HHS Public Access

Author manuscript

Med Care. Author manuscript; available in PMC 2018 March 29.

Published in final edited form as:

Med Care. 2014 September ; 52(9): e58–e64. doi:10.1097/MLR.0b013e318277eba5.

Treatment Patterns for Prostate Cancer:

Comparison of Medicare Claims Data to Medical Record Review

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Abstract

Background—As evidence-based guidelines increasingly define standards of care, the accurate reporting of patterns of treatment becomes critical to determine if appropriate care has been provided. We explore the level of agreement between claims and record abstraction for treatment regimens for prostate cancer.

Methods—Medicare claims data were linked to medical records abstraction using data from the Centers for Disease Control and Prevention's National Program of Cancer Registry–funded Breast and Prostate Patterns of Care study. The first course of therapy included surgery, radiation therapy (RT), and hormonal therapy with luteinizing hormone–releasing hormone agonists.

Results—The linked sample included 2765 men most (84.7%) of whom had stage II prostate cancer. Agreement was excellent for surgery ($\kappa = 0.92$) and RT ($\kappa = 0.92$) and lower for hormonal therapy ($\kappa = 0.71$); however, most of the discrepancies were due to greater number of patients reported who received hormonal therapy in the claims database than in the medical records database. For some standard multicomponent management strategies sensitivities were high, for example, hormonal therapy with either combination RT (86.9%) or cryosurgery (96.6%).

Conclusions—Medicare claims are sensitive for determining patterns of multicomponent care for prostate cancer and for detecting use of hormonal therapy when not reported in the medical records abstracts.

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The authors declare no conflict of interest.

Keywords

prostate cancer; Medicare; claims; administrative data

Evidence-based guidelines for prostate cancer that are derived from clinical trials can improve outcomes of care. As the treatment for prostate cancer is changing rapidly, particularly with regard to radiation therapy (RT), multiple approaches based on life expectancy, comorbidities, and quality of life, might be considered appropriate. The comparative effectiveness of various approaches can be studied at the population level.[1] Although cancer registries, by design, are not set up to obtain comprehensive and quality-controlled treatment data, enhanced data can be obtained by reabstraction of hospital data and contact with physician and outpatient facilities. Such reabstraction can secure more complete information on RT, chemotherapy, and hormonal therapy, as was done in the Centers for Disease Control and Prevention National Program of Cancer Registries Patterns of Care for Breast and Prostate Cancer study. In contrast, Claims databases are structured to capture all therapies for the purpose of billing, but may be difficult to consolidate for a given patient and have other limitations, which have been discussed in the literature.[2–8]

Previous studies have generally shown a high level of agreement between claims and records.[9–16] There is little evidence, however, regarding whether treatment regimens with multiple components (surgery, radiation, and hormonal therapy) or specific kinds of RT have as high a level of agreement. We aimed to examine the level of agreement between Medicare claims and record review for treatment of prostate cancer. This study advances the literature by comparing data from the 2 sources for single and multiple component prostate cancer therapy, and by examining specific types of RT for this disease.

METHODS

The Centers for Disease Control and Prevention (CDC) National Program of Cancer Registries (NPCR) patterns of care for breast and prostate cancer study (POCBP) was the source of data for this study. Data related to the diagnosis and treatment of breast and prostate cancers diagnosed in 2004 were reabstracted from hospitals, radiation facilities, and oncologists' offices in 7 states (California, Georgia, Kentucky, Louisiana, Minnesota, North Carolina, and Wisconsin), including 9017 randomly selected cases of invasive prostate cancer (C61.9). Minorities and Appalachian residents were over sampled. Cases diagnosed at Veterans Affairs hospitals and through autopsies or deaths certificates were excluded. Institutional Review Board approval was secured from 5 of the 7 states to send unique patient identifiers to the Centers for Medicare and Medicaid Services to link POCBP data with Medicare claims. Medicare is the primary insurer for 97% of the US population aged 65 years and older, covering inpatient hospital care (part A) and outpatient care and physician services (part B). There were 6862 men with prostate cancer from the 5 participating states. Records for these men were linked to claims data to capture treatment in the 12 months after diagnosis. We excluded 2968 patients because they were under 65 years of age. Another 1129 patients were excluded because they had incomplete Medicare

coverage, managed care enrollment, or lack of Medicare claims. The final sample was 2765 patients.

