Supporting Information

Materials and Methods

Data Description

To empirically estimate the effect of racial concordance on health outcomes for newborns we draw on data from the State of Florida's Agency for Healthcare Administration (AHCA). Used extensively in prior research (32-34), these data grant us access to a census of patients admitted to Florida hospitals between January of 1992 and August 2015. These data include detailed information about patients, including: race, co-morbidities, outcomes, where the patient was treated, and more. We also receive access to information about the attending physician in charge of the patient's care, e.g. name, specialty and board certifications, and date of licensure. Birthing mothers are identified through ICD-9 diagnosis codes (codes 650 – 669 which range from normal delivery to induced labor to complications occurring during the course of labor and delivery). As an explicit coding of the physician's race is not available, we derive this information from searchable online images of the physician. This process is described in detail below. To ensure a clean comparison across race, patients and physicians not explicitly coded as white or black are dropped from the sample. In order to be included in the sample the patient, i.e. the newborn, must be admitted to a short-term acute care facility. As a result, some infants who are born in the state of Florida are omitted from the sample, e.g. home births. This is of little concern as only 1.36% of American births happen outside the hospital (44).

The initial dataset is comprised of 4,625,898 newborns. This pool is comprised of 2,568,942 white newborns, 981,641 black newborns, 65,889 Asian newborns, and 928,849 Hispanic newborns. The remaining 80,577 newborns are of other races (e.g. native American, Pacific Islander, et.). As discussed, newborns not classified as either white or black are omitted from the sample. Further, not all newborns are treated by either a white or black physician (some physicians being of Asian, Latino, middle eastern, etc. descent). Of the 8,045 physicians in the sample with identified race, 3,936 of them are white, 514 are black, 1,638 are Latino, and so on. The remaining sample is comprised of 1,353,078 white newborns, and 459,901 black newborns. The panel is not extended prior to 1992 because information on patient race is not available. The panel concludes in the third quarter of 2015 because the AHCA switches from coding procedures and diagnoses in ICD-9 to ICD-10. This allows coding to remain consistent.

Variable Definitions

Dependent Variable: The primary dependent variable, *Death*, is a dichotomous indicator which captures whether or not the patient (newborn) expired in the hospital. To improve interpretability, we scale this variable at 0/100. This variable is coded as 100 if the patient expires, zero otherwise. To ensure consistency, we replicate the results with patient length of stay (a consistent indicator of quality in healthcare settings (53)). Results remain consistent.

Independent Variables: Two key independent variables are used for the investigation: *Physician Black* and *Patient Black. Patient Black* is an indicator of if the newborn is coded as "Black or African American" by the AHCA.

As discussed, the AHCA does not have an explicit coding of physician race. To determine race, we enlisted a team of ten experienced, trained, research associates to manually code physician race. In the initial sample, 9,992 physicians were identified. As the AHCA dataset contains physician information, e.g. specialty, hospital affiliations, license number, and so on, this team was able to find photos for 8,045 of these physicians. Photos came from a variety of sites, including physician rating sites (e.g. vitals.com, healthgrades.com), hospital and clinic webpages, obituaries, affiliated organizations and non-profits, board memberships, among others. Prior to explicitly coding the AHCA data, each research associate was given a corpus of 100 randomly selected high-resolution, standardized photographs of male and female faces of varying race and ethnicity between the ages of 17-65, validated in prior work (54).

Of the ten research associates, four demonstrated 100% accuracy. These four were retained to code data from the AHCA. Each was assigned a portion of the physician names as well as the location of the physician's practice. The associates were then instructed to conduct an online web search to locate a photograph of the physician and subsequently code for physician race, indicating *Black, White, Latino/Hispanic, East Asian, South Asian, or Middle Eastern.* Following this initial coding, each section was reassigned to a different research associate to confirm consistency in both identifying an accurate online photograph as well as, for the purpose of inter-coder reliability, the coding of physician race. There were no discrepancies in capturing accurate physician photographs. For each instance of discrepancy in identification of race (a total of 175 instances of discrepancy were identified), research associates met to discuss their coding until there was 100% agreement. We then allotted each of these 175 photographs to a third research associate on the team, to further assess agreement. As a final step, we randomly selected 10% of the entire sample of physician photographs and asked the research associates to work as a team to determine any disagreement in the coding of physician race. No disagreements were identified, providing us with confidence that physician's race was coded with the greatest accuracy possible.

Finally, to obtain convergent evidence, and to prevent the occurrence of "false positives" (categorizing individuals as black when they were not) or "false negatives" (ensuring that all black physicians were categorized as black), we had an independent set of research assistants individually assess the surname of each physician in our dataset (55) by sifting through all names to determine persons of African American origin, drawing on lists of surnames from government databases (56), and lists of

African Americans who have held leadership positions in the business workforce (57-62). The coding of surnames was then cross-checked with coding based on physician photographs, providing us with greater assurance that we did not omit any black physicians, nor falsely categorize a physician as black.

