Supplemental Digital Content

Supplemental Table 1. Measures of Predictive Performance between Black and White cases for the threshold of optimal sensitivity and specificity (VASQIP, RAI 26, 3.5%)

Supplemental Table 2. Measures of Predictive Performance between Black and White cases for the threshold of detectable frailty (NSQIP, RAI 30, 2.3% predicted 30-day mortality)

Supplemental Figure 1. Comparison of ROC curves between Black and White cases in the RAI_{Base} (NSQIP)

Supplemental Table 1. Measures of Predictive Performance between Black and White cases for the threshold of optimal sensitivity and specificity (VASQIP, RAI 26, 3.5%)

Bias Assessment

Comparative Model Performance

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	RAI _{Base}	RAI _{Balanced}	$RAI_{Age-adj}$	RAIFair		Δ from RAI	Base
	Statistic	Statistic	Statistic	Statistic	ΔRAI _{Balanced}	$\Delta RAI_{Age-adj}$	ΔRAI _{Fair}
Black	0.829	0.823	0.803	0.765	-0.6%	-2.6%	-6.4%
White	0.794	0.786	0.801	0.648	-0.8%	0.7%	-14.6%
Bias	3.5%	3.7%	0.2%	11.7%	0.2%	-3.3%	8.2%
Black	0.783	0.782	0.783	0.693	-0.1%	0.0%	-9.0%
White	0.762	0.76	0.761	0.68	-0.2%	-0.1%	-8.2%
Bias	2.1%	2.2%	2.2%	1.3%	0.1%	0.1%	-0.8%
Black	0.733	0.737	0.762	0.616	0.4%	2.9%	-11.7%
White	0.727	0.733	0.718	0.714	0.6%	-0.9%	-1.3%
Bias	0.6%	0.4%	4.4%	-9.8%	-0.2%	3.8%	-10.4%
Black	0.833	0.827	0.804	0.771	-0.6%	-2.9%	-6.2%
White	0.797	0.788	0.804	0.645	-0.9%	0.7%	-15.2%
Bias	3.6%	3.9%	0.0%	12.6%	0.3%	-3.6%	9.0%
Black	0.167	0.173	0.196	0.229	0.6%	2.9%	6.2%
White	0.203	0.212	0.196	0.355	0.9%	-0.7%	15.2%
Bias	3.6%	3.9%	0.0%	12.6%	0.3%	-3.6%	9.0%
Black	0.267	0.263	0.238	0.384	-0.4%	-2.9%	11.7%
White	0.273	0.267	0.282	0.286	-0.6%	0.9%	1.3%
Bias	0.6%	0.4%	4.4%	-9.8%	-0.2%	3.8%	-10.4%
Black	0.242	0.237	0.223	0.163	-0.5%	-1.9%	-7.9%
White	0.206	0.2	0.209	0.129	-0.6%	0.3%	-7.7%
Bias	3.6%	3.7%	1.4%	3.4%	0.1%	-2.2%	-0.2%
Black	0.274	0.27	0.26	0.171	-0.4%	-1.4%	-10.3%
White	0.236	0.232	0.239	0.14	-0.4%	0.3%	-9.6%
	White Bias Black White Bias	Black 0.829 White 0.794 Bias 3.5% Black 0.783 White 0.762 Bias 2.1% Black 0.733 White 0.727 Bias 0.6% Black 0.833 White 0.797 Bias 3.6% Black 0.167 White 0.203 Bias 3.6% Black 0.267 White 0.273 Bias 0.6% Black 0.242 White 0.206 Bias 3.6% Black 0.274	Black 0.829 0.823 White 0.794 0.786 Bias 3.5% 3.7% Black 0.783 0.782 White 0.762 0.76 Bias 2.1% 2.2% Black 0.733 0.737 White 0.727 0.733 Bias 0.6% 0.4% Black 0.833 0.827 White 0.797 0.788 Bias 3.6% 