**SUPPLEMENTARY MATERIAL**

| Lab | Mean | SD | Mean(log) | SD(log) | % with lab test |
|---|---|---|---|---|---|
| 25-OH vitamin D | 21.5 | 9.7 | 2.9 | 0.52 | 4.0 |
| Bicarbonate | 25.2 | 3.3 | 3.2 | 0.14 | 95.8 |
| Blood urea nitrogen | 20.5 | 10.6 | 2.9 | 0.38 | 95.8 |
| Calcium | 9.1 | 0.6 | 2.2 | 0.07 | 91.5 |
| Chloride | 102.6 | 3.5 | 4.6 | 0.03 | 94.7 |
| Hematocrit | 38.6 | 5.0 | 3.6 | 0.14 | 90.2 |
| Hemoglobin | 12.7 | 1.8 | 2.5 | 0.15 | 90.2 |
| High-sensitivity C-reactive protein | 36.4 | 54.3 | 2.6 | 1.66 | 8.3 |
| Ionized calcium | 1.1 | 0.1 | 0.1 | 0.08 | 16.3 |
| Magnesium | 1.9 | 0.3 | 0.6 | 0.13 | 56.0 |
| Microalbumin creatinine ratio | 409.2 | 1027.6 | 3.8 | 2.07 | 8.9 |
| Parathyroid hormone | 139.3 | 215.3 | 4.4 | 1.06 | 2.7 |
| Phosphorous | 3.5 | 0.7 | 1.2 | 0.20 | 58.8 |
| Potassium | 4.3 | 0.5 | 1.5 | 0.11 | 95.8 |
| Sodium | 138.3 | 2.7 | 4.9 | 0.02 | 95.8 |
| Triglycerides | 156.8 | 159.2 | 4.9 | 0.56 | 62.5 |
| Uric acid | 6.2 | 2.3 | 1.8 | 0.38 | 17.4 |

Table 1: Summaries for the 17 laboratory tests used in the healthcare model. The columns with "Mean(log)" and "SD(log)" in the headings denote the mean and standard deviation on the log scale, respectively.

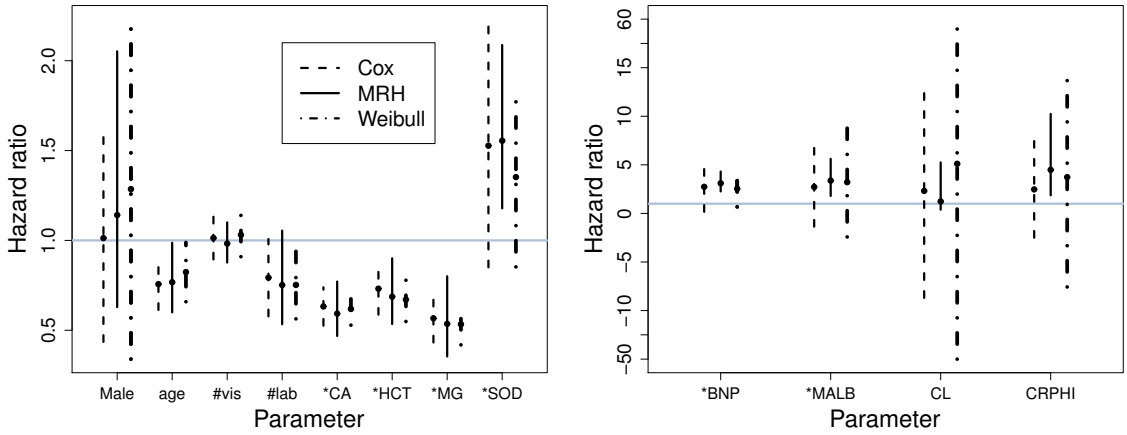


Figure 1: Estimates of the hazard ratios, with Cox estimates (dashed lines), Weibull estimates (dotted lines), and MRH estimates (solid lines) for the optimal healthcare model with lab values. The hazard ratio for the number of visits estimates the change due to an additional 1 visit, the hazard ratio for the number of laboratory tests estimates a 1-category increase in laboratory test count, and the hazard ratios for the continuous laboratory test variables (denoted by *) are based on an increase of 1 standard deviation on the log scale. Results are similar among the three methods, although when exponentiated, the MRH parameters have smaller uncertainty.