Controls: Owing to the fact that patient-physician matching is quasi-random, we include a host of controls. First, as insurance coverage can strongly influence both the provider available to the patient, and clinical care outcomes, we include controls for *Medicaid* status, *Medicare* status (which is rare but observed), and *Self-Pay*. Forms of private insurance (e.g. HMO, PPO) serve as the base case. Second, owing to the fact that individual patients present heterogeneously, and with idiosyncratic needs, we include controls for the top co-morbidities by frequency of occurrence. To do so we partial out the incidence rate of each comorbidity, viz. ICD-9 diagnosis, in the sample. We then create 0/1 indicators for the top 65 comorbidities as well as whether or not the child was born outside the hospital. Intuitively, these should capture the relative level of care required by the newborn. The same process is replicated for the analysis of birthing mothers. Third, owing to the fact that heterogeneity in care may be experienced by newborns over time and location, and that these differences may be correlated with the race of the physician (or their own race), we include hospital and time fixed effects. Time controls are defined at the quarter level, which is the smallest unit of time available from the AHCA. To account for the fact that organizational level ability to treat patients may evolve heterogeneously over time, and that different organizations may excel in the physician-patient matching process, we include hospital-year fixed effects. Finally, to capture physician level heterogeneity, we include physician fixed effects. This should allow us to capture within physician change in performance based on a change in the race of the patient.

Patient and Physician Matching

To capture the unbiased effect of racial concordance patients (newborns) would ideally be randomly assigned to their healthcare provider (attending physician). In lieu of random assignment, their assignment to the physician must be plausibly exogenous conditional upon controls. Although we include a robust set of conditioning variables, up to and including physician and hospital-year fixed effects, and conversations with physicians suggest that the assignment of newborns to physicians is done in a quasi-random manner (based on which pediatricians happen to be on call), it is important this assumption hold up to empirical scrutiny. Intuitively, three sources of endogeneity may undermine the claim of exogenous assignment, conditional upon controls. On the one hand, given that gestation lasts on average 280 days, mothers have a non-trivial amount of time to select both their obstetrician and pediatrician. Hence, there may be selection on which physicians mothers choose, or have the ability to choose, to care for their child. Still, although many pediatricians offer third trimester appointments, the American Academy of

Pediatrics indicates relatively few parents actually make use of them (63). Further, expecting parents may not be able to meet their newborn's actual physician prior to delivery due to ambiguity in the date of actual arrival. Second, hospital administrators may be attempting to match physicians to patients based on any number of unobserved factors. This is intuitive. Finally, and also in deference to ambiguity of the actual delivery date, mothers enter labor at heterogeneous times. Some mothers, for example, may elect to induce labor at times when they know preferred practitioners are available, while others may not have such ability or flexibility with their insurance carriers or healthcare providers.

To examine the first two concerns, we estimate a model of patient mortality risk based on all non-racial observables and study how it differs by physician-patient race combination. Using a logistic regression, we parallel specification (4) from Table 1, but exclude the three main variables based on patient and physician race. From the estimated coefficients, we score each patient's predicted mortality. We then graph each of the four groups defined by physician and patient racial concordance. Figure S1 graphs the distribution of predicted mortality conditional on having mortality probability below 10%. This contains more than 99% percent of patients. As can be seen, differences in the distributions for the various groups are imperceptible. However, a Kolmogorov Smirnov test does indicate the distributions are different, suggesting there may be a selection issue, and underscoring the importance of including both the conditioning variables and the suite of fixed effects. Finally, to ensure there is no heterogeneity in the arrival times for black (white) patients (physicians), i.e. mothers (physicians) being admitted to (practicing at) the hospital at different times regardless of race, we chart the hour of arrival by group. Note that the AHCA only captures arrival time after 2010. Results are in Figure S2. The distribution of arrival times is similar across groups. Results of a Kolmogorov Smirnov test indicate that the distribution of arrival times for both black newborns, and white newborns, are not significantly different across white and black physicians, consistent with doctor race being orthogonal to patient arrival time conditional on patient race. Results are also consistent if dummies for hour of arrival are included in our estimations.

We execute our estimations using a Linear Probability Model (LPM). We opt for the LPM over nonlinear estimators (e.g. Logit or Probit) because of our reliance on interpreting interaction terms to assess the effect of concordance. A non-linear estimator is impractical as it renders the interaction term uninterpretable (35). While simulation tools exist to recover the net effects of such estimations, such tools cannot handle either the number of independent variables in the estimation or the number of observations. An LPM obviates such problems by allowing direct interpretation of the interaction. Standard errors are robust, to manage heteroskedasticity concerns, and clustered at the physician level, i.e. the treated unit.

Robustness and Secondary Checks

Length of Stay

One plausible concern with leveraging *Death* as a dependent variable is its relative infrequency, i.e. it occurs in less than half a percent of patients. While these numbers are still staggeringly high, as compared with the remainder of OECD nations, it does mean that we are modeling a rare event, where a small number of occurrences are driving the observed effect. One way to safeguard against spurious correlation in such circumstances is to leverage an alternate dependent variable which also serves as a proxy for overall quality. To do so, we leverage patient Length of Stay, which has been used in numerous investigations to capture quality of care (10, 53). The intuition behind the measure is straightforward. Conditional on controls, patients receiving superior care will be able to depart the hospital faster than those receiving inferior care. We therefore replicate the estimation of Equation 1 with Length of Stay (in days) as the dependent variable. The estimator is an OLS. Results are in Table S6. As can be seen, there is a significant penalty, in terms of longer length of stay, for black newborns. Further, there is a significant effect of racial concordance, with the penalty in terms of stay being more than halved for black newborns treated by black physicians. Results are consistent with a Poisson estimator.