3.9% Black 0.167 0.173 White 0.203 0.212 Bias 3.6% 3.9% Black 0.267 0.263 White 0.273 0.267 Bias 0.6% 0.4% Black 0.242 0.237 White 0.206 0.2 Bias 3.6% 3.7% Black 0.274 0.27	Black 0.829 0.823 0.803 White 0.794 0.786 0.801 Bias 3.5% 3.7% 0.2% Black 0.783 0.782 0.783 White 0.762 0.76 0.761 Bias 2.1% 2.2% 2.2% Black 0.733 0.737 0.762 White 0.727 0.733 0.718 Bias 0.6% 0.4% 4.4% Black 0.833 0.827 0.804 White 0.797 0.788 0.804 Bias 3.6% 3.9% 0.0% Black 0.167 0.173 0.196 White 0.203 0.212 0.196 Bias 3.6% 3.9% 0.0% Black 0.267 0.263 0.238 White 0.273 0.267 0.282 Bias 0.6% 0.4% 4.4% Black 0.242 0.23	Black 0.829 0.823 0.801 0.648 White 0.794 0.786 0.801 0.648 Bias 3.5% 3.7% 0.2% 11.7% Black 0.783 0.782 0.783 0.693 White 0.762 0.76 0.761 0.68 Bias 2.1% 2.2% 2.2% 1.3% Black 0.733 0.737 0.762 0.616 White 0.727 0.733 0.718 0.714 Bias 0.6% 0.4% 4.4% -9.8% Black 0.833 0.827 0.804 0.771 White 0.797 0.788 0.804 0.645 Bias 3.6% 3.9% 0.0% 12.6% Black 0.167 0.173 0.196 0.355 Bias 3.6% 3.9% 0.0% 12.6% Black 0.267 0.263 0.238 0.384 White 0.273	Black 0.829 0.823 0.803 0.765 -0.6% White 0.794 0.786 0.801 0.648 -0.8% Bias 3.5% 3.7% 0.2% 11.7% 0.2% Black 0.783 0.782 0.783 0.693 -0.1% White 0.762 0.76 0.761 0.68 -0.2% Bias 2.1% 2.2% 2.2% 1.3% 0.1% Black 0.733 0.737 0.762 0.616 0.4% White 0.727 0.733 0.718 0.714 0.6% Bias 0.6% 0.4% 4.4% -9.8% -0.2% Black 0.833 0.827 0.804 0.771 -0.6% White 0.797 0.788 0.804 0.645 -0.9% Bias 3.6% 3.9% 0.0% 12.6% 0.3% Black 0.167 0.173 0.196 0.229 0.6% White </th <th>Black 0.829 0.823 0.803 0.765 -0.6% -2.6% White 0.794 0.786 0.801 0.648 -0.8% 0.7% Bias 3.5% 3.7% 0.2% 11.7% 0.2% -3.3% Black 0.783 0.782 0.783 0.693 -0.1% 0.0% White 0.762 0.76 0.761 0.68 -0.2% -0.1% Bias 2.1% 2.2% 2.2% 1.3% 0.1% 0.1% Black 0.733 0.737 0.762 0.616 0.4% 2.9% White 0.727 0.733 0.718 0.714 0.6% -0.9% White 0.727 0.733 0.718 0.714 0.6% -0.9% Bias 0.6% 0.4% 4.4% -9.8% -0.2% 3.8% Black 0.833 0.827 0.804 0.771 -0.6% -2.9% White 0.797 0.788 <t< th=""></t<></th>	Black 0.829 0.823 0.803 0.765 -0.6% -2.6% White 0.794 0.786 0.801 0.648 -0.8% 0.7% Bias 3.5% 3.7% 0.2% 11.7% 0.2% -3.3% Black 0.783 0.782 0.783 0.693 -0.1% 0.0% White 0.762 0.76 0.761 0.68 -0.2% -0.1% Bias 2.1% 2.2% 2.2% 1.3% 0.1% 0.1% Black 0.733 0.737 0.762 0.616 0.4% 2.9% White 0.727 0.733 0.718 0.714 0.6% -0.9% White 0.727 0.733 0.718 0.714 0.6% -0.9% Bias 0.6% 0.4% 4.4% -9.8% -0.2% 3.8% Black 0.833 0.827 0.804 0.771 -0.6% -2.9% White 0.797 0.788 <t< th=""></t<>