TREATMENT ASSESSMENT MEDICAL RECORDS

The overall goal of the POCBP study was to ascertain whether or not the patient had received guideline-concordant care based on National Comprehensive Cancer Network guidelines for prostate cancer[17] in their year of diagnosis. To obtain complete treatment data to assess quality of care, registries reviewed not only hospital medical records but also outpatient records when there was no adequate information to determine guideline-concordant care.

Definitions of Treatment

We used the standard North American Association of Central Cancer Registries data collection rules (http://seer.cancer.gov/tools/codingmanuals/historical.html) to gather information on first course of treatment and defined it as the therapy regimen that is given or planned. First course of treatment could extend up to 1 year or more after cancer diagnosis. We categorized surgery as: (1) prostatectomy (simple, subtotal, segmental, or radical); (2) cryosurgery; (3) hyperthermia, laser surgery, radiofrequency ablation, or microwave. We differentiated RT into: (1) external beam (including 3D combination RT); (2) brachytherapy; and (3) combination of external beam and brachytherapy, seed, or radiotherapy. Hormonal therapy was based on receipt of luteinizing hormone–releasing hormone (LHRH) agonists including goserelin acetate, leuprolide, and leuproliden implants.

Other Covariates

Covariates in the multivariate models were AJCC stage (stages I, II, III, or IV),[18] comorbidity score from the ACE-27 comorbidity index (none, mild, moderate, or severe),[19] age (65–74 vs. 75+ y), urban/rural location, race/ethnicity (White, non-Hispanic; Black, non-Hispanic; American Indian/Alaska Native (AI/AN), non-Hispanic, Asian/Pacific Islander (API), non-Hispanic, Hispanic), source of payment (Medicaid, private insurance, or none vs. Medicare or other public payer), source of medical records (hospital chart only not requiring physician verification, no verification of physician offices, or unified chart vs. 1 or more physician offices), and cancer registry.

TREATMENT ASSESSMENT CLAIMS

We derived treatment information from all available Medicare claims files (hospital, outpatient, physician, hospice, home health, durable medical equipment, and skilled nursing) during a 1-year time window after cancer diagnosis. Service codes categorize services by type. We only used claims from the physician file with a service code of medical, surgical, or consultation, and thereby assume that such claims were more likely to be recorded or “directed” by physicians. Claims with other service codes, for example, radiology and laboratory, were excluded. Treatments were classified similar to their medical record counterparts but on the basis of International Classification of Diseases,[20] Current Procedure Terminology,[21] or Healthcare Common Procedure Coding System codes (Appendix 1).

STATISTICAL ANALYSIS

We reported patient, payer, and sociodemographic characteristics of our included sample and those patients who were excluded from the analysis, and tested for significant differences. We assessed agreement between the Medicare claims and POCBP-abstracted medical records for surgery, radiation, and LHRH hormonal therapy, and calculated the sensitivity of the Medicare claims data using the POCBP medical records as the "gold standard." We assessed reliability by calculating the κ statistic for each treatment component, and various combinations of these components, and interpreted the κ statistics according to the following[22]: excellent (0.81–1.00), substantial (0.61–0.80), moderate (0.41–0.60), fair (0.21–0.40), slight (0.00–0.20), and <0.00 (poor). We also assessed sensitivity of the claims data when using different sources of Medicare claims (eg, inpatient only and inpatient plus physician.) Finally, we estimated 3 multivariate logistic regressions for the 3 treatment outcomes (surgery, radiation, and LHRH hormonal therapy) to identify predictors of agreement between claims and records for surgery, radiation, or LHRH agonist therapy. SAS version 9.2 and 9.3 was used in all analyses.

RESULTS

Patient characteristics of men aged 65+ whose records were linked to Medicare claims and those who were not able to be linked for various reasons are shown in Table 1. There were statistically significant differences between the study sample and those not included in the study with respect to age, stage, payer, urban/rural location, registry, and race/ethnicity. In particular, cases not included in the study were more likely Hispanic and API, private pay or uninsured, from urban areas, and residents of 1 urban registry from a state with high proportion of HMO patients ($P < 0.01$ for race, payer, urban/rural location, and registry).

