

Supplemental Table 1. Healthcare Common Procedure Coding System (HCPCS) and International Classification of Diseases, Ninth Revision, Clinical Modification (ICD9-CM) codes used to assign prostate cancer treatments.

Treatment	HCPCS code	ICD9-CM code
Radical prostatectomy	55810, 55812, 55815, 55840, 55842, 55845, 55866	60.4, 60.5, 60.62
Radiotherapy	55859, 55860, 55862, 55865, 55875, 76873, 76965, 77373, 77380, 77381, 77401, 77402, 77403, 77404, 77406, 77407, 77408, 77409, 77411, 77412, 77413, 77414, 77416, 77417, 77418, 77419, 77420, 77421, 77425, 77427, 77430, 77431, 77435, 77470, 77499, 77520, 77522, 77523, 77525, 77750, 77761, 77762, 77763, 77776, 77777, 77778, 77781, 77782, 77783, 77784, 77785, 77786, 77787, 77789, 77790, 77799, C1164, C1174, C1325, C1350, C1700, C1701, C1702, C1703, C1704, C1705, C1706, C1707, C1708, C1709, C1710, C1711, C1712, C1715, C1716, C1717, C1718, C1719, C1720, C1728, C1790, C1791, C1792, C1793, C1794, C1795, C1796, C1797, C1798, C1799, C1800, C1801, C1802, C1803, C1804, C1805, C1806, C2632, C2633, C2634, C2635, C2636, C2638, C2639, C2640, C2641, C2642, C2643, G0256, G0261, Q3001, G0174, 0073T	92.20, 92.21, 92.22, 92.24, 92.27, 92.33, V58.0

Supplemental Table 2. Details of measurement of quality using Medicare claims. HCPCS:

Healthcare Common Procedure Coding System; hcfaspec: Health Care Financing

Administration provider specialty; ICD-9 CM: International Classification of Diseases, Ninth Revision, Clinical Modification.

Measure	Numerator	Denominator
1. Proportion of patients seen by both a urologist and a radiation oncologist between diagnosis and start of treatment.	Number of patients who were seen (HCPCS 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99241, 99242, 99243, 99244, 99245, 99271, 99272, 99273, 99274, 99275, 99354, 99355, 99358, 99359, 99251, 99252, 99253, 99254, 99255, 55700, 55705, 55706, 76872, 76942) by both a urologist (hcfaspec 34) and a radiation oncologist (hcfaspec 92) between diagnosis and treatment.	Number of patients undergoing surgery or radiotherapy.
2. Proportion of patients with low-risk* cancer avoiding receipt of a non-indicated bone scan.	Number of low-risk* patients with a claim for a bone scan (ICD9-CM 92.14, HCPCS 78300, 78305, 78306, 78315, 78320) with a corresponding ICD9 diagnosis code for prostate cancer (185 or V10.46) between diagnosis and treatment.	Number of low-risk* patients undergoing surgery or radiotherapy.
3. Proportion of patients with high-risk* cancer receiving adjuvant androgen deprivation therapy while undergoing radiotherapy	Number of high-risk* patients with a claim for at least one dose of androgen deprivation therapy (HCPCS 11980, 11981, 11982, 11983, 96400, 96402, G0356, C9216, C9430, J0128, S0165, J0970, J1000, J1056, J1380, J1390, J1410, J9165, J1675, J1950, J3315, J9155, J9202, J9217, J9218, J9219, J9225, J9226, Q2020, S0133, S9560) during the time-interval from 6 months prior to radiotherapy start to 6 months after radiotherapy end.	Number of high-risk* patients treated with radiotherapy.
4. Proportion of patients treated by a high volume provider.	Number of patients treated by a high volume surgeon** or a high volume radiation oncologist.***	Number of patients undergoing surgery or radiotherapy.
5a. Proportion of patients having at least two follow-up visits with a treating radiation oncologist	Number of patients with at least 2 evaluation and management visits (HCPCS 99024, 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99241, 99242, 99243, 99244, 99245, 99271, 99272, 99273, 99274, 99275, 99354, 99355, 99358, 99359) in the first year after completion of treatment with any provider who submitted a claim for radiation treatment (see Supplemental table 1 for radiation treatment codes).	Number of patients undergoing radiation therapy.

Measure	Numerator	Denominator
5b. Proportion of patients having at least two follow-up visits with a treating surgeon	Number of patients with at least 2 evaluation and management visits (HCPCS 99024, 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99241, 99242, 99243, 99244, 99245, 99271, 99272, 99273, 99274, 99275, 99354, 99355, 99358, 99359) in the first year after prostatectomy with any provider who submitted a claim for radical prostatectomy (see Supplemental table 1 for radical prostatectomy codes).	Number of patients undergoing radical prostatectomy.

* Prostate cancer risk was defined according to the D'Amico classification.¹³ Because SEER recorded PSA and Gleason grade beginning in 2004, patients who were diagnosed prior to 2004 did not qualify for the bone scan and adjuvant androgen deprivation therapy measures.

**The treating surgeon was identified using Unique Physician Identifier and National Provider Identifier Numbers, which are submitted with Medicare physician claims. Using an approach similar to previous studies (Begg CB, et al; NEJM 2002; 346:1138), we empirically defined high-volume surgeons as those who performed ≥ 6 annual radical prostatectomy procedures (upper tertile of the patient cohort). Although the absolute annual volume is likely an underestimation of true surgeon volume due to the use of Medicare data (only men 66 years and older included), previous studies have shown very high correlations between Medicare and all-payer surgeon volume ($r=0.91$; Begg CB, et al; NEJM 2002; 346:1138).

*** The treating radiation oncologist was assigned using the same identifiers as the provider who performed the clinical planning and simulation. We empirically defined high-volume radiation oncologists as those who treated ≥ 22 patients per year for prostate cancer (upper tertile of the patient cohort).