Online-Only Supplement

“Development and Validation of a Life Expectancy Calculator for U.S. Prostate Cancer Patients,” by Chase EC, Bryant AK, Sun Y, et al.

Contents:

- Supplementary Methods: Variable Definitions
- Supplementary Tables:
  - Supplemental Table 1: Cause-specific and competing-risks time-dependent area-under-the-curves (AUCs) of the other-cause comorbidity-adjusted mortality (OCCAM) model in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial validation cohort of 8,220 men.
  - Supplemental Table 2: Cause-specific time-dependent area-under-the-curves (AUCs) of the other-cause comorbidity-adjusted mortality (OCCAM) model in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial validation cohort of 8,220 men, stratified by race.
  - Supplemental Table 3: Cause-specific time-dependent area-under-the-curves (AUCs) of the other-cause comorbidity-adjusted mortality (OCCAM) model in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial validation cohort of 8,220 men, stratified by marital status.
  - Supplemental Table 4: Cause-specific time-dependent area-under-the-curves (AUCs) of the other-cause comorbidity-adjusted mortality (OCCAM) model in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial validation cohort of 8,220 men, stratified by educational attainment.
  - Supplemental Table 5: Characteristics of a cohort of 7,596 men from the Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial, grouped by our other-cause comorbidity-adjusted mortality model (OCCAM)-predicted median survival time.
- Supplementary Figures:
  - Supplemental Figure 1: STROBE diagram to construct National Health and Nutrition Examination Survey training data and Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial validation data.
  - Supplemental Figure 2: Forest plot from full model using all candidate predictors, both unweighted and survey weighted, fit in the National Health and Nutrition Examination Survey training cohort of 2,420 men.
  - Supplemental Figure 3: Forest plot comparing the effect sizes of predictors from the unweighted and survey weighted versions of the other-cause comorbidity-adjusted mortality model fit in the National Health and Nutrition Examination Survey training cohort of 7,369 men.
  - Supplemental Figure 4: Externally validated time-dependent area-under-the-curves at 5, 10, and 15 years of our other-cause comorbidity-adjusted mortality model, the Social Security Administration 2001 actuarial life table predictions and the National Vital Statistics System’s 2001 life expectancy predictions.
  - Supplemental Figure 5: Calibration performance of other-cause comorbidity-adjusted mortality model (OCCAM) for 10- and 15-year risk of other-cause mortality (OCM) in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial cohort of 8,220 men with prostate cancer.
  - Supplemental Figure 6: Forest plot of the reduced other-cause comorbidity-adjusted mortality (OCCAM) model without education and marital status predictors, for both the unweighted and survey weighted versions of the model fit in the National Health and Nutrition Examination Survey training cohort of 7,369 men.
Supplementary Methods

Variable Definitions

We constructed some of our variables from other National Health and Nutrition Examination Survey (NHANES) variables. In particular:

1. We defined a patient as having hypertension if they reported a previous diagnosis of hypertension or if their blood pressure reading was hypertensive (we followed standard NHANES guidelines on constructing the blood pressure reading).
2. We defined a patient as having diabetes if they reported a previous diagnosis of diabetes or if their blood glucose met clinical criteria for diabetes.
3. We defined a patient as having high cholesterol if they reported high cholesterol, or if their blood work met clinical criteria for high cholesterol.
4. We defined patients as current smokers if they had smoked 100 cigarettes in their lifetime and reported smoking cigarettes every day or some days at present; we defined patients as former smokers if they had smoked 100 cigarettes in their lifetime and reported smoking not at all at present; we defined patients as never smokers if they had not smoked 100 cigarettes in their lifetime.
5. We collapsed marital status into three categories: married if the patient was currently married or living with a partner, separated if the patient was widowed, divorced, or separated from their partner, and single if the patient had never married or had a live-in partner.
6. We collapsed race into non-Hispanic white, non-Hispanic black, and all other races.