When Medicare claims were compared with records abstraction (Table 2), the κ statistics for surgery and RT were high (0.92 and 0.92, respectively) as were the sensitivities of claims using records as the gold standard for all of the surgical or RT options overall (96.8% and 96.2%, respectively). For detecting treatment with LHRH agonists, overall sensitivity of claims was high (95.3%) and κ was 0.71. As LHRH agonists are administered in the outpatient setting, it was of interest to find that there were 335 cases (or nearly 27%) where claims indicated use of LHRH agonists but medical records did not, compared with 47 (5%) for which use was only indicated in the medical records data. When the analysis was stratified by state (unreported) for LHRH, the percentage of claims not documented by records ranged from 21.6% to 40.8% across the 5 states, and the percentage of records not represented by claims ranged from 0% to 11.8%. The sensitivities of individual local treatment modalities were nearly as high as the overall treatment categories with the exception of the category of the less commonly used treatments of laser ablation, hyperthermia, radiofrequency, or microwave treatments.

The most common single and combination treatment options were external beam radiation with LHRH agonists, radical prostatectomy only, and LHRH agonists only (Table 3). The highest sensitivities are reported for cryosurgery with LHRH agonists (96.6%) and radical prostatectomy alone (91.9%). Relatively low sensitivities were found for some regimens,

including external beam radiation only (56.6%), combination RT alone (77.2%), brachytherapy with hormonal therapy (73.7%), and the no treatment option (64.7%).

The effect of using different sources of claims data (Table 4) show that Medicare hospital claims only were unable to identify hyper/laser surgery, any kind of RT, and LHRH agonists. For surgery, sensitivity for radical prostatectomy was high with hospital files alone and not substantially improved with additional files. For cryosurgery, sensitivity improved after adding physician files to hospital files. Sensitivity for external beam radiation and combination RT improved substantially when outpatient files were added to hospital and physician files, although additional files did not improve sensitivity for brachytherapy.

We conducted 3 separate multivariate logistic regression models to predict concordance between claims and records for (1) any surgery, (2) any radiation, and (3) hormonal therapy (Table 5). All regression models included covariates for state registries, comorbidity burden, age, location (urban, rural, and mix), race/ethnicity, source of payment, and abstraction method. Those with mild or severe comorbidity (vs. none) or stage 1 prostate cancer (vs. 4) were less likely to have concordance for surgery [odds ratio (OR) = 0.677, 0.400, and 0.212, respectively]. Younger men were much more likely to have concordance (OR = 2.245) and those whose records were abstracted from hospital charts only had half the odds of concordance for surgery (OR = 0.547). The odds of agreement for RT from both sources of data were lower for patients with stage 2 (vs. 4) disease (OR = 0.270). The odds of concordance for hormonal therapy was higher for those with stage 1 or 2 (vs. 4) but lower for those with a source of payment of Medicaid (vs. Medicare and other public insurances) (OR = 4.336, 2.627, and 0.653, respectively).

DISCUSSION

We compared Medicare claims to medical record review as sources for information on treatment regimens for prostate cancer. The results showed that claims are a sensitive source of information even for multicomponent treatment strategies including specific types of surgery or radiation and hormonal therapy. Findings regarding the sensitivity of Medicare claims using records as the gold standard for different prostate cancer regimens have not been previously reported. Moreover, the excess of claims over records for LHRH agonists suggests that claims could be an additional source of information on this important treatment modality.

Our findings of a high level of agreement between claims and record review for detecting prostate cancer surgery and RT overall are generally consistent with the literature.

Although there is some discordance between medical claims compared with chart review or tumor registry data with respect to type of surgery, receipt of chemotherapy, and radiation, previous studies have found agreement to be relatively high between the 2 sources for single therapies. This has been demonstrated for prostate, breast, and other cancers.[9–13] For example, Virnig et al[13] reported κ statistics of 0.84–0.89 for prostate cancer treatment when comparing Medicare claims to Surveillance, Epidemiology, and End Results (SEER) data, with slightly higher rates of agreement for radical surgery versus resection or no surgery/

biopsy. Virnig et al[13] showed that radiotherapy for prostate cancer also seems to be consistently reported in both claims and medical records. A comparison of any radiation treatment on Medicare claims to radiation treatment reported by the SEER program found a level of agreement of 93.1% for prostate cancer with a κ statistic of 0.85.

