Supplemental Online Content

Kim DD, Daly AT, Koethe BC, et al. Low-value prostate-specific antigen test for prostate cancer screening and subsequent health care utilization and spending. JAMA Netw Open. 2022;5(11):e2243449. doi:10.1001/jamanetworkopen.2022.43449

**eTable 1.** Identifying Follow-up Care Directly Attributable to the Initial PSA Test

**eTable 2.** Study Characteristics of the Non-PSA and PSA Group: 2016, 2017, and 2018 (Unweighted)

**eTable 3.** Annual Utilization and Spending of Select Follow-up Services From a Low-Value PSA Screening: 2016, 2017, and 2018

**eTable 4.** Logistic Regression Model Results for Having a Low-Value PSA Screening: 2016, 2017, and 2018

This supplemental material has been provided by the authors to give readers additional information about their work.
**eTable 1. Identifying Follow-up Care Directly Attributable to the Initial PSA Test**

*CPT/HCPCS for specific PSA test-related services*

| Service                                      | Code                               | CE Category       |
|----------------------------------------------|------------------------------------|-------------------|
| Biopsy                                       | 55700, 55705, 55706, G0416          | Biopsy            |
| Brachytherapy, Needle Insertion, Interstitial Radioelement Application | 55875                              | Radiation         |
| Destruction                                  | 55873                              | Prostatectomy     |
| Thermotherapy                                | 53850, 53852, 0421T, 0582T, 53854  | Radiation         |
| Excision                                     | 55801, 55821, 55831, 55801, 55810, 55812, 55815, 55831, 55866, 55840, 55842, 55845, 55866, 55821, 52402, 52601, 52630, 0443T, 52450 | Prostatectomy     |
| Resection                                    | 52601, 52630                        | Prostatectomy     |
| Ultrasound                                   | 76872, 76873                       | Imaging           |
| Prostatectomy                                | 52601, 55801, 55810, 55812, 55815, 55831, 55840, 55842, 55845, 55866, 55821, 52601, 52630 | Prostatectomy     |
| PSA                                          | G0103, 84152, 84153, 84154          | PSA               |
### ICD-10 PCS for specific PSA test-related services

| Service               | All codes that start with | Specific Codes | CE Category   |
|-----------------------|---------------------------|----------------|---------------|
| Destruction of Prostate | 0V5                       | 0V500ZZ, 0V503ZZ, 0V504ZZ, 0V507ZZ, 0V508ZZ | Prostatectomy |
| Excision of Prostate  | 0VB                       | 0VB00ZX, 0VB00ZZ, 0VB03ZX, 0VB03ZZ, 0VB04ZX, 0VB04ZZ, 0VB07ZX, 0VB07ZZ, 0VB08ZX, 0VB08ZZ | Prostatectomy |
| Radiation             | 0VH                       | 0VH001Z, 0VH031Z, 0VH041Z, 0VH071Z, 0VH081Z, 0VH403Z, 0VH40YZ, 0VH433Z, 0VH43YZ, 0VH443Z, 0VH44YZ, 0VH473Z, 0VH47YZ, 0VH483Z, 0VH48YZ | Radiation    |
| Resection             | 0VT                       | 0VT00ZZ, 0VT04ZZ, 0VT07ZZ, 0VT08ZZ | Prostatectomy |
| Plain Radiography     | BV0                       | BV030ZZ, BV031ZZ, BV03YZZ | Imaging      |
| Procedure                                      | Code      | Description                |
|-----------------------------------------------|-----------|----------------------------|
| CT Scan                                       | BV2       | BV2300Z, BV230ZZ, BV2310Z, BV231ZZ, BV23Y0Z, BV23YZZ, BV23ZZZ | Imaging          |
| MRI                                           | BV3       | BV33Y0Z, BV33YZZ, BV33ZZZ  | Imaging          |
| Ultrasound                                    | BV4       | BV49ZZZ                     | Imaging          |
| Beam Radiation Using Photons                  | DV0       | DV000ZZ, DV001ZZ, DV002ZZ, DV003Z0, DV003ZZ, DV004ZZ, DV005ZZ, DV006ZZ | Radiation        |
| HDR Brachytherapy                             | DV1       | DV1097Z, DV1098Z, DV1099Z, DV109BZ, DV109CZ, DV109YZ, DV10B6Z, DV10B7Z, DV10B8Z, DV10B9Z, DV10BB1, DV10BBZ, DV10BCZ, DV10BYZ | Radiation        |
| Stereotactic Other Photon Radio Surgery       | DV2       | DV20DZZ, DV20HZZ, DV20IZZ   | Radiation        |
| Contact Radiation                             | DVY       | DVY07ZZ, DVY08ZZ, DVY0CZZ, DVY0FZZ, DVY0KZZ | Radiation        |
| Destruction using waterjet                    | XV5       | XV508A4                     | Prostatectomy    |
| Procedure     | Code  | Codes                                                                 | Procedure         |
|---------------|-------|----------------------------------------------------------------------|-------------------|
| Removal       | 0VP   | 0VP400Z 0VP401Z 0VP403Z 0VP407Z 0VP40JZ 0VP40KZ 0VP40YZ 0VP430Z 0VP431Z 0VP433Z 0VP437Z 0VP43JZ 0VP43KZ 0VP43YZ 0VP440Z 0VP441Z 0VP443Z 0VP447Z 0VP44JZ 0VP44KZ 0VP44YZ 0VP470Z 0VP471Z 0VP473Z 0VP477Z 0VP47JZ 0VP47KZ 0VP47YZ 0VP480Z 0VP481Z 0VP483Z 0VP487Z 0VP48JZ 0VP48KZ 0VP48YZ 0VP4X0Z 0VP4X1Z 0VP4X3Z | Prostatectomy     |
| Extirpation   | 0VC   | 0VC00ZZ 0VC03ZZ 0VC04ZZ 0VC07ZZ 0VC08ZZ | Prostatectomy     |
eTable 2. Study Characteristics of the Non-PSA and PSA Group: 2016, 2017, and 2018 (Unweighted)