Latino Newborns

To increase the interpretability of our results, our initial approach was to focus on differences across the white and black populations. One concern with this approach is that the findings associated with concordance might simply be a function of in-group out-group biases, the white community being substantially larger than the black community in Florida, as opposed to an idiosyncrasy associated with black newborns. If this is the case, then the interpretation of the effect changes, because the implicated mechanism relates to being a member of the social out-group. To investigate this possibility, we replicate our analysis across white and Latino newborns. Such an approach is intuitive, inasmuch as the Latino community suffers many of the same challenges posed by social and economic marginalization as the black community. Results are in Table S7. As can be seen, there is evidence of raw disparities in mortality across the white and Latino community. However, the disparity is an order of magnitude smaller than that of black newborns. Further, in the final set of estimations (Columns 7 and 8), we observe no significant difference in the mortality of newborns by ethnicity within-physician, for either white or Latino physicians. While this may be specific to the State of Florida, where the Latino community is significantly larger than in other states, these findings do suggest our main results for black newborns do not generalize to all communities of color.

Residents

Another concern which surrounds our estimations is the inability to observe the totality of the patient care team. Above and beyond the attending physician herself, there may be an effect of fellow physicians, nurses, residents, and other practitioners in the healthcare space. To the extent that we include both hospital and physician fixed effects in the estimations, time invariant characteristics of the location where the newborn is being treated, and stylistic preferences of the physician, should be accounted for. Further, as we include hospital-year fixed effects, evolving practices at individual hospitals should be accounted for. Nevertheless, it remains plausible that other agents, such as residents, are taking the lead on patient care more often when newborns are black. To assess the extent to which this issue may be a problem, we next replicate our estimations while excluding hospitals that have residency programs. Data on acute care facilities with residency programs are drawn from the American Medical Association's online database. Results are in Table S8 and remain consistent. As can be seen, there is a significant penalty for black newborns born in hospitals without residency programs. Further, there is a significant concordance effect, with the mortality penalty accruing to black newborns being more than halved if they are treated by black physicians.

Conditional Logit

Another concern is our use of an LPM as the primary estimation technique. Research suggests that such an approach does not create demonstrable issues in terms of bias in coefficient estimates (35) and increases the interpretability of the results. Still, given concerns that the LPM can predict probabilities outside the [0,1] bound and gives rise to heteroscedasticity, replication with a non-linear estimator is warranted. We therefore replicate the analysis using a conditional logit. Results are in Table S9 and remain consistent up to and including hospital and time fixed effects. It should be noted that the results cannot be estimated using a physician fixed effect due to a numeric overflow problem in Stata 15 which cannot be overcome without changing the assumptions of the logit model.

Racial and Gender Concordance

One further concern is that there may be heterogeneity in the effect across the gender of physicians. To the extent that that recent work has highlighted disparities in the quality of care patients receive across male and female physicians (10, 64), and to the degree that in-sample black physicians are more likely to be female then their white counterparts (Table S1a), this raises the possibility that it is the gender of the physicians which is driving the result, rather than race. To safeguard against this possibility, we replicate our estimations while splitting the sample based on physician gender. Results are in Table S10. Two striking observations come from these estimates. First, corroborating recent work, female physicians significantly outperform their male colleagues, inasmuch as the penalty which accrues to black patients is smaller in this sample. Second, concordance is observed in both samples, suggesting that the observed effects are not driven solely by female practitioners.

Medicaid and Non-Medicaid Samples

Our next concern relates to the socio-economic status of the women seeking care. To the extent that race, income, and education are correlated in the United States, it is plausible that the effect is an artifact of socioeconomic status, rather than race. To safeguard against this possibility, we split the sample, this time on Medicaid as an insurance provider. As the purpose of Medicaid is to assist individuals with limited income and resources, such an approach is intuitive. Results are in Table S11. As can be seen, the concordance effect persists in both the Medicaid and non-Medicaid samples. Interestingly, while the mortality is higher in the Medicaid sample (525 deaths per 100,000 births vs 396 deaths per 100,000 births) the penalty is higher in the non-Medicaid sample. Remarkably, the effect of concordance appears to roughly half the penalty across both groups. This again underscores the effect as being a function of racial concordance, rather than an artifact of socio-economic status.

Learning

The final empirical possibility we explore is the potential for physicians to learn as they treat black newborns, thereby improving over time. Such an outcome is intuitive. If black newborns are inherently more challenging to treat, it is plausible that increased experience with such patients will ameliorate any disparities. To investigate any such effect, we include a new indicator, *num Black Newborns* into the estimations. This variable is defined as the number of black newborns the physician has treated in all observed periods prior to the current period. In deference to the possibility that any learning is curvilinear we also include the polynomial term in the estimations. We also condition upon the *num White Newborns* to capture general experience. To resolve the concern that we cannot observe the number of newborns treated prior to the sample's beginning, we omit any physician who appears in our data in the first period of the sample. Finally, to avoid the interpretation of cumbersome three-way interactions, we estimate the effects independently across white and black physicians. Results are in Table S12. As can be seen, there is no significant evidence that outcomes improve as the number of treated black newborns increases.