We found the sensitivity of Medicare claims to records for hormonal therapy using LHRH agonists to be 95.3%, and that Medicare claims identified about one-third more patients with this therapy than record review (1247 vs. 959 patients). Kuo et al[23] studied GnRH agonists use in men with SEER-Medicare data. They found that 8.9% of incident GnRH users had no prostate cancer diagnosis in SEER data, and that GnRH users without a tumor registry diagnosis were more likely to be older, black, and have comorbidities; factors that are probably typical of patients with incomplete diagnostic evaluations for cancer.[16,24,25] Our finding that claims data are an important source of information on hormonal therapy complements the work of Kou and suggests that these data are useful as both diagnosis and treatment indicators.

Use of additional Medicare files compared with hospital claims alone improved the comparability of claims with medical records for all therapies except for radical prostatectomy, where hospital claims alone provided a high level of sensitivity. This was particularly true for cryosurgery (62.8% sensitivity with hospital claims only, 95.6% sensitivity with hospital, physician, and outpatients claims). Moreover, radiation and hormonal therapy could only be identified from physicians and/or outpatient claims. Furthermore, for RT, physician files alone were only adequate for brachytherapy, whereas for external beam or combination RT, outpatient files substantially improved sensitivity.

A modest level of agreement was found for some specific treatment regimens. For example, nearly 27% of LHRH therapy recognized in claims was not recognized by record review. The scope and method of data collection of the POCBP study may be a factor. Although medical record abstraction is considered by most the “gold standard” of first course of treatment, such abstraction often focuses only on the hospital record.[22] By contrast, the POCBP abstractors also reviewed outpatient data for most cases. This notwithstanding, the claims data indicate that there were components of care that may have been missed by chart reviews. That there are claims undocumented in the medical record is therefore not surprising given that there was variability in the extent to which the registries pursued outpatient records from radiation facilities and oncologist offices. As LHRH is commonly administered in an outpatient setting, these therapies may have been missed in the reabstraction from registries than were less aggressive in the pursuit of outpatient records. In addition, the medical record abstraction was directed toward first course of treatment regimens, whereas Medicare claims were reviewed within a predefined time window of 1 year. Therefore as we could not discern the endpoint for first course of therapy in claims, Medicare claims could not distinguish between adjuvant/curative RT and palliative RT. If first course of treatment exceeded 1 year, the treatment would be recognized by record review but not by claims. This may lead to an underestimate of agreement and sensitivity of claims to records; however, this did not seem to be reflected in our data as sensitivity was uniformly high and when there was disagreement between the 2 sources, it was more likely that the treatment was reported in the Medicare data than in the medical records. We also

found that no treatment was much more likely to be suggested by medical records and that hormonal therapy and radiation were much more likely to be suggested by claims. At least some of this discordance could reflect active surveillance followed by a second course of treatment or palliative care after progression. In such cases, medical records would have no treatment recorded as only the first course of treatment is abstracted, but claims would pick up subsequent courses of treatment and palliative care occurring in the first year.

The multivariate analyses to identify predictors of concordance was only somewhat elucidating. It is unclear why comorbidity burden or earlier stage of disease would lead to less agreement, except to the extent that such patients may be more likely to be treated in an outpatient setting only. This would be supported by the finding that reabstraction from hospital charts only had half the odds of concordance compared with patients whose records abstraction included at least 1 physician office.

We are aware of both strengths and weaknesses of our study. Strengths include the large sample size and geographic diversity, including data from 5 different states. Moreover, the POCBP study used a thorough method of chart review,[26] with reabstraction of hospital records and contact with doctors' offices. The follow-up was active and more focused for treatment information than registries funded by the CDC's NPCR. Thus inclusion of treatment information from the medical record review in this study should be more complete than that obtained routinely by both SEER and NPCR tumor registries.

Limitations include the timing of the POCBP abstracting (nearly 5 y after diagnosis when some records may have been no longer available), and the inability to control for incongruities between the initial course of treatment time window for records and the 1-year time frame for Medicare claims. Limitations associated with the claims data include the purpose of claims being primarily for reimbursement,[2] the bundling of some procedures into office visits,[3] providers failing to bill for some procedures,[4,5] the underreporting of chronic disease, other underlying conditions, or procedures that do not result in additional reimbursement,[6,7] and coding errors.[8,27–30] Finally, the study is limited to men 65 years and older, those with complete Medicare coverage, and no managed care involvement.

