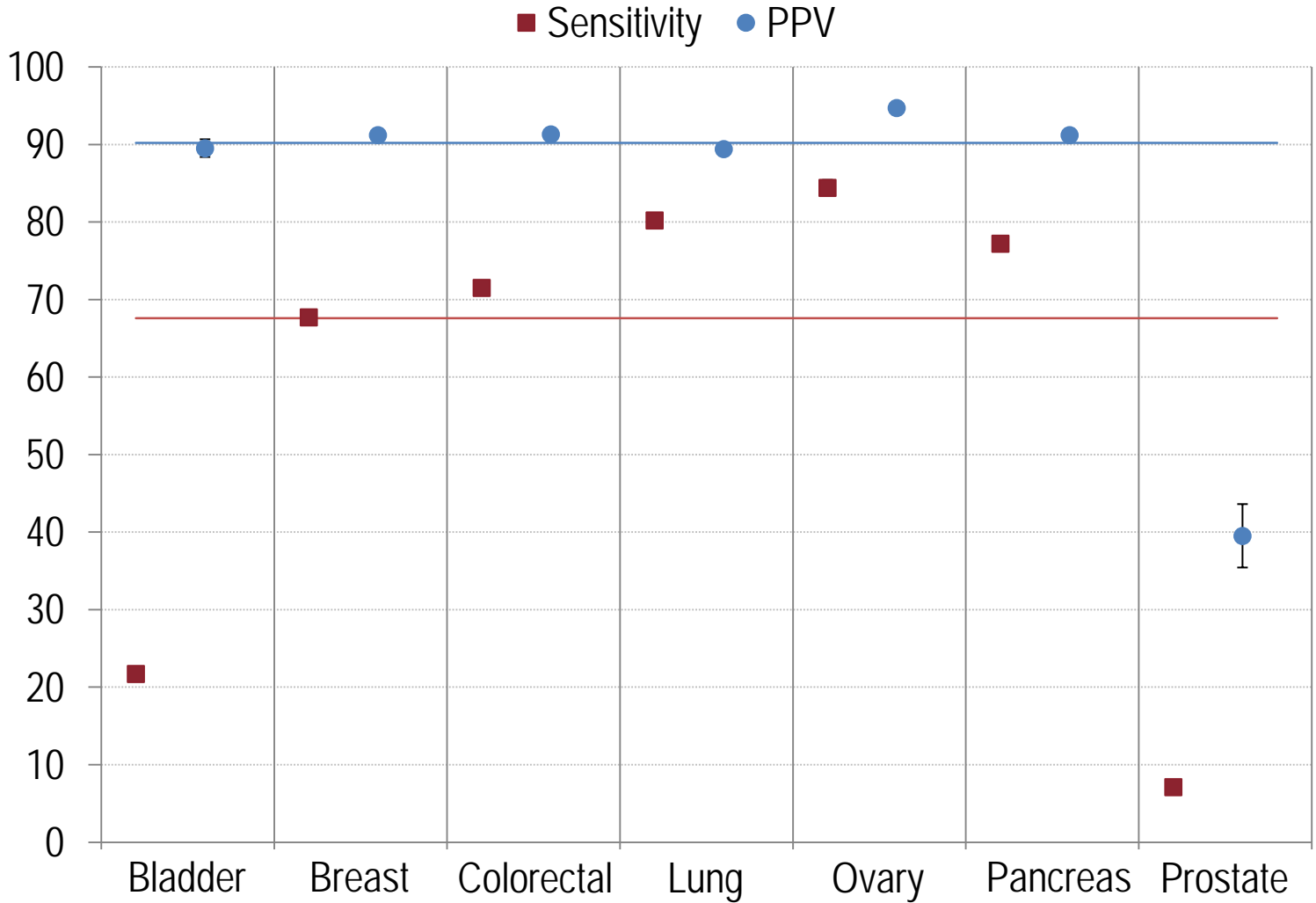
Results: Overall

	Sensitivity	PPV	Specificity	NPV
Chemo (N=415,341)				
12 month	67.6 (67.3, 67.9)	90.2 (90.0, 90.0)	97.7 (97.6, 97.7)	90.5 (90.4, 90.6)
8 month	69.4 (69.1, 69.7)	89.6 (89.4, 89.8)	97.6 (97.5, 97.6)	91.3 (91.2, 91.4)
4 month	71.8 (71.5, 72.1)	86.8 (86.5, 87.0)	96.9 (96.9, 97.0)	92.5 (92.4, 92.6)
Radiation (N=412,350)				
12 month	79.6 (79.4, 79.8)	94.6 (94.4, 94.7)	97.4 (97.3, 97.5)	89.3 (89.2, 89.5)
8 month	81.7 (81.5, 81.9)	92.5 (92.4, 92.6)	96.5 (96.4, 96.6)	90.9 (90.8, 91.0)
4 month	84.5 (84.3, 84.7)	81.1 (80.9, 81.3)	91.8 (91.7, 91.9)	93.5 (93.4, 93.5)
Hormone (N=115,724)				
12 month	69.0 (68.6, 69.4)	86.0 (85.6, 86.3)	90.9 (90.7, 91.1)	78.4 (78.1, 78.7)
8 month	69.7 (69.3, 70.1)	84.9 (84.6, 85.3)	90.4 (90.1, 90.6)	79.4 (79.1, 79.7)
4 month	70.5 (70.1, 70.9)	81.3 (80.9, 81.7)	88.6 (88.3, 88.8)	81.0 (80.7, 81.3)