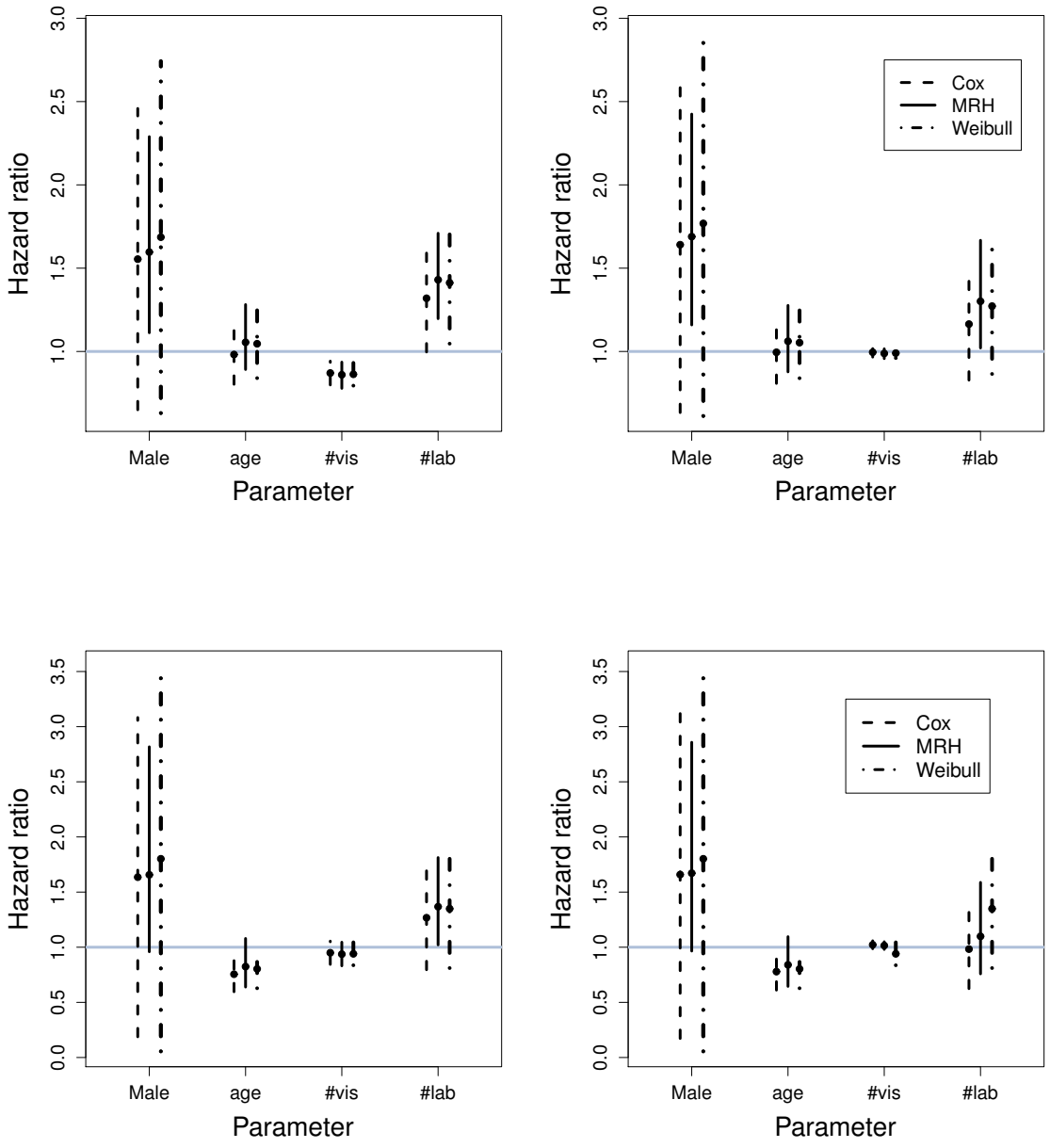


Figure 2: Estimates of the hazard ratios, with Cox estimates (dashed lines), Weibull estimates (dotted lines), and MRH estimates (solid lines) for the optimal healthcare model with lab values. The hazard ratio for the number of visits estimates the change due to an additional 1 visit, while the hazard ratio for the number of laboratory tests estimates a 1-category increase in laboratory test count. Results are similar among the three methods, although when exponentiated, the MRH parameters have smaller uncertainty. The top left graph is model A2, top right is model A1, bottom left is model B2, and bottom right is model B1.