In conclusion, claims are a readily available, inexpensive, and convenient source of data for epidemiologic research, and we have shown that, for prostate cancer, they provide greater coverage of hormonal therapy, which is often delivered in the outpatient setting. Medical record review is considerably more expensive and logistically difficult. Although it has the reputation of being a more sensitive metric for identifying treatment patterns, it is not without flaws.[31] It would seem prudent at this juncture to establish the extent to which claims are an acceptable, accurate, and sensitive source of specific cancer treatment regimens. As Medicare claims are a highly sensitive source of information on surgery, radiation, and hormonal therapy for prostate cancer compared with medical records, we suggest using claims as a supplement to registry data, the utility of which has been demonstrated by others[16] or when collection of complete treatment data through medical record review is unfeasible.

Acknowledgments

The Breast and Prostate Cancer Data Quality and Patterns of Care Study was supported by the Centers for Disease Control and Prevention through cooperative agreements with the California Cancer Registry (Public Health Institute) (1-U01-DP000260), Emory University (1-U01-DP000258), Louisiana State University Health Sciences Center (1-U01-DP000253), Minnesota Cancer Surveillance System (Minnesota Department of Health) (1-U01-DP000259), Medical College of Wisconsin (1-U01-DP000261), University of Kentucky (1-U01-DP000251), and Wake Forest University (1-U01-DP000264). The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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APPENDIX 1

TABLE A1

Description of Treatment Based on Medicare Claims—Prostate Cancer

Treatment Category	Treatment Type	Procedures
Surgery	Subtotal, segmental, or simple prostatectomy	ICD: 603, 604
		CPT: 55801, 55821, 55831
	Radical prostatectomy	ICD: 605
		CPT: 55810, 55812, 55815, 55840, 55842, 55845, 55866
	Prostatectomy NOS	ICD: 606, 6061, 6062, 6069
		CPT: 55899
	Cryoprostatectomy/cryosurgery+TURP	ICD: 6062
		CPT: 55873
	Laser ablation/hyperthermia/radiofrequency, microwave	ICD: 6096, 6097
		CPT: 53850, 53852, 52647, 52648, 55853
		ICD:
	Other laparoscopic	CPT: 55866
Hormonal therapy	LHRH agonists	CPT: J9202, J9217, J9218, J9219
Radiation	Not otherwise specified	CPT: 0073T, 77371, 77372, 77373, G0174
	External beams	CPT: 77401–77423, 77520, 77522, 77523, 77525

Treatment Category	Treatment Type	Procedures
	Brachytherapy	CPT 77326–77328, 77776–77778, 77781–77784, 77790, 77799, 19296, 19298, 19499, 55859
	Radiotherapy	CPT: 79005, 79101, 79200, 79300, 79440, 79445, 79999
	Seed	CPT: 55876
	Combination therapy	Beams and (brachytherapy, seed, or radio)

CPT indicates Current Procedure Terminology; ICD, International Classification of Diseases; LHRH, luteinizing hormone–releasing hormone.

TABLE 1

Frequency Distribution of Characteristics of Men Aged 65 Years and Older With Prostate Cancer, by Inclusion Status; 2765 Prostate Cancer Patients, NPCR POCBP Study