References

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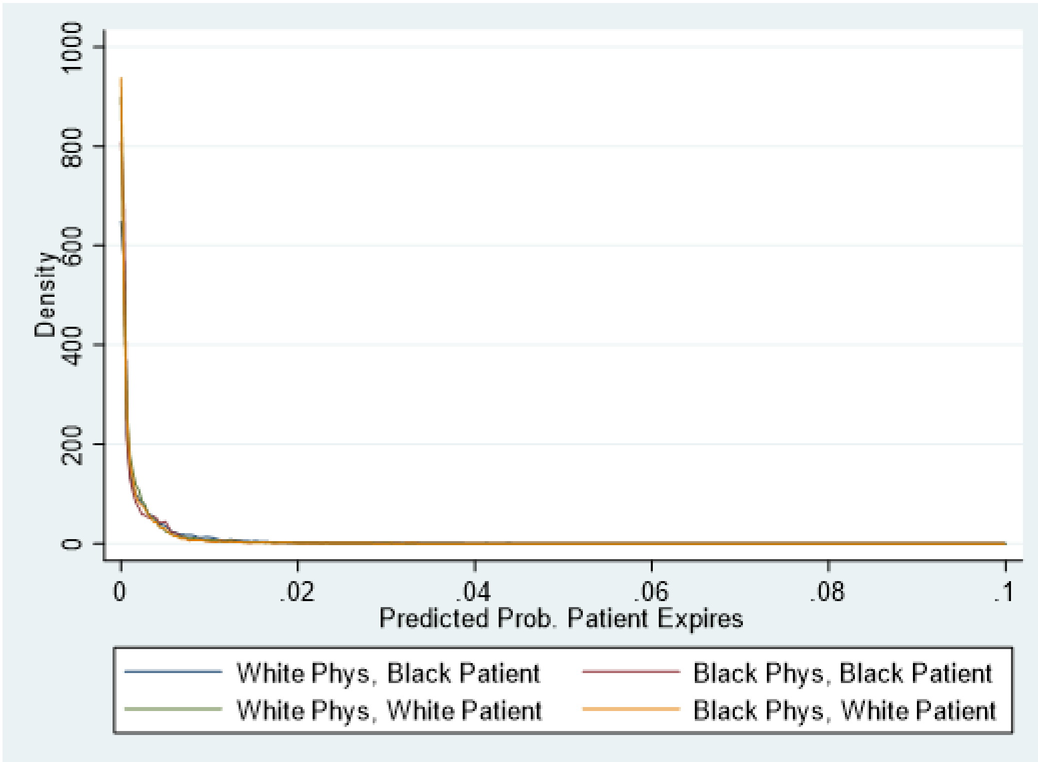

Figure S1.

Distributions of Predicted Probability of Patient Mortality by Patient and Physician Race Combinations Conditional on Probability Below 10 percent

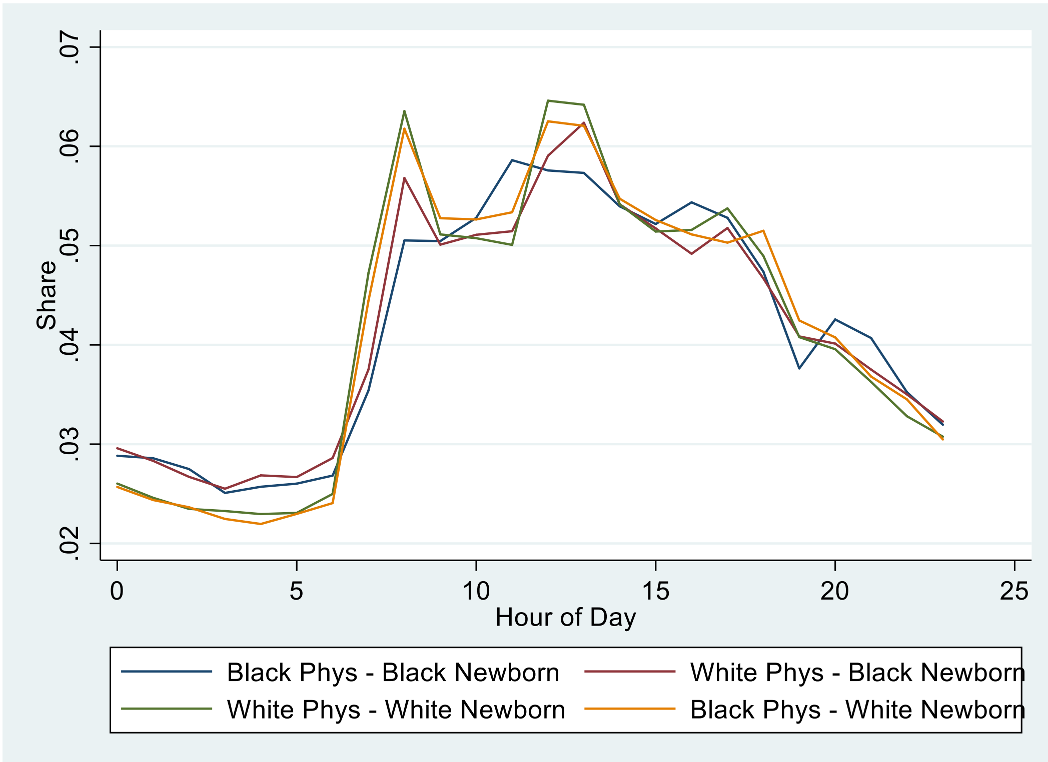

Figure S2.