For all other variables, we used unmodified results from the NHANES questionnaires about demographics, health insurance, health care access, mental health, and medical history. For more information on variable definition and construction, please see the repository on GitHub.
Supplementary Tables

**Supplemental Table 1**: Cause-specific and competing-risks time-dependent area-under-the-curves (AUCs) of the other-cause comorbidity-adjusted model (OCCAM) in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial validation cohort of 8,220 men.

| Metric                | 5 Years | 10 Years | 15 Years |
|-----------------------|---------|----------|----------|
| Cause-specific AUC    | 0.70    | 0.75     | 0.78     |
| Competing-risks AUC  | 0.70    | 0.74     | 0.74     |

**Supplemental Table 2**: Cause-specific time-dependent area-under-the-curves (AUCs) of the other-cause comorbidity-adjusted mortality (OCCAM) model in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial validation cohort of 8,220 men, stratified by race.

| Race                     | 5 Years | 10 Years | 15 Years |
|--------------------------|---------|----------|----------|
| Non-Hispanic Black       | 0.65    | 0.67     | 0.77     |
| Non-Hispanic White       | 0.70    | 0.75     | 0.75     |
| Other                    | 0.73    | 0.76     | 0.80     |

**Supplemental Table 3**: Cause-specific time-dependent area-under-the-curves (AUCs) of the other-cause comorbidity-adjusted mortality (OCCAM) model in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial validation cohort of 8,220 men, stratified by marital status.

| Marital Status | 5 Years | 10 Years | 15 Years |
|----------------|---------|----------|----------|
| Married        | 0.68    | 0.75     | 0.78     |
| Single         | 0.65    | 0.76     | 0.76     |
| Separated      | 0.76    | 0.75     | 0.77     |

**Supplemental Table 4**: Cause-specific time-dependent area-under-the-curves (AUCs) of the other-cause comorbidity-adjusted mortality (OCCAM) model in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial validation cohort of 8,220 men, stratified by educational attainment.

| Educational Attainment | 5 Years | 10 Years | 15 Years |
|------------------------|---------|----------|----------|
| Less than 9th grade    | 0.77    | 0.70     | 0.68     |
| 9th-11th grade         | 0.65    | 0.70     | 0.75     |
| High school graduate   | 0.68    | 0.72     | 0.75     |
| Some college           | 0.72    | 0.74     | 0.77     |
| College graduate       | 0.68    | 0.76     | 0.79     |
Supplemental Table 5: Characteristics of a cohort of 7,596 men from the Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial, grouped by our other-cause comorbidity-adjusted mortality model (OCCAM)-predicted median survival time.