	N (%)	
	Cases Included (n = 2765)	**Cases Excluded (n = 1129)**
Comorbidity score		
None	712 (27.0%)	310 (29.2%)
Mild	1475 (56.0%)	582 (54.9%)
Moderate	319 (12.1%)	117 (11.0%)
Severe	130 (4.9%)	52 (4.9%)
Age *		
65–70	1162 (42.0%)	535 (47.4%)
71–75	777 (28.1%)	292 (25.9%)
76–80	504 (18.2%)	195 (17.3%)
81–85	221 (8.0%)	74 (6.6%)
> 85	101 (3.7%)	33 (2.9%)
AJCC stage *		
0	5 (0.2%)	2 (0.2%)
1	78 (2.8%)	38 (3.4%)
2	2342 (84.7%)	905 (80.2%)
3	70 (2.5%)	23 (2.0%)
4	114 (4.1%)	72 (6.4%)
Missing	156 (5.6%)	89 (7.9%)
Payer *		
Medicare or other public	1673 (62.3%)	431 (39.0%)
Medicaid	283 (10.5%)	107 (9.7%)
Private	715 (26.6%)	543 (49.1%)
None	16 (0.6%)	25 (2.3%)
Urban/rural *		
Urban	1059 (38.5%)	827 (73.8%)
Rural	528 (19.2%)	48 (4.3%)
Urban/rural Mix	1164 (42.3%)	246 (21.9%)
Registry *		
California	371 (13.4%)	598 (53.0%)
Georgia	850 (30.7%)	146 (12.9%)
Kentucky	239 (8.7%)	30 (2.7%)
Louisiana	824 (29.8%)	263 (23.3%)
North Carolina	481 (17.4%)	92 (8.2%)
Race/ethnicity *		
White, non-Hispanic	1635 (59.1%)	369 (32.7%)
Black, non-Hispanic	887 (32.1%)	388 (34.4%)

	N (%)	
	Cases Included (n = 2765)	**Cases Excluded (n = 1129)**
AI/AN, non-Hispanic	15 (0.5%)	2 (0.2%)
API, non-Hispanic	86 (3.1%)	135 (12.0%)
Hispanic	142 (5.1%)	235 (20.8%)

$^{*}P < 0.01$, χ^2.

Med Care. Author manuscript; available in PMC 2018 March 29.

TABLE 2

Reliability and Sensitivity of Medicare Claims With Medical Record Abstraction for Prostate Cancer Surgery, Radiation Therapy, Hormonal Therapy, NPCR POCBP Study

Treatment*	Claims	Records	Concordant Cases	Claims (y) Records (n)	Claims (n) Records (y)	Sensitivity	κ*
Surgery‡ (n = 2700)	635	595	576	59	19	96.8	0.92
Prostatectomy (radical, subtotal, segmental, simple)	487	490	477	10	13	97.3	0.97
Cryotherapy	98	91	87	11	4	95.6	0.92
Hyper/laser§	28	12	7	21	5	58.3	0.35
Radiation therapy‖ (n = 2696)	1382	1380	1327	55	53	96.2	0.92
External beam	1103	825	786	317	39	95.3	0.72
Brachytherapy	643	301	286	357	15	95.0	0.54
Combination of external beam and brachytherapy	371	242	227	144	15	93.8	0.71
Hormonal therapy (LHRH agonists) (n = 2690)	1247	959	912	335	47	95.3	0.71

*Unknown treatment excluded from analyses; TURP not considered surgery.

†POCBP medical records used as gold standard.

‡Includes with or without RT or LHRH agonists

§Includes laser ablation, hyperthermia, radiofrequency, or microwave treatments.

‖Includes with or without surgery or LHRH agonists.

TABLE 3

Reliability and Sensitivity of Medicare Claims With Medical Record Abstraction for Receipt of Single Therapies and Combinations of Prostate Cancer Surgery, Radiation, and Hormonal Treatment (n = 2665 [*]), NPCR POCBP Study

	Claims	Records	Concordant Cases	Claims (y) Records (n)	Claims (n) Records (y)	Sensitivity	κ
Single therapy treatment regimens							
External beams	235	376	213	22	163	56.6	0.65
Brachytherapy	173	221	160	13	61	72.4	0.79
Prostatectomy	407	433	398	9	35	91.9	0.94
Cryosurgery	51	59	48	3	11	81.4	0.87
LHRH agonists	416	303	267	149	36	88.1	0.67
Combination therapies							
Radiation combination only	194	158	122	72	36	77.2	0.67
Radiation (external beams), LHRH agonists	442	411	324	118	87	78.8	0.70
Brachytherapy, LHRH agonists	85	76	56	29	20	73.7	0.69
Radiation (Combination), LHRH agonists	161	84	73	88	11	86.9	0.58
Prostatectomy, LHRH agonists	41	30	23	18	7	76.7	0.64
Cryosurgery, LHRH agonists	42	29	28	14	1	96.6	0.79
No treatment	329	433	280	49	153	64.7	0.69

[*] 100 patients omitted due to unknown surgical, hormonal, and radiation therapy status.