Visualization of Newborn Hour of Arrival Distributions based on Newborn and Physician Race

Group	All Included Patients		White Phys, Black Patient		Black Phys, Black Patient		White Phys, White Patient		Black Phys, White Patient		Black Patient Omitted		White Patient Omitted		Other Patients Omitted	
Observations	1,812,979		362,597		97,304		1,222,228		130,850		521,740		1,215,864		1,075,315	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Patient Expired	0.004	0.064	0.009	0.094	0.004	0.062	0.003	0.054	0.003	0.053	0.006	0.077	0.0029	0.054	0.003	0.058
Patient Black	0.254	0.435	1	0	1	0	0	0	0	0	1	0	0	0	0.000	0.000
Physician Black	0.126	0.332	0	0	1	0	0	0	1	0	0	0	0	0	0.064	0.245
Pediatrician	0.792	0.406	0.777	0.416	0.712	0.453	0.806	0.396	0.762	0.426	0.665	0.472	0.671	0.470	0.688	0.463
Male Phys	0.647	0.478	0.645	0.479	0.457	0.498	0.674	0.469	0.513	0.500	0.548	0.498	0.612	0.487	0.580	0.494
Length of Stay	3.543	8.919	4.726	12.831	3.366	8.070	3.207	7.523	3.531	7.993	4.582	11.892	3.374	7.718	3.387	7.756
Medicaid	0.407	0.491	0.621	0.485	0.645	0.479	0.312	0.463	0.518	0.500	0.659	0.474	0.431	0.495	0.460	0.498
Medicare	0.002	0.040	0.002	0.047	0.001	0.038	0.001	0.037	0.002	0.039	0.002	0.041	0.001	0.037	0.003	0.052
Self-Pay	0.052	0.222	0.052	0.221	0.067	0.251	0.051	0.220	0.053	0.224	0.071	0.257	0.062	0.243	0.115	0.319
Residency	0.453	0.498	0.501	0.500	0.449	0.497	0.440	0.496	0.447	0.497	0.435	0.496	0.413	0.493	0.514	0.500
Cesarean	0.297	0.457	0.298	0.457	0.303	0.459	0.294	0.456	0.319	0.466	0.300	0.458	0.306	0.461	0.318	0.466
Num Comorbid	1.567	1.691	1.775	1.853	1.648	1.617	1.469	1.625	1.845	1.787	1.751	1.836	1.550	1.703	1.582	1.629

Table S1a. Newborn Patient Summary Statistics. Note: Patient Expired Scaled 0/1 in this Table.

	Variable	1	2	3	4	5	6	7	8	9	10	11
1	Patient Expired											
2	Patient Black	0.035										
3	Physician Black	-0.005	0.152									
4	Pediatrician	-0.035	-0.041	-0.041								
5	Male Phys	0.008	-0.047	-0.116	0.014							
6	Length of Stay	0.065	0.061	-0.007	-0.051	0.015						
7	Medicaid	0.015	0.263	0.127	-0.056	-0.038	0.061					
8	Medicare	-0.001	0.007	0.000	-0.002	-0.003	0.002	-0.033				
9	Self-Pay	0.009	0.006	0.004	-0.013	-0.011	-0.024	-0.191	-0.009			
10	Residency	0.005	0.047	0.029	-0.002	-0.014	0.02	-0.014	0.006	-0.023		
11	Cesarean	0.006	0.002	0.007	-0.008	-0.013	0.089	-0.025	0.002	-0.025	0.001	
12	Num Comorbid	0.0382	0.062	0.028	-0.0713	-0.0349	0.3997	0.0977	0.002	-0.0288	-0.0422	0.387

Table S1b. Newborn Patient Correlation Matrix

Compression of umbilical cord affecting fetus or newborn	Heavy-for-dates' infants	Observation for other specified suspected conditions	Single liveborn infant, delivered vaginally
24 completed weeks of gestation	Hemolytic disease of fetus or newborn	Observation for suspected infectious condition	Single liveborn, born in hospital without mention of cesarean section
31-32 completed weeks of gestation	Hemolytic disease of fetus or newborn due to ABO isoimmunization	Ostium secundum type atrial septal defect	Single liveborn, born in hospital, delivered by cesarean section
33-34 completed weeks of gestation	Hypothermia of newborn	Other preterm infants, 1,500-1,749 grams	Syndrome of 'infant of a diabetic mother'
35-36 completed weeks of gestation	Hypoxemia of newborn	Other preterm infants, 1,750-1,999 grams	Transient neonatal thrombocytopenia
Abnormality in fetal heart rate or rhythm before the onset of labor	Infections specific to the perinatal period	Other preterm infants, 2,000-2,499 grams	transitory neonatal electrolyte disturbances
Anemia of prematurity	Injuries to scalp due to birth trauma	Other preterm infants, 2,500 grams and over	Transitory tachypnea of newborn
Congenital hydrocele	Newborn (suspected to be) affected by maternal infectious and parasitic diseases	Other specified conditions involving the integument of fetus and newborn	Twin birth, mate liveborn
Congenital pigmentary anomalies of skin	Interstitial emphysema	Patent ductus arteriosus	Twin birth, mate liveborn, delivered by cesarean section
Cutaneous hemorrhage of fetus or newborn	'Light-for-dates' without mention of fetal malnutrition	Post-term infant	Umbilical hernia
Diaper or napkin rash	'Light-for-dates' without mention of fetal malnutrition, 2,500 grams and over	Primary apnea of newborn	Undiagnosed cardiac murmurs
disturbances of temperature regulation of newborn	Meconium staining	Redundant prepuce and phimosis	Unspecified fetal and neonatal jaundice
Encounter for hearing examination following failed hearing screening	Need for prophylactic vaccination and inoculation against unspecified single disease	Respiratory distress syndrome in newborn	Vaccination not carried out because of caregiver refusal
Exam ears & hearing NEC	Need for prophylactic vaccination and inoculation against viral hepatitis	Respiratory problems after birth	Vascular hamartomas
Ventricular septal defect	Neonatal bradycardia	Hearing Loss	
Feeding problems in newborn	Neonatal hypoglycemia	Septicemia [sepsis] of newborn	
Hallucinogenic agents affecting fetus or newborn via placenta or breast milk	Neonatal jaundice associated with preterm delivery	Single liveborn infant, delivered by cesarean	