| Predictor                          | 15+  | 10 to 15 | 5 to 10 | < 5  |
|------------------------------------|------|----------|---------|------|
| N                                  | 3458 | 2799     | 1307    | 32   |
| Age (mean (SD))                    | 65 (4.0) | 71 (3.9) | 76.4 (4.3) | 80.8 (3.8) |
| Race (%)                           |      |          |         |      |
| Non-Hispanic Black                 | 165 (4.8) | 175 (6.3) | 97 (7.4) | 3 (9.4) |
| Non-Hispanic White                 | 3143 (91) | 2468 (88) | 1114 (85) | 26 (81) |
| Other                              | 150 (4.3) | 156 (5.6) | 96 (7.3) | 3 (9.4) |
| Educational attainment (%)         |      |          |         |      |
| Less than 9th grade                | 31 (0.9) | 38 (1.4) | 13 (1.0) | 3 (9.4) |
| 9th-11th grade                     | 127 (3.7) | 248 (8.9) | 106 (8.1) | 2 (6.2) |
| HS graduate                        | 849 (25) | 426 (15) | 115 (8.8) | 2 (6.2) |
| Some college                       | 675 (20) | 1041 (37) | 666 (51) | 15 (47) |
| College graduate                   | 1776 (51) | 1046 (37) | 407 (31) | 10 (31) |
| Marital status (%)                 |      |          |         |      |
| Married                            | 3173 (92) | 2379 (85) | 947 (73) | 11 (34) |
| Separated                          | 234 (6.8) | 350 (13) | 273 (21) | 17 (53) |
| Single                             | 51 (1.5) | 70 (2.5) | 87 (6.7) | 4 (13) |
| Smoking status (%)                 |      |          |         |      |
| Current                            | 175 (5.1) | 262 (9.4) | 226 (17) | 16 (50) |
| Former                             | 1565 (45) | 1510 (54) | 736 (56) | 12 (38) |
| Never                              | 1718 (50) | 1027 (37) | 345 (26) | 4 (13) |
| Diabetes = Yes (%)                 | 101 (2.9) | 224 (8.0) | 149 (11) | 3 (9.4) |
| Hypertension = Yes (%)             | 846 (25) | 1112 (40) | 571 (44) | 11 (34) |
| Stroke = Yes (%)                   | 8 (0.2) | 58 (2.1) | 101 (7.7) | 5 (16) |
| BMI (%)                            |      |          |         |      |
| < 18.5                             | 2 (0.1) | 8 (0.3) | 6 (0.5) | 4 (13) |
| 18.5-25                            | 802 (23) | 811 (29) | 517 (40) | 17 (53) |
| 25-40                              | 2636 (76) | 1963 (70) | 761 (58) | 9 (28) |
| 40+                                | 18 (0.5) | 17 (0.6) | 23 (1.8) | 2 (6.2) |
| T stage (%)                        |      |          |         |      |
| N0                                 | 3067 (89) | 2389 (85) | 1099 (84) | 23 (72) |
| N1                                 | 47 (1.4) | 32 (1.1) | 15 (1.1) | 1 (3.1) |
| N2                                 | 9 (0.3) | 2 (0.1) | 0 (0.0) | 0 (0.0) |
| Missing                            | 335 (9.7) | 376 (13) | 193 (15) | 8 (25) |
| Gleason score (%)                  |      |          |         |      |
| <= 6                               | 2028 (59) | 1524 (54) | 604 (46) | 12 (38) |
| 7                                  | 1134 (33) | 893 (32) | 451 (35) | 9 (28) |
| 8                                  | 166 (4.8) | 223 (8.0) | 141 (11) | 6 (19) |
| 9                                  | 116 (3.4) | 147 (5.3) | 90 (6.9) | 4 (13) |
| 10                                 | 14 (0.4) | 12 (0.4) | 21 (1.6) | 1 (3.1) |
| PSA at diagnosis (mean (SD))       | 11 (89) | 12 (43) | 17 (65) | 48 (134) |
| NCCN risk group (%)                |      |          |         |      |
| Low                                | 906 (26) | 809 (29) | 326 (25) | 3 (9.4) |
| Intermediate                       | 794 (23) | 622 (22) | 327 (25) | 5 (16) |
| High                               | 613 (18) | 550 (20) | 296 (23) | 12 (38) |
|                         |       |       |       |     |
|-------------------------|-------|-------|-------|-----|
| Regional                | 56 (1.6) | 34 (1.2) | 15 (1.1) | 1 (3.1) |
| Missing                 | 1089 (32) | 784 (28) | 343 (26) | 11 (34) |
| Primary treatment (%)   |       |       |       |     |
| Active surveillance     | 219 (6.3) | 352 (13) | 279 (21) | 15 (47) |
| Other ablative treatment| 41 (1.2) | 73 (2.6) | 52 (4.0) | 1 (3.1) |
| Hormone alone           | 99 (2.9) | 215 (7.7) | 224 (17) | 10 (31) |
| Radiation alone         | 627 (18) | 690 (25) | 297 (23) | 2 (6.2) |
| Prostatectomy           | 1973 (57) | 759 (27) | 112 (8.6) | 0 (0.0) |
| Radiation + hormone     | 499 (14) | 710 (25) | 343 (26) | 4 (13) |
Supplementary Figures

Supplemental Figure 1: STROBE diagram to construct National Health and Nutrition Examination Survey training data and Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial validation data.
Supplemental Figure 2: Forest plot from full model using all candidate predictors, both unweighted and survey weighted, fit in the National Health and Nutrition Examination Survey training cohort of 2,420 men.
Supplemental Figure 3: Forest plot comparing the effect sizes of predictors from the unweighted and survey weighted versions of our other-cause comorbidity-adjusted mortality model (OCCAM) fit in the National Health and Nutrition Examination Survey (NHANES) training cohort of 7,369 men.
Supplemental Figure 4: Externally validated time-dependent area-under-the-curves at 5, 10, and 15 years of our other-cause comorbidity-adjusted mortality model, the Social Security Administration 2001 actuarial life table predictions, and the National Vital Statistics System’s 2001 life expectancy predictions. Models were validated in the Prostate, Lung, Colon, and Ovarian Cancer Screening Trial cohort of 8,220 men with prostate cancer.

AUC: area-under-the-curve, OCCAM: other-cause comorbidity-adjusted mortality model, NVSS: National Vital Statistics System life expectancy predictions, SSA: Social Security Administration life tables predictions
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