Community-Acquired Pneumonia: Hospital Outcomes in California, 2002 - 2004

CALIFORNIA HOSPITAL OUTCOMES PROGRAM REPORT 2006

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State of California

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Office of Statewide Health Planning and Development
Healthcare Information Division

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The SAS programming and data analyses were performed by Cliff Li, M.P.H., Victor Simon, Geeta Mahendra, M.A., M.S., Brian Paciotti, Ph.D., and Mallika Rajapaksa, Ph.D., of the Healthcare Outcomes Center, OSHPD. It builds upon a risk-adjustment model that was originally developed and validated by Jennifer Haas, M.D., M.S.P.H., at the University of California, San Francisco.

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TABLE CONTENTS

EXECUTIVE SUMMARY: KEY FINDINGS OF THE 2002-2004 REPORT ON HOSPITAL CARE FOR COMMUNITY-ACQUIRED PNEUMONIA

This is the second public report that the Office of Statewide Health Planning and Development (OSHPD) has published on Community-Acquired Pneumonia (CAP) outcomes for California hospitals. The report is based on analysis of Patient Discharge Data (PDD) records submitted to OSHPD by California-licensed acute care hospitals. The CAP patients were admitted to the hospital between January 2002 and November 2004. The previous report was based on PDD records for CAP admissions that occurred in 1999 through 2001. An additional study was conducted in 1996 for the purposes of CAP risk model development and data validation.

The quality of hospital performance was assessed by comparing each hospital's risk-adjusted mortality rate for CAP patients with the statewide rate. This method allows for fair comparison of each hospital's mortality rate with the statewide rate and with other hospitals by taking into account patients' severity of illness prior to admission. Hospitals are defined as "better" if their risk-adjusted mortality rates are statistically significantly lower than the state rate and "worse" if they are higher.

Key findings for this report:

- Between January 2002 and November 2004, a total of 203,647 patients (age 18 and above) were admitted to California hospitals with a diagnosis of CAP. Of these, 25,027 died within 30 days after admission, either in the hospital or following discharge.

- The statewide mortality rate for CAP patients was 12.29%.

- The strongest predictor of death for these patients was having a diagnosis of respiratory failure at the time of admission; for these patients the risk of dying was five times greater. Risk of death was three times higher for patients with diagnoses of lung cancer or other (non-lung) solid cancers. It was twice as high for patients with diagnoses of septicemia or coagulopathy.

- Another important predictor of dying was having a Do Not Resuscitate (DNR) order in place. For these CAP patients risk of death was four times greater. Twelve percent of the patients had DNR orders (similar to the percentage reported for CAP patients in 1999-2001).

- A total of 390 hospitals reported CAP cases for this time period. Of these, 25 hospitals had mortality rates that were "better than expected" and 28 had mortality rates that were "worse than expected." Most of the hospitals (309) were found to have mortality rates in the "expected" range and 28 had too few cases to be rated.

- When DNR was added to the statistical calculation for risk-adjustment, about a third of the hospitals with high mortality rates and a third with low mortality rates shifted toward the middle range (i.e., shifted to mortality rates similar to the overall statewide rate).

- For the 25 hospitals rated “better” the average risk-adjusted mortality rate was 8.1%. For the 28 hospitals rated “worse” the average adjusted mortality rate was more than twice as high (17.2%).

  Such a large difference in outcomes, even after accounting for the severity of risk in patient mix, suggests that there are important differences in the clinical practices of these two groups of hospitals.

It is critical that all hospitals caring for CAP patients implement the “best practice” guidelines supported by the medical community. It is especially important that hospitals with poor outcomes review how they care for pneumonia patients to identify and correct any shortcomings.

The hospitals with “better” and “worse” mortality rates for the CAP patients are as follows:

Hospitals With “Better” (Lower) Mortality Rates	**Hospitals With “Worse” (Higher) Mortality Rates**
Alhambra Hospital-Alhambra	Community Medical Center-Clovis
Alvarado Hospital Medical Center	Coast Plaza Doctors Hospital
Beverly Hospital	Coastal Communities Hospital
California Pacific Medical Center	Dameron Hospital
Cedars-Sinai Medical Center	Desert Hospital
Columbia San Clemente Hospital Medical Center	Emanuel Medical Center
East Los Angeles Doctor’s Hospital	Kaiser Foundation-Sacramento
El Camino Hospital	Kaiser Foundation-South Sacramento
Garfield Medical Center	Kaiser Foundation-Panorama City
Irvine Regional Hospital & Medical Center	Kaiser Foundation-Riverside
John Muir Medical Center	Kaiser Foundation-Valley Medical Center
Kaiser Foundation, Rehabilitation Center-Vallejo	Los Angeles Co Harbor-UCLA Medical Center
Los Robles Regional Medical Center	Memorial Hospital Modesto
Marshall Hospital	Mercy Hospital-Bakersfield
Mercy Medical Center-Merced	Mercy Hospital-Folsom
Paradise Valley Hospital	Pacifica Hospital of The Valley
San Ramon Regional Medical Center	Palomar Medical Center
Scripps Memorial Hospital-Encinitas	Parkview Community Hospital
Sharp Chula Vista Medical Center	Placentia-Linda Community Hospital
St. Helena Hospital & Health Center	Pomerado Hospital
St. Louise Regional Hospital	Redlands Community Hospital
St. Rose Hospital	San Gorgonio Memorial Hospital
St. Vincent Medical Center	San Joaquin General Hospital
Univ. of California Irvine Medical Center	Sierra View District Hospital
Washington Hospital-Fremont	Sutter Roseville Medical Center
	Torrance Memorial Medical Center
	University Medical Center
	West Anaheim Medical Center

Of the 27 hospitals that appeared as “better” in the last CAP report released in 2004, 9 remain “better” in this report. Of the 32 hospitals that appeared as “worse” in the last report, 15 retain that rating. In total, slightly less than half of the hospitals that were performance outliers in the last report remain outliers in this report. In no instance, did a hospital’s rating go from “better” to “worse” or vice-versa between reports.

INTRODUCTION