|                  | 2016          | 2017          | 2018          |
|------------------|---------------|---------------|---------------|
|                  | Non-PSA       | PSA           | Non-PSA       | PSA           |
|                  | N=            | N=            | N=            | N=            |
|                  | 119,149       | 49,802        | 214,884       | 134,404       |
|                  | 71%           | 29%           | 62%           | 38%           |
|                  | 277,351       | 199,852       |               |               |
|                  | 58%           | 42%           |               |               |
| Mean Age         | 78.7          | 76.6          | 79.0          | 77.0          |
| Age group        |               |               |               |               |
| 70-74            | 30%           | 48%           | 30%           | 47%           |
|                  | 25%           | 28%           | 25%           | 29%           |
| 80-84            | 20%           | 14%           | 20%           | 14%           |
| 85+              | 25%           | 11%           | 25%           | 10%           |
| Race/Ethnicity   |               |               |               |               |
| Asian            | 2%            | 3%            | 2%            | 3%            |
| Black            | 7%            | 8%            | 8%            | 9%            |
| Hispanic         | 4%            | 6%            | 5%            | 8%            |
| White            | 78%           | 75%           | 74%           | 72%           |
| Missing          | 10%           | 8%            | 11%           | 9%            |
| Home Ownership   |               |               |               |               |
| Own              | 86%           | 87%           | 85%           | 87%           |
| Does not own     | 4%            | 4%            | 5%            | 4%            |
| Missing          | 10%           | 8%            | 11%           | 9%            |
| Census Region    |               |               |               |               |
| New England      | 18%           | 22%           | 17%           | 18%           |
| Midwest          | 44%           | 33%           | 39%           | 29%           |
| South            | 27%           | 36%           | 34%           | 44%           |
| West             | 10%           | 9%            | 10%           | 9%            |
| Charlton         | 2.0           | 1.6           | 1.9           | 1.5           |
| Comorbidity Index|               |               |               |               |
| Mean total number of healthcare visits | 22 | 21 | 24 | 22 |
| Median           | 14            | 15            | 15            | 16            |
| Mean total of medical spending | $9,209 | $8,109 | $13,985 | $10,435 |
| Median           | $2,693        | $2,488        | $3,811        | $3,146        |
|                  |               |               |               |               |

© 2022 Kim DD et al. JAMA Network Open.
### eTable 3. Annual Utilization and Spending of Select Follow-up Services From a Low-Value PSA Screening: 2016, 2017, and 2018

|                        | 2016       | 2017       | 2018       | All        |
|------------------------|------------|------------|------------|------------|
| **Utilization**        |            |            |            |            |
| Initial low-value PSA test | 100%       | 100%       | 100%       | 100%       |
| At least one follow-up service | 49.1%      | 58.3%      | 69.4%      | 62.8%      |
| Additional PSA Test    | 38.6%      | 46.7%      | 55.4%      | 50.1%      |
| Prostate Biopsy        | 4.5%       | 4.8%       | 6.2%       | 5.5%       |
| Imagining of the Prostate | 3.8%      | 4.2%       | 4.9%       | 4.5%       |
| Radiation Therapy      | 0.2%       | 0.2%       | 0.2%       | 0.2%       |
| Prostatectomy          | 2.0%       | 2.4%       | 2.6%       | 2.4%       |
| **Mean unit cost of care** |            |            |            |            |
| Initial low-value PSA test | $13        | $14        | $14        | $14        |
| All services received in follow-up care | $66        | $80        | $94        | $85        |
| Additional PSA Test    | $13        | $13        | $13        | $13        |
| Prostate Biopsy        | $251       | $268       | $273       | $268       |
| Imagining of the Prostate | $51        | $56        | $57        | $56        |
| Radiation Therapy      | $1,053     | $1,077     | $1,328     | $1,204     |
| Prostatectomy          | $1,848     | $2,021     | $2,205     | $2,093     |
| **Total Spending (per 100,000 beneficiaries)** |            |            |            |            |
| Initial low-value PSA test | $1,299,000 | $1,357,000 | $1,430,000 | $1,386,975 |
| All follow-up care     | $5,710,690 | $7,180,379 | $8,693,504 | $7,765,701 |
| Additional PSA Test    | $483,658   | $597,293   | $721,862   | $646,470   |
| Prostate Biopsy        | $1,128,240 | $1,285,104 | $1,695,018 | $1,476,145 |
| Imagining of the Prostate | $193,002   | $233,142   | $278,320   | $251,122   |
| Radiation Therapy      | $210,670   | $215,424   | $265,512   | $240,707   |
| Prostatectomy          | $3,695,120 | $4,849,416 | $5,732,792 | $5,151,256 |
**eTable 4. Logistic Regression Model Results for Having a Low-Value PSA Screening: 2016, 2017, and 2018**