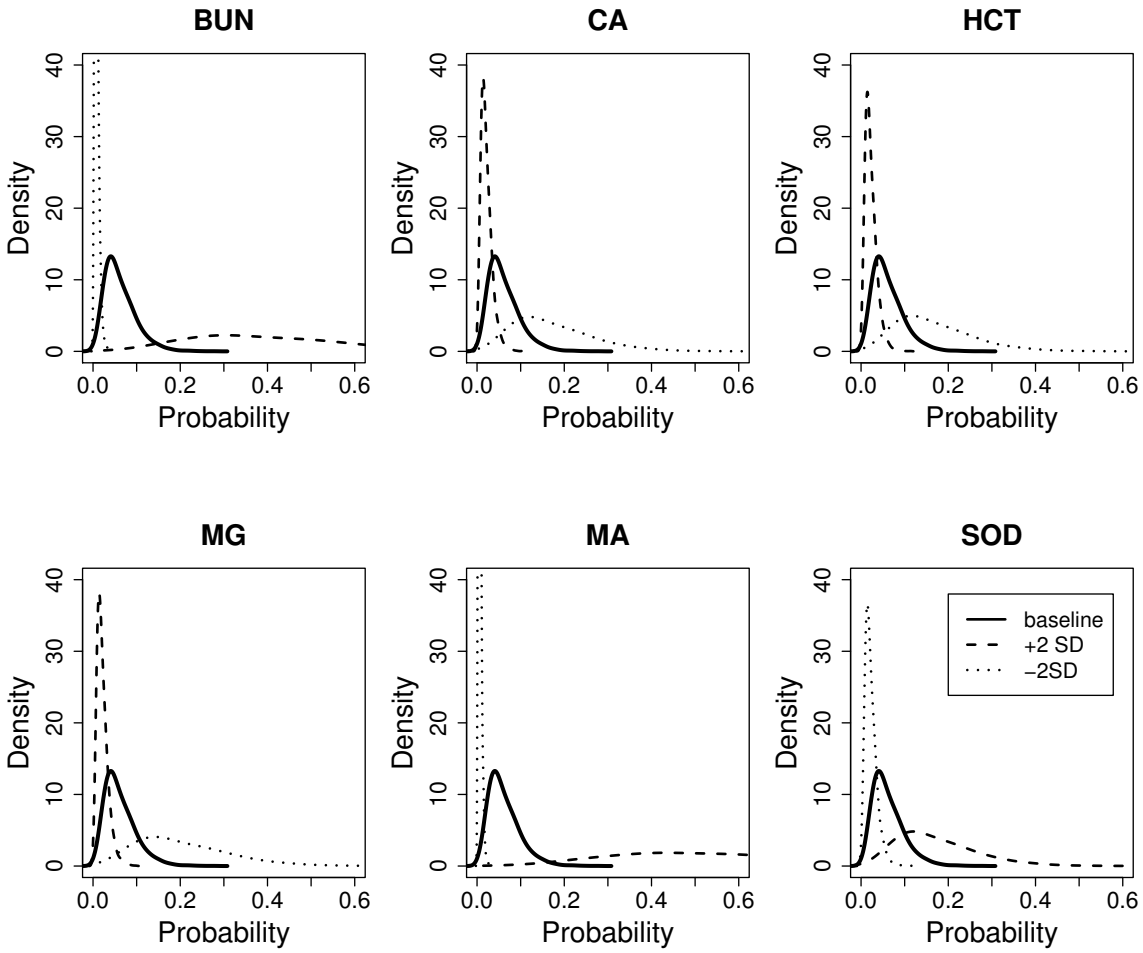


Figure 3: The posterior distribution of the probability of developing stage 4 CKD as a function of laboratory test values. The solid black line represents the baseline group, the dashed line represents 2 standard deviations above the mean, and the dotted line represents 2 standard deviations below the mean (all on the log scale). Each graph represents the effect of one of the six continuous laboratory tests used in the optimal model (holding all other variables fixed at their mean or null values): blood urea nitrogen (BUN), calcium (CA), hematocrit (HCT), magnesium (MG), microalbumin creatinine ratio (MA), and sodium (SOD). A two standard deviation decrease below the mean in BUN, MA, or SOD results in greatly lowering the probability of stage 4 CKD, while the opposite is true for CA, HCT and MG.

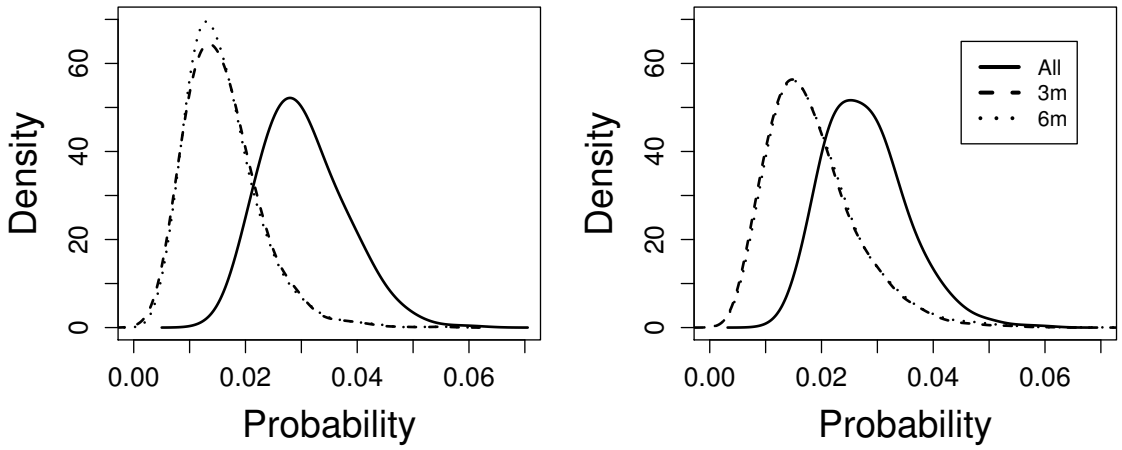


Figure 4: The posterior distribution of the probability of developing stage 4 CKD within one year of stage 3 CKD diagnosis. The solid line represents the probability of developing stage 4 CKD for all patients, the dashed line represents the probability of developing stage 4 CKD for patients with at least one laboratory test measure 3 or more months prior to stage 3 diagnosis, and the dotted line represents the probability of developing stage 4 CKD for patients with at least one laboratory test measure 6 or more months prior to stage 3 diagnosis. The figure on the left is for the models using the number of visits, with laboratory tests at least 3 days apart, and the figure on the right is for models using the number of visits, calculated using laboratory tests on each unique date. Both figures show that the probability of developing stage 4 CKD is higher for all patients when compared to the 3 month and 6 month patients.