Table S2. Comorbidities included in estimations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death
Sample	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs
Restriction	> 2	> 2	> 2	> 2	> 2	> 3	> 3	> 3	> 3	> 3
Physician Black	-0.0416	-0.0615				-0.102	-0.109			
	(0.0988)	(0.0883)				(0.124)	(0.109)			
Patient Black	0.513***	0.459***	0.423***	0.446***	0.206**	0.658***	0.607***	0.575***	0.589***	0.269*
	(0.0792)	(0.0774)	(0.0797)	(0.0781)	(0.0856)	(0.0852)	(0.0864)	(0.0891)	(0.0873)	(0.150)
Physician Black	-0.400***	-0.316***	-0.195			-0.478***	-0.434***	-0.311*		
* Patient Black	(0.114)	(0.110)	(0.130)			(0.157)	(0.159)	(0.183)		
Insurance Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital-Year Fixed Effects		Yes	Yes				Yes	Yes		
Physician Fixed Effects			Yes	Yes	Yes			Yes	Yes	Yes
Observations	385,535	385,449	384,926	329,117	55,884	206,463	206,320	205,869	176,913	29,087
R-squared	0.088	0.100	0.118	0.111	0.081	0.095	0.109	0.123	0.113	0.088

Table S3. LPM Estimates of The Effect of Racial Concordance on Survival of Newborns Split by Higher Count of Comorbidities. Mean of Death 0.3059 (Columns 1-5) / 0.8312 (Columns 6 – 10). Robust standard errors are clustered on the physician. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death
Sample	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs
Restriction	Above Median	Above Median	Above Median	Above Median	Above Median	Below Median	Below Median	Below Median	Below Median	Below Median
Physician Black	0.0138	0.0484				0.0137	0.0116			
	(0.0699)	(0.0654)				(0.0509)	(0.0475)			
Patient Black	0.472***	0.476***	0.331***	0.322***	0.193***	0.376***	0.365***	0.265***	0.290***	0.147***
	(0.0566)	(0.0563)	(0.0486)	(0.0473)	(0.0590)	(0.0439)	(0.0387)	(0.0316)	(0.0350)	(0.0416)
Physician Black	-0.244***	-0.236**	-0.150*			-0.243***	-0.206***	-0.0947*		
* Patient Black	(0.0920)	(0.0928)	(0.0774)			(0.0705)	(0.0646)	(0.0553)		
Insurance Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital-Year Fixed Effects		Yes	Yes				Yes	Yes		
Physician Fixed Effects			Yes	Yes	Yes			Yes	Yes	Yes
Observations	909,170	909,170	908,593	830,392	78,201	903,801	903,768	903,057	753,266	149,823
R-squared	0.048	0.051	0.139	0.135	0.159	0.054	0.069	0.152	0.140	0.153

Table S4. Linear Probability Model Estimates of the Effect of Racial Concordance on Survival of Newborns. Sample Split by Median Number of White Newborn Cases Handled by Hospital. Mean of Death 0.3059 (Columns 1-5) / 0.8312 (Columns 6 – 10). Robust standard errors are clustered on the physician. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death
Sample	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs
Restriction	Above Median	Above Median	Above Median	Above Median	Above Median	Below Median	Below Median	Below Median	Below Median	Below Median
Physician Black	0.0388	0.0737				0.00986	0.00113			
	(0.0746)	(0.0731)				(0.0448)	(0.0369)			
Patient Black	0.477***	0.481***	0.341***	0.335***	0.153**	0.376***	0.344***	0.247***	0.277***	0.172***
	(0.0540)	(0.0543)	(0.0476)	(0.0462)	(0.0706)	(0.0417)	(0.0364)	(0.0305)	(0.0356)	(0.0432)
Physician Black	-0.308***	-0.313***	-0.199**			-0.194***	-0.143**	-0.0454		
* Patient Black	(0.0903)	(0.0928)	(0.0880)			(0.0632)	(0.0572)	(0.0586)		
Insurance Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital-Year Fixed Effects		Yes	Yes				Yes	Yes		
Physician Fixed Effects			Yes	Yes	Yes			Yes	Yes	Yes
Observations	907,219	907,219	906,646	809,204	97,442	905,752	905,719	904,979	774,439	130,574
R-squared	0.054	0.057	0.138	0.133	0.164	0.046	0.064	0.159	0.148	0.131