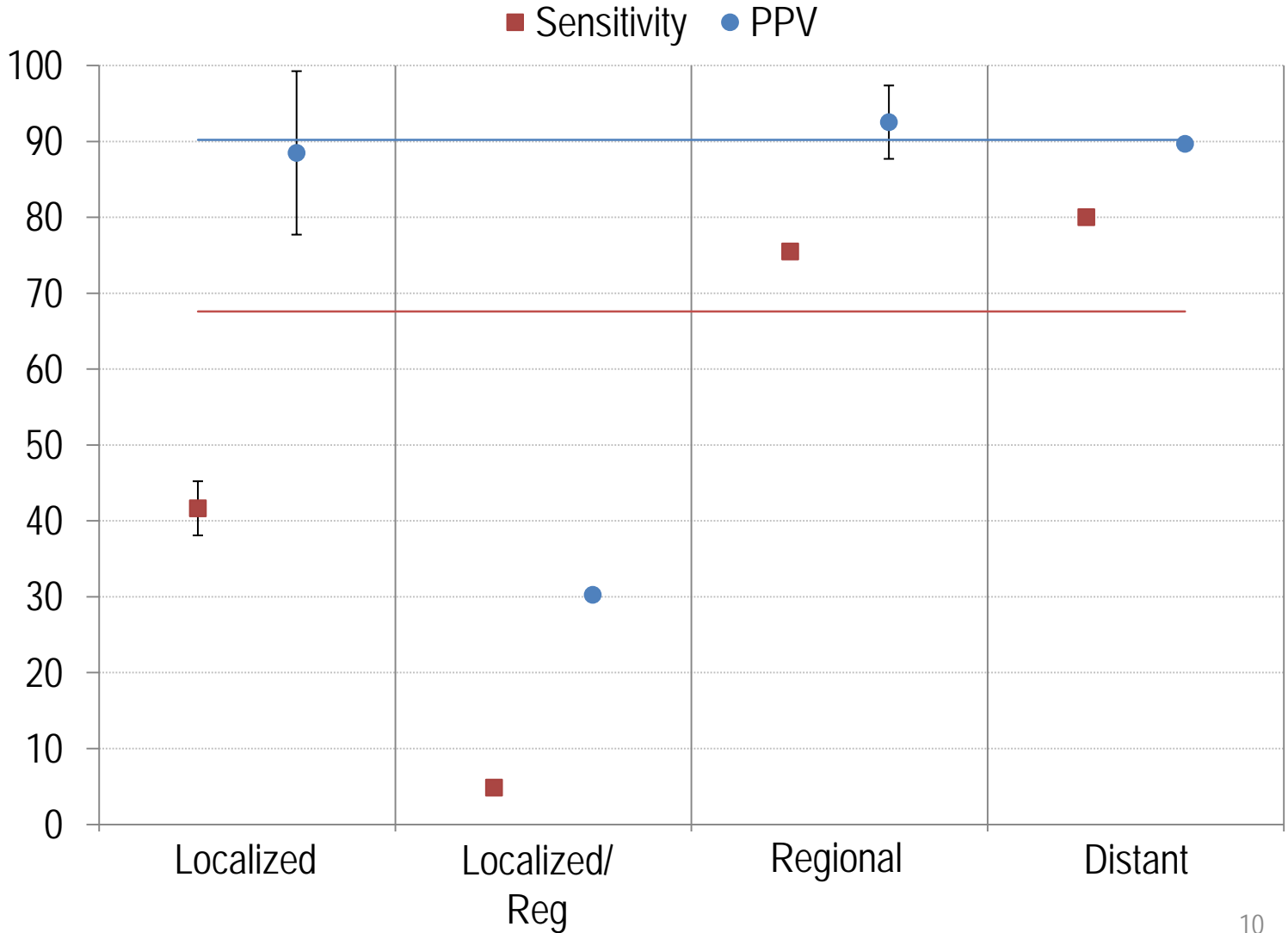
Results: Overall Percent Agreement



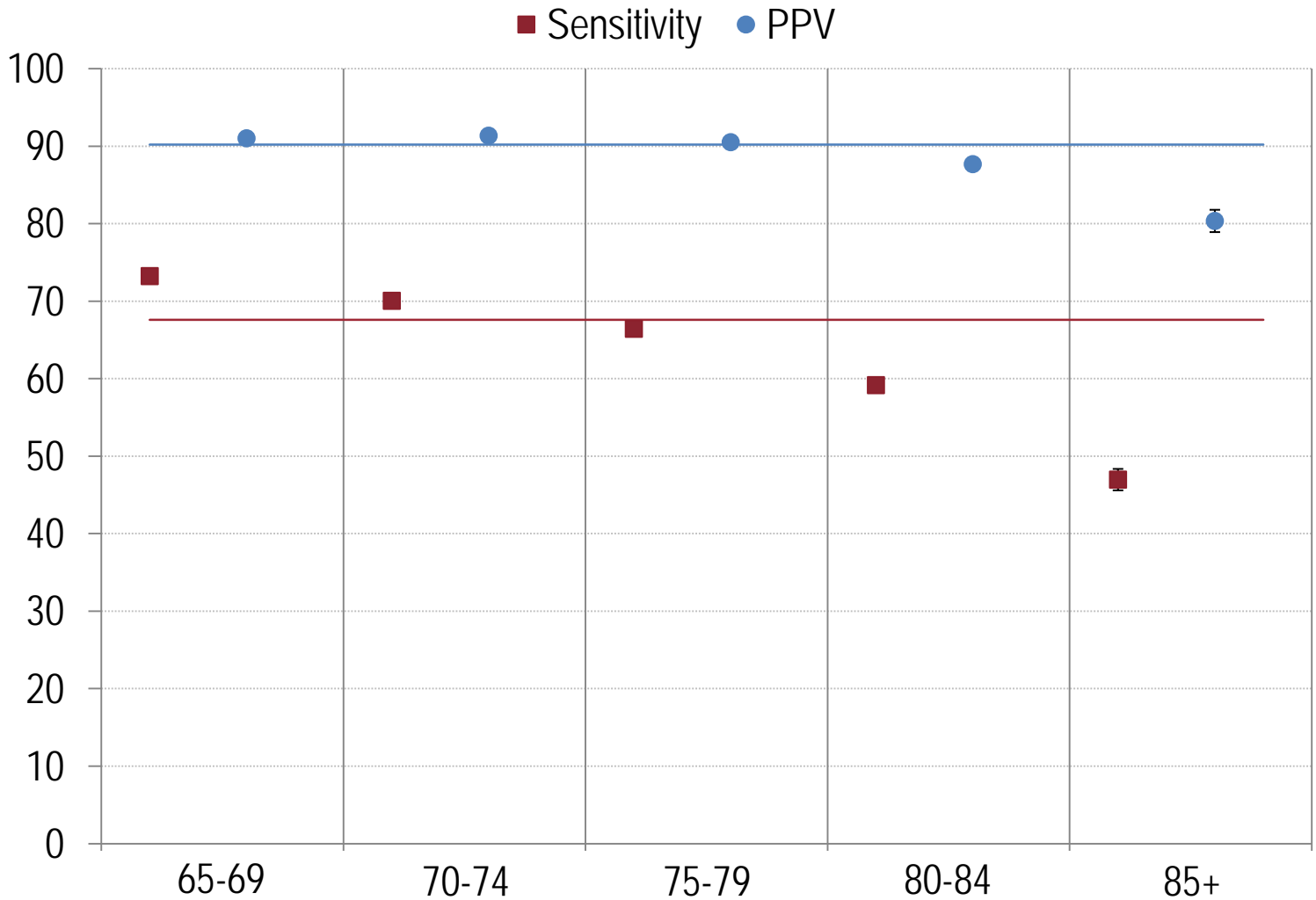