	Bias	3.8%	3.8%	2.1%	3.1%	0.0%	-1.7%	-0.7%
	Black	0.0309	0.0308	0.0309	0.0339	0.0001	0.0000	0.0030
Brier score	White	0.0306	0.0306	0.0306	0.0335	0.0000	0.0000	0.0029
	Bias	-0.0003	-0.0002	-0.0003	-0.0004	0.0001	0.0000	-0.0001
	Black	0.8546	0.833	0.8334	0.7614	-0.0216	-0.0212	-0.0932
Harrel's C	White	0.8335	0.8545	0.8546	0.7867	0.021	0.0211	-0.0468
	Bias	0.0211	-0.0215	-0.0212	-0.0253	0.0426	0.0423	0.0464
Equal Opportunity ^a		1.01	1.01	1.06	0.86	0.0%	5.0%	-15.0%
Predictive Equality ^b		1.05	1.05	1	1.2	0.0%	-5.0%	15.0%

^aRatio of Sensitivity between Black and White cases – ratio higher than 1 suggests better sensitivity in Black patients than White, ratio less than 1 suggests better sensitivity in White patients than Black

For comparisons of racial bias, inc	icates metrics with better performance among Black patients than White, while	indicates
metrics with better performance among \	Vhite patients than Black.	
For comparisons of various RAI versions, predictive performance.	indicates improvements in predictive performance, while indicates re	eductions in

Abbreviations: RAI, Risk Analysis Index; MCC, Matthew's correlation coefficient

^bRatio of Specificity between Black and White cases – ratio higher than 1 suggest better specificity in Black patients than White, ratio less than 1 suggests better specificity in White patients than Black

Supplemental Table 2. Measures of Predictive Performance between Black and White cases for the threshold of detectable frailty (NSQIP, RAI 30, 2.3% predicted 30-day mortality)

		RAI _{Base}
		Statistic
	Black	0.921
Accuracy	White	0.906
	Bias	1.5%
Dalamaad	Black	0.73
Balanced Accuracy	White	0.733
Accuracy	Bias	-0.3%
True Positive	Black	0.534
Rate	White	0.557
(Sensitivity)	Bias	-2.3%
Tour Nonetice	Black	0.925
True Negative Rate (Specificity)	White	0.91
Rate (Specificity)	Bias	1.5%
Falso Bastilla	Black	0.075
False Positive Rate	White	0.09
Nate	Bias	1.5%
Falsa Nassatius	Black	0.466
False Negative Rate	White	0.443
Nate	Bias	-2.3%
	Black	0.119
F1 score	White	0.108
	Bias	1.1%
	Black	0.169
MCC	White	0.16
	Bias	0.9%

	Black	0.0095
Brier score	White	0.0097
	Bias	0.0002
	Black	0.8544
Harrel's C	White	0.8476
	Bias	0.0068
Equal Opportunity ^a		0.96
Predictive Equality ^b		1.02

^aRatio of Sensitivity between Black and White cases – ratio higher than 1 suggests better sensitivity in Black patients than White, ratio less than 1 suggests better sensitivity in White patients than Black

^bRatio of Specificity between Black and White cases – ratio higher than 1 suggest better specificity in Black patients than White, ratio less than 1 suggests better specificity in White patients than Black

For comparisons of racial bias, indicates metrics with better performance among Black patients than White, while metrics with better performance among White patients than Black.

For comparisons of various RAI versions, indicates improvements in predictive performance, while indicates reductions in predictive performance.

Abbreviations: RAI, Risk Analysis Index; MCC, Matthew's correlation coefficient

Supplemental Figure 1. Comparison of ROC curves between Black and White cases in the RAI_{Base} (NSQIP)