Table S5. Linear Probability Model Estimates of the Effect of Racial Concordance on Survival of Newborns. Sample Split by Median Number of Newborn Cases Handled by Hospital. Mean of Death 0.3059 (Columns 1-5) / 0.8312 (Columns 6 – 10). Robust standard errors are clustered on the physician. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Length of Stay (Days)	Length of Stay (Days)	Length of Stay (Days)	Length of Stay (Days)	Length of Stay (Days)	Length of Stay (Days)	Length of Stay (Days)	Length of Stay (Days)
Sample	Newborns	Newborns	Newborns	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs
Physician Black	0.324	-0.154**	-0.159**	-0.0755	-0.0817			
	(0.339)	(0.0747)	(0.0749)	(0.0630)	(0.0631)			
Patient Black	1.519***	0.580***	0.587***	0.376***	0.372***	0.347***	0.342***	0.158***
	(0.201)	(0.0674)	(0.0658)	(0.0562)	(0.0550)	(0.0533)	(0.0530)	(0.0390)
Physician Black	-1.684***	-0.351***	-0.341***	-0.275***	-0.253***	-0.190***		
* Patient Black	(0.276)	(0.0805)	(0.0809)	(0.0673)	(0.0606)	(0.0691)		
Constant	3.207***							
	(0.134)							
Insurance Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)			Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects				Yes	Yes	Yes	Yes	Yes
Hospital-Year Fixed Effects					Yes	Yes		
Physician Fixed Effects						Yes	Yes	Yes
Observations	1,812,979	1,812,979	1,812,979	1,812,972	1,812,938	1,811,979	1,583,958	228,052
R-squared	0.004	0.455	0.456	0.462	0.466	0.511	0.508	0.515

Table S6. OLS Estimates of the effect of Racial Concordance on Patient Length of Stay in Days. Mean of Length of Stay 0.3059. Robust standard errors are clustered on the physician. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$;

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death
Sample	Newborns	Newborns	Newborns	Newborns	Newborns	Newborns	WhiteDocs	LatinoDocs
Physician Latino	0.0173	-0.0642*	-0.0658*	-0.0118	0.00186			
	(0.0533)	(0.0375)	(0.0373)	(0.0356)	(0.0352)			
Patient Latino	0.0865**	0.0941***	0.0873***	0.0550**	0.0596***	0.00957	0.0127	0.0120
	(0.0382)	(0.0304)	(0.0286)	(0.0218)	(0.0198)	(0.0167)	(0.0166)	(0.0160)
Physician Latino	-0.187***	-0.166***	-0.169***	-0.103***	-0.100***	-0.00127		
* Patient Latino	(0.0499)	(0.0394)	(0.0392)	(0.0384)	(0.0342)	(0.0250)		
Constant	0.292***							
	(0.0332)							
Insurance Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)			Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects				Yes	Yes	Yes	Yes	Yes
Hospital-Year Fixed Effects					Yes	Yes		
Physician Fixed Effects						Yes	Yes	Yes
Observations	2,173,359	2,173,359	2,173,359	2,173,353	2,173,324	2,172,176	1,435,634	736,568
R-squared	0.000	0.036	0.036	0.039	0.043	0.114	0.122	0.090

Table S7. LPM Estimates of the effect of Racial Concordance on Patient Mortality Across White and Latino Patients. Mean of Death 0.3059. Robust standard errors are clustered on the physician. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$;

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death
Sample	Newborns	Newborns	Newborns	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs
Restrictions	Non-Residents	Non-Residents	Non-Residents	Non-Residents	Non-Residents	Non-Residents	Non-Residents	Non-Residents
Physician Black	-0.136**	-0.0422	-0.101**	-0.0542	-0.0114			
	(0.0620)	(0.0426)	(0.0491)	(0.0557)	(0.0578)			
Patient Black	0.634***	0.514***	0.529***	0.435***	0.449***	0.311***	0.312***	0.114***
	(0.114)	(0.0707)	(0.0713)	(0.0597)	(0.0607)	(0.0528)	(0.0518)	(0.0403)
Physician Black	-0.529***	-0.421***	-0.386***	-0.309***	-0.289***	-0.185***		
* Patient Black	(0.125)	(0.0922)	(0.0859)	(0.0836)	(0.0763)	(0.0687)		
Constant	0.280***							
	(0.0500)							
Insurance Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)			Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects				Yes	Yes	Yes	Yes	Yes
Hospital-Year Fixed Effects					Yes	Yes		
Physician Fixed Effects						Yes	Yes	Yes
Observations	974,436	974,436	974,436	974,431	974,403	973,836	848,942	124,922
R-squared	0.002	0.049	0.050	0.053	0.058	0.149	0.143	0.204

Table S8. LPM Estimates of the effect of Racial Concordance on Patient Mortality with Hospitals Housing Residency Programs Removed. Mean of Death 0.3059. Robust standard errors are clustered on the physician. *** p < 0.01, ** p < 0.05, * p < 0.10