Results: Chemotherapy by Site



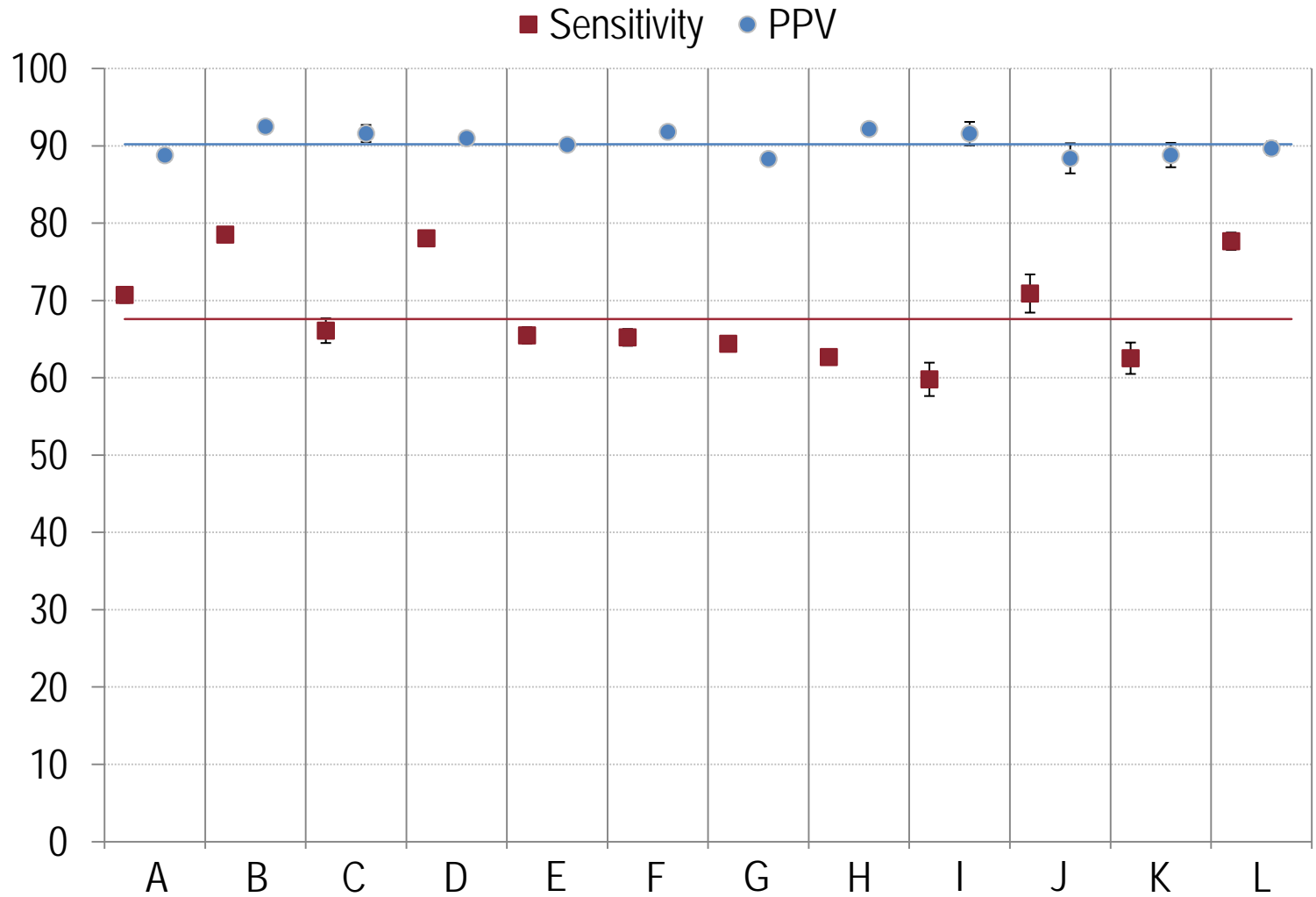
Results: Chemotherapy by Stage