|                        | 2016          | 2017          | 2018          |
|------------------------|---------------|---------------|---------------|
|                        | Odds Ratio    | 95% CI        | Odds Ratio    | 95% CI        | Odds Ratio    | 95% CI        |
| **Age group**          |               |               |               |
| 70-74                  | Ref           | Ref           | Ref           |
| 75-79                  | 0.70          | (0.69, 0.72)  | 0.76          | (0.75, 0.77)  | 0.78          | (0.77, 0.79)  |
| 80-84                  | 0.44          | (0.43, 0.46)  | 0.47          | (0.46, 0.48)  | 0.48          | (0.47, 0.49)  |
| 85+                    | 0.28          | (0.27, 0.29)  | 0.28          | (0.27, 0.29)  | 0.28          | (0.28, 0.29)  |
| **Race and Ethnicity** |               |               |               |
| White                  | Ref           | Ref           | Ref           |
| Black                  | 1.06          | (1.02, 1.11)  | 0.99          | (0.96, 1.02)  | 1.00          | (0.98, 1.03)  |
| Hispanic               | 1.38          | (1.31, 1.45)  | 1.57          | (1.52, 1.62)  | 1.61          | (1.56, 1.65)  |
| Asian                  | 1.38          | (1.28, 1.48)  | 1.45          | (1.38, 1.53)  | 1.43          | (1.37, 1.49)  |
| Missing                | 0.84          | (0.81, 0.88)  | 0.89          | (0.87, 0.92)  | 0.99          | (0.97, 1.01)  |
| **Home Ownership**     |               |               |               |
| Own                    | Ref           | Ref           | Ref           |
| Does not own           | 0.83          | (0.79, 0.88)  | 0.80          | (0.77, 0.83)  | 0.78          | (0.76, 0.81)  |
| **Census Region**      |               |               |               |
| New England            | Ref           | Ref           | Ref           |
| Midwest                | 0.57          | (0.55, 0.58)  | 0.72          | (0.71, 0.74)  | 0.74          | (0.73, 0.75)  |
| South                  | 1.00          | (0.97, 1.03)  | 1.25          | (1.23, 1.28)  | 1.27          | (1.25, 1.29)  |
| West                   | 0.65          | (0.62, 0.68)  | 0.83          | (0.81, 0.85)  | 0.87          | (0.85, 0.90)  |
| **Charlton Comorbidity Index** | 0.93          | (0.92, 0.94)  | 0.92          | (0.92, 0.93)  | 0.90          | (0.89, 0.90)  |
| **Total healthcare utilization quintiles** |               |               |               |
| First                  | Ref           | Ref           | Ref           |
| Second                 | 1.06          | (1.02, 1.10)  | 1.24          | (1.21, 1.28)  | 1.27          | (1.24, 1.30)  |

© 2022 Kim DD et al. *JAMA Network Open.*
|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| Third | 1.23  | (1.17, 1.29) | 1.53 (1.49, 1.58) | 1.56 (1.52, 1.60) |
| Fourth| 1.35  | (1.28, 1.41) | 1.82 (1.76, 1.88) | 1.91 (1.85, 1.96) |
| Fifth | 1.40  | (1.33, 1.48) | 2.06 (1.99, 2.13) | 2.34 (2.27, 2.42) |

**Total medical spending quintiles**

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| First | Ref   | Ref   | Ref   | Ref   |
| Second| 0.79  | (0.76, 0.82) | 0.80 (0.78, 0.83) | 0.91 (0.89, 0.93) |
| Third | 0.78  | (0.75, 0.82) | 0.71 (0.69, 0.74) | 0.83 (0.81, 0.86) |
| Fourth| 0.78  | (0.74, 0.82) | 0.66 (0.63, 0.68) | 0.72 (0.70, 0.74) |
| Fifth | 0.69  | (0.66, 0.73) | 0.52 (0.50, 0.54) | 0.54 (0.53, 0.56) |