	(1)	(2)	(3)	(4)
Dependent Variable	1 = Death	1 = Death	1 = Death	1 = Death
Sample	All	All	All	All
Physician Black	-0.0364	0.0229	-0.0402	0.157**
	(0.0550)	(0.0598)	(0.0596)	(0.0631)
Patient Black	1.131***	0.897***	0.939***	0.769***
	(0.0244)	(0.0294)	(0.0296)	(0.0312)
Physician Black * Patient Black	-0.799***	-0.490***	-0.437***	-0.440***
	(0.0774)	(0.0851)	(0.0847)	(0.0871)
Constant	-5.840***			
	(0.0168)			
Insurance Fixed Effects		Yes	Yes	Yes
Co-Morbidity Fixed Effects		Yes	Yes	Yes
Time Fixed Effects (Quarter)			Yes	Yes
Hospital Fixed Effects				Yes
Observations	1,812,979	1,762,461	1,762,461	1,745,499

Table S9. Conditional Logit Estimates of the effect of Racial Concordance on Patient Mortality. Mean of Death 0.4123. Robust standard errors are clustered on the physician. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death
Sample	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs
Restriction	Male Phys	Male Phys	Male Phys	Male Phys	Male Phys	Female Phys	Female Phys	Female Phys	Female Phys	Female Phys
Physician Black	0.132***					0.00181				
	(0.0441)					(0.0426)				
Patient Black	0.491***	0.353***	0.349***	0.350***	0.253***	0.363***	0.278***	0.264***	0.288***	0.109**
	(0.0295)	(0.0263)	(0.0266)	(0.0263)	(0.0589)	(0.0338)	(0.0293)	(0.0291)	(0.0297)	(0.0449)
Physician Black	-0.313***	-0.125*	-0.120*			-0.211***	-0.0976*	-0.114**		
* Patient Black	(0.0630)	(0.0642)	(0.0645)			(0.0555)	(0.0578)	(0.0551)		
Insurance Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes
Hospital-Year Fixed Effects			Yes					Yes		
Physician Fixed Effects		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes
Observations	1,107,979	1,107,308	1,107,247	1,014,723	92,584	603,228	602,993	602,926	506,100	96,884
R-squared	0.055	0.137	0.145	0.139	0.123	0.046	0.140	0.152	0.135	0.222

Table S10. Linear Probability Model Estimates of the Effect of Racial Concordance on Survival of Newborns. Sample Split by Gender of the Practicing Physician. Mean of Death 0.3059 (Columns 1-5) / 0.8312 (Columns 6 – 10). Robust standard errors are clustered on the physician. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death
Sample	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs	Newborns	Newborns	Newborns	WhiteDocs	BlackDocs
Restriction	Medicaid	Medicaid	Medicaid	Medicaid	Medicaid	Non-Medicaid	Non-Medicaid	Non-Medicaid	Non-Medicaid	Non-Medicaid
Physician Black	-0.0505	-0.0130				0.0438	0.0614			
	(0.0577)	(0.0544)				(0.0527)	(0.0513)			
Patient Black	0.307***	0.293***	0.230***	0.239***	0.137***	0.547***	0.549***	0.397***	0.399***	0.247***
	(0.0347)	(0.0324)	(0.0311)	(0.0309)	(0.0344)	(0.0500)	(0.0497)	(0.0425)	(0.0422)	(0.0669)
Physician Black	-0.188***	-0.159***	-0.0769			-0.306***	-0.287***	-0.157**		
* Patient Black	(0.0568)	(0.0531)	(0.0523)			(0.0871)	(0.0851)	(0.0780)		
Insurance Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital-Year Fixed Effects		Yes	Yes				Yes	Yes		
Physician Fixed Effects			Yes	Yes	Yes			Yes	Yes	Yes
Observations	737,309	737,272	736,575	606,181	130,425	1,075,662	1,075,630	1,074,791	977,260	97,559
R-squared	0.058	0.068	0.143	0.135	0.146	0.044	0.053	0.147	0.140	0.149

Table S11. Linear Probability Model Estimates of the Effect of Racial Concordance on Survival of Newborns. Sample Split by Medicaid and non-Medicaid Patient Insurance Status. Mean of Death 0.3059 (Columns 1-5) / 0.8312 (Columns 6 – 10). Robust standard errors are clustered on the physician. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death	100 = Death
Sample	WhiteDocs	WhiteDocs	WhiteDocs	BlackDocs	BlackDocs	BlackDocs
Patient Black	0.335***	0.335***	0.335***	0.186***	0.187***	0.187***
	(0.0507)	(0.0509)	(0.0507)	(0.0461)	(0.0461)	(0.0461)
num Black Newborns		1.08e-06	-0.000243		1.93e-05	-2.20e-05
		(0.000165)	(0.000242)		(3.12e-05)	(0.000112)
num Black Newborns^2			7.13e-08			8.85e-09
			(5.37e-08)			(2.14e-08)
num White Newborns	7.02e-05	6.99e-05*	8.16e-05*	2.93e-06	-5.03e-06	-3.03e-06
	(4.65e-05)	(4.23e-05)	(4.83e-05)	(5.88e-05)	(5.68e-05)	(5.52e-05)
Insurance Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Co-Morbidity Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects (Quarter)	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Physician Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	818,566	818,566	818,566	154,989	154,989	154,989
R-squared	0.170	0.170	0.170	0.220	0.220	0.220

Table S12. Linear Probability Model Estimates of the Effect of Physician Experience with Black Newborns Survival of Black Newborns. Sample Split by White and Black Physicians. Mean of Death – 0.4123. Robust standard errors are clustered on the physician. *** p<0.01, ** p<0.05, * p<0.1