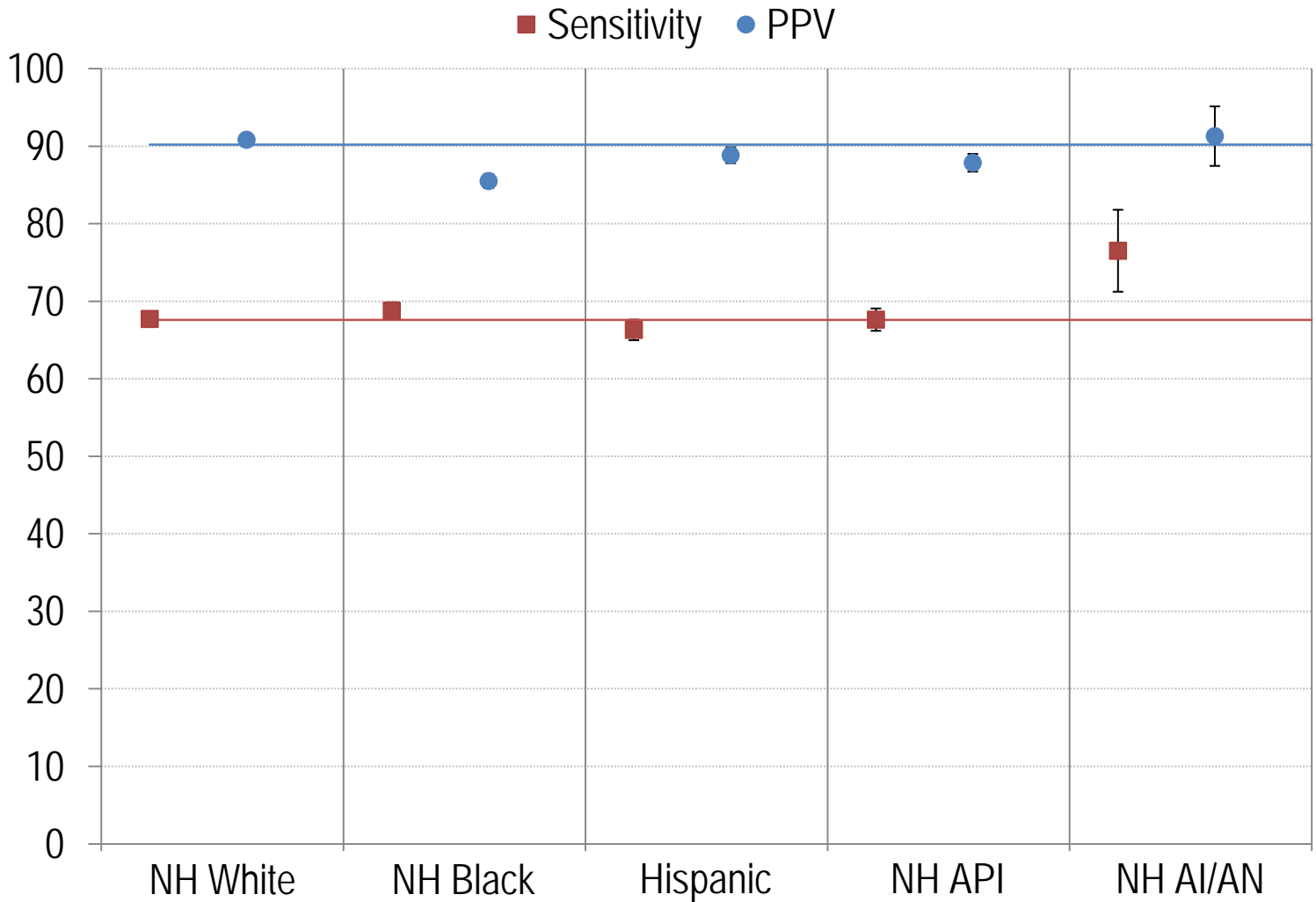
Results: Chemotherapy by Age



Results: Chemotherapy by Registry