TABLE 4

Comparing the Sensitivity* of Medicare Claims to Record Abstraction Using Different Sources of Medicare Claims: Prostate Cancer Patients, NPCR POCBP Study

	Source of Medicare Claims			
Treatment†	**Hospital (H)**	**Hospital+Physician (HP)**	**Hospital+Physician+Outpatient (HPO)**	**All‡**
Surgery (n = 2705)	95.0	96.2	96.8	96.8
Prostatectomy	98.3	97.5	97.3	97.3
Cryosurgery	62.8	91.2	95.6	95.6
Hyper/laser	0.0	58.3	58.3	58.3
Radiation (n = 2700)	0.0	60.6	96.2	96.2
External beam	0.0	29.3	95.3	95.3
Brachytherapy	0.0	94.3	95.0	95.0
Combination	0.0	45.4	93.8	93.8
Hormonal therapy (n = 2690)	0.0	91.4	95.2	95.3

*With the sources of Medicare claims, sensitivity is measured as the percentage of patients with records identified therapies that are confirmed by claims.

†Sample size depends on source of claims (H, HP, HPO, All) and treatment type; for surgery (1078, 2698, 2704, and 2705, respectively); for radiation (1077, 2693, 2700, and 2700, respectively); for hormonal therapy (1072, 2683, 2690, and 2690, respectively).

‡The All category includes hospice, home health care, skilled nursing, and durable medical equipment.

TABLE 5

Multivariate Logistic Regression* Analysis of Factors Associated With Claims/Records Agreement for Prostate Cancer Surgery, Radiation Therapy, and LHRH Agonists Prostate Cancer Patients, NPCR POCBP Study

	Surgery (n = 2396)		Radiation (n = 2387)		LHRH Agonists (n = 2396)	
	Adjusted OR	**95% CI**	**Adjusted OR**	**95% CI**	**Adjusted OR**	**95% CI**
Comorbidity score						
Mild vs. none	0.677†	0.476–0.964	0.751	0.468–1.204	0.990	0.748–1.311
Moderate vs. none	1.226	0.706–2.128	0.903	0.462–1.764	1.207	0.788–1.849
Severe vs. none	0.400†	0.229–0.698	0.321	0.074–1.392	1.143	0.636–2.057
Stage						
1 vs. 4	0.212†	0.100–0.449	0.340	0.090–1.293	4.336†	1.746–10.770
2 vs. 4	1.475	0.831–2.618	0.270†	0.138–0.527	2.627	1.677–4.115
3 vs. 4	1.473	0.526–4.124	0.594	0.193–1.826	1.315†	0.626–2.762
Aged 65–74 vs. 75+	2.245†	1.699–2.966	—	—	—	—
Race						
Black vs. white	0.782	0.570–1.073	1.045	0.643–1.699	0.770	0.584–1.015
Hispanic vs. white	1.592	0.708–3.582	1.215	0.502–2.941	0.707	0.398–1.257
Other vs. white	0.812	0.372–1.770	0.681	0.188–2.461	0.545	0.296–1.006
Source of payment						
Medicaid vs. Medicare and other public	0.718	0.467–1.104	1.262	0.660–2.411	0.653†	0.455–0.936
Private vs. Medicare and other public	1.009	0.720–1.415	1.149	0.702–1.879	1.208	0.896–1.628
None vs. Medicare and other public	1.578	0.188–13.254	2.450	0.308–19.509	0.721	0.157–3.307
Source of data						
Hospital chart only (source record) vs. 1 or more physician offices	0.547†	0.379–0.790	0.812	0.451–1.463	1.030	0.748–1.418
No verification of any physician office vs. 1 or more physician offices	0.690	0.412–1.154	0.821	0.371–1.815	0.830	0.540–1.277
Unified chart vs. 1 or more physician offices	0.770	0.513–1.157	1.293	0.755–2.214	1.272	0.894–1.810

*Controlling for all variables in the table as well as location (urban, rural, and urban/rural) and registry. Cases omitted due to missing race, comorbidity score, stage 0, or missing/unknown surgery, radiation, or LHRH agonists.

†Statistically significant, $P < 0.05$.

CI indicates confidence interval; LHRH, luteinizing hormone–releasing hormone; OR, odds ratio.