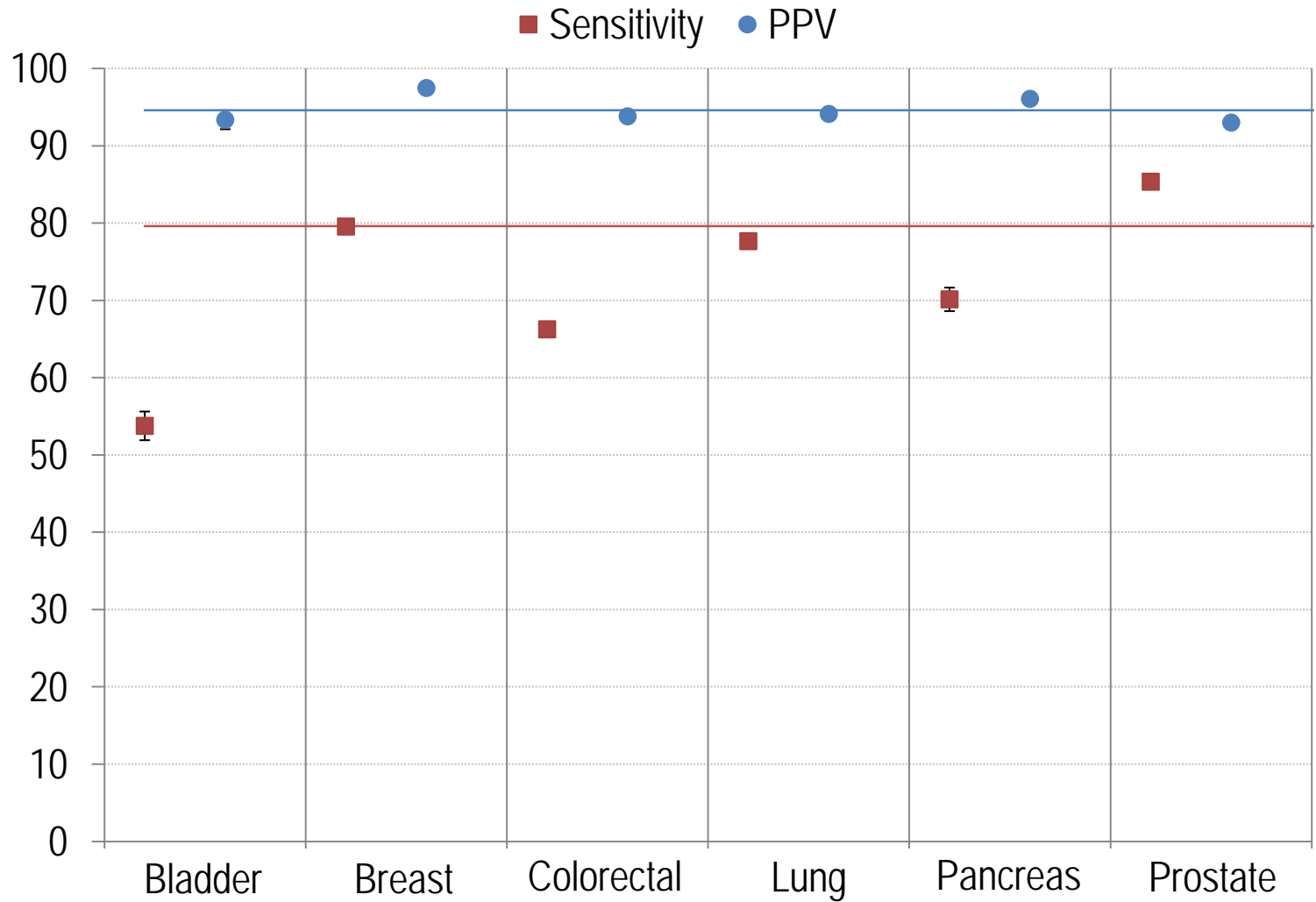
Results: Chemotherapy by Race



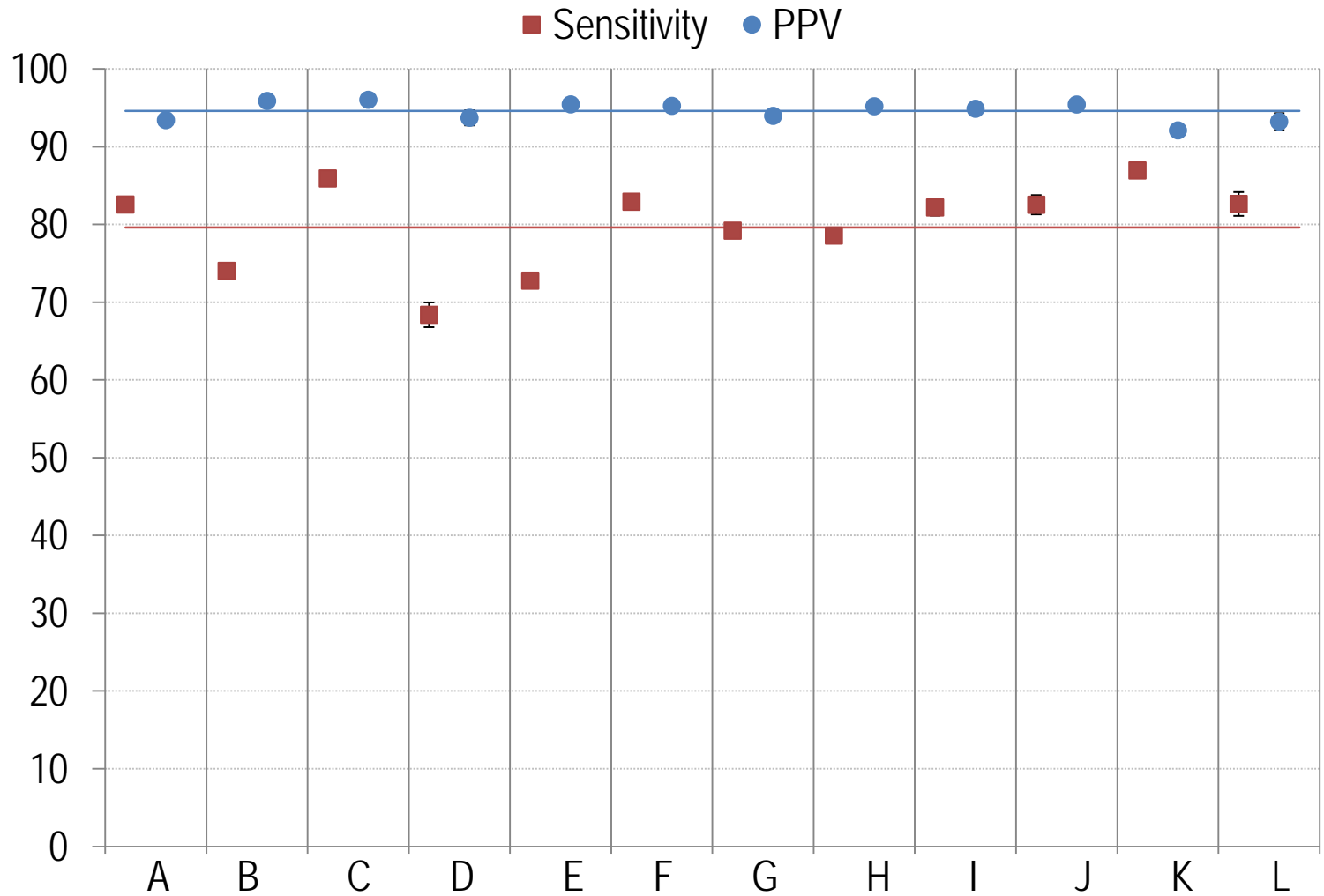
Results: Chemotherapy

- Sex
 - Males have lower sensitivity and PPV than females
- Year of diagnosis
 - Not much variation

Results: Radiation by Site



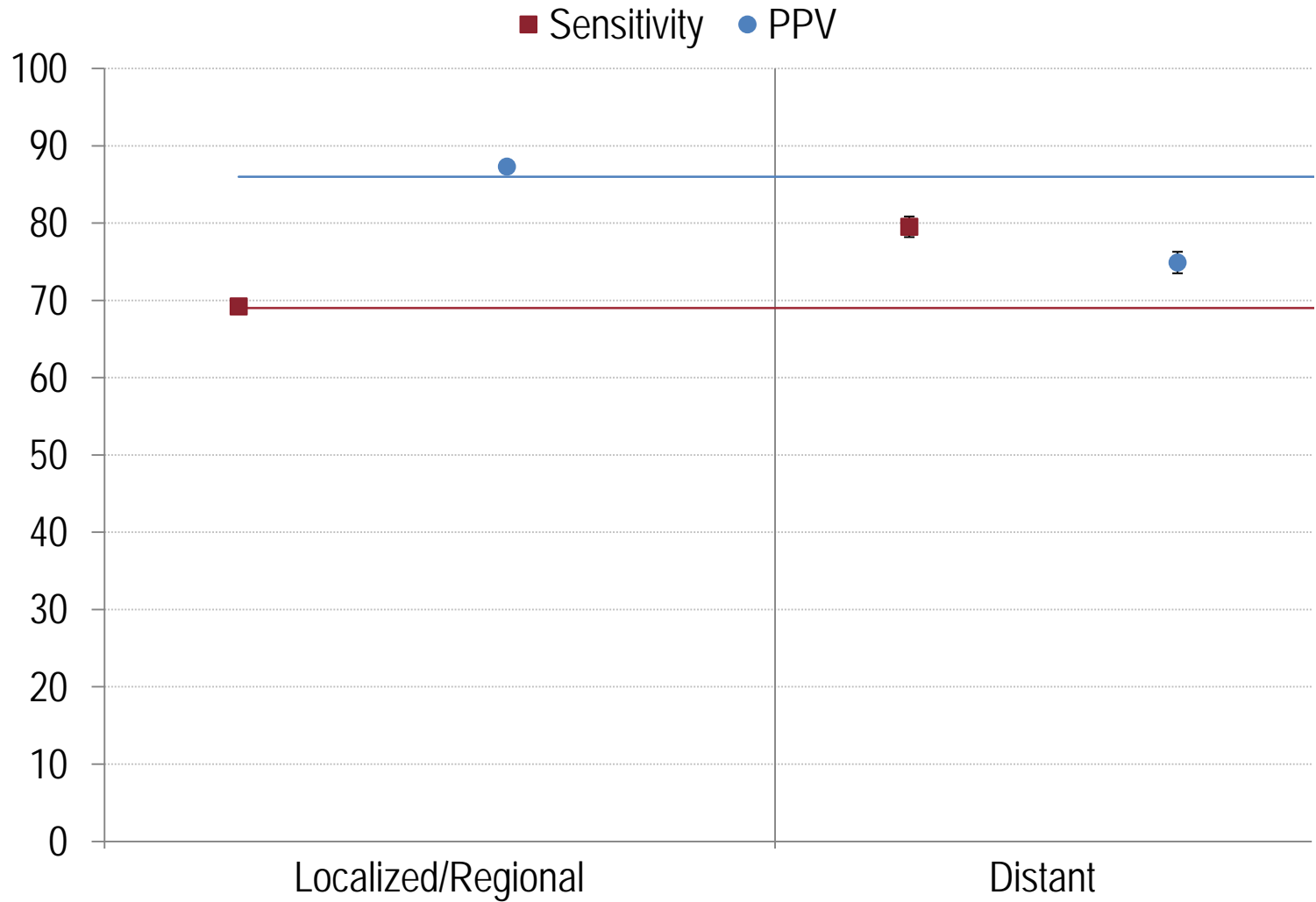
Results: Radiation by Registry



Results: Radiation

- Sex
 - Sensitivity lower for females than males (76.8 vs. 81.8)
- Year of diagnosis
 - Sensitivity decreased over time
 - 2000: 81.8
 - 2006: 78.0
- Stage
 - Specificity, PPV, NPV high for all stages (≥ 88.0)
 - Sensitivity for Regional (76.3), Distant (75.7)
- Race-Similar pattern to chemo

Results: Hormone (Prostate)



Results: Hormone (Prostate)

- Age
 - All metrics decreased with age
- Race
 - Similar pattern to chemo

Discussion: Sensitivity

- Among those with claims, the proportion also identified in SEER as receiving treatment
- Ability of SEER to identify treatment
- If low then treatment is misclassified in SEER data
 - Comparisons of treated vs. non-treated will be **biased**
 - Estimates of proportion treated will be **biased**

Discussion: PPV

- Among those identified as treated in SEER, proportion truly treated
- If high then many individuals identified in SEER were treated
 - Select cohort of treated individuals

Sensitivity & PPV by Site & Stage

≤60%	60-90%	>90%
------	--------	------

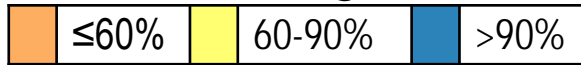
		Chemotherapy		Radiation Therapy	
		Sensitivity	PPV	Sensitivity	PPV
Bladder	Localized	11.0 (10.3, 11.6)	88.2 (86.2, 90.1)	24.0 (20.7, 27.2)	84.2 (79.0, 89.4)
	Regional	53.4 (51.3, 55.4)	91.7 (90.2, 93.2)	63.0 (60.7, 65.3)	94.8 (93.5, 96.1)
	Distant	76.6 (72.6, 80.6)	86.9 (83.4, 90.3)	70.3 (65.4, 75.2)	94.4 (91.6, 97.3)
	Unstaged	18.9 (12.5, 25.3)	79.4 (65.8, 93.0)	--	--
Breast	In situ	4.9 (1.9, 7.9)	18.2 (8.0, 28.4)	82.3 (81.2, 83.3)	97.8 (97.3, 98.2)
	Localized	56.7 (55.3, 58.0)	87.9 (86.8, 89.0)	82.2 (81.7, 82.7)	97.7 (97.5, 97.9)
	Regional	76.1 (75.2, 77.1)	94.4 (93.9, 95.0)	74.0 (73.1, 74.9)	96.9 (96.4, 97.3)
	Distant	71.5 (69.6, 73.5)	88.9 (87.3, 90.4)	72.1 (70.0, 74.1)	96.6 (95.6, 97.5)
	Unstaged	46.0 (38.4, 53.7)	78.1 (69.9, 86.4)	39.2 (33.1, 45.3)	93.2 (88.3, 98.1)
Colorectal	In situ	--	--	--	--
	Localized	65.2 (63.6, 66.8)	88.2 (87.0, 89.5)	66.7 (65.0, 68.5)	95.2 (94.2, 96.1)
	Regional	72.1 (71.3, 72.9)	92.3 (91.8, 92.9)	71.1 (69.6, 72.5)	93.8 (93.0, 94.7)
	Distant	76.4 (75.3, 77.5)	91.7 (90.9, 92.4)	59.3 (57.0, 61.6)	91.6 (90.0, 93.3)
	Unstaged	53.5 (49.3, 57.6)	85.5 (81.7, 89.2)	59.6 (55.2, 64.0)	93.2 (90.3, 96.0)
Lung	In situ				
	Localized	66.0 (64.4, 67.6)	88.7 (87.4, 89.9)	71.5 (70.3, 72.8)	93.1 (92.3, 93.9)
	Regional	81.6 (80.9, 82.3)	91.6 (91.0, 92.1)	81.2 (80.5, 81.9)	94.2 (93.8, 94.6)
	Distant	83.3 (82.8, 83.8)	88.5 (88.1, 89.0)	78.9 (78.4, 79.4)	94.5 (94.1, 94.8)
	Unstaged	55.8 (53.3, 58.4)	87.1 (84.9, 89.2)	48.5 (46.0, 51.1)	89.7 (87.6, 91.8)

Sensitivity & PPV by Site & Stage

≤60%	60-90%	>90%
------	--------	------

		Chemotherapy		Radiation Therapy	
		Sensitivity	PPV	Sensitivity	PPV
Ovary	In situ	--			
	Localized	69.6 (64.6, 74.5)	95.1 (92.3, 97.8)		
	Regional	78.7 (74.3, 83.1)	95.9 (93.6, 98.3)		
	Distant	86.6 (85.6, 87.6)	94.8 (94.2, 95.5)		
	Unstaged	73.3 (67.2, 79.4)	89.2 (84.4, 93.9)		
Pancreas	In situ	--	--		
	Localized	73.6 (69.7, 77.5)	91.0 (88.1, 93.8)	73.1 (68.8, 77.4)	98.3 (96.9, 99.8)
	Regional	80.8 (79.1, 82.4)	92.5 (91.4, 93.7)	77.9 (76.0, 79.9)	96.3 (95.3, 97.2)
	Distant	77.6 (76.3, 78.9)	90.5 (89.5, 91.5)	60.5 (57.5, 63.5)	94.7 (93.0, 96.5)
	Unstaged	60.2 (55.7, 64.7)	91.7 (88.5, 94.8)	47.8 (41.5, 54.0)	95.1 (91.3, 98.9)
Prostate	In situ	--	--	--	--
	Localized/ Regional	4.9 (3.9, 5.8)	30.3 (25.4, 35.1)	86.8 (86.5, 87.1)	93.2 (93.0, 93.5)
	Distant	13.6 (11.1, 16.0)	55.2 (48.0, 62.5)	62.5 (60.1, 64.9)	87.1 (85.1, 89.0)
	Unstaged	8.1 (3.7, 12.5)	57.1 (36.0, 78.3)	46.2 (43.0, 49.4)	85.2 (82.2, 88.3)

Sensitivity and PPV by Site & Stage



		Hormone Therapy			
		Sensitivity		PPV	
Prostate	In situ	--		--	
	Localized/	69.2 (68.8, 69.6)		87.3 (87.0, 87.7)	
	Regional				
	Distant	79.5 (78.2, 80.9)		74.9 (73.5, 76.3)	
	Unstaged	43.9 (41.6, 46.1)		80.0 (77.5, 82.4)	

Discussion

- SEER data cannot generally be used to compare treated vs. non-treated individuals
- SEER data may be used to identify cohort of treated individuals
- May be able to augment SEER data using other data sources
 - Cancer Research Network data
 - Electronic Medical Record
 - Administrative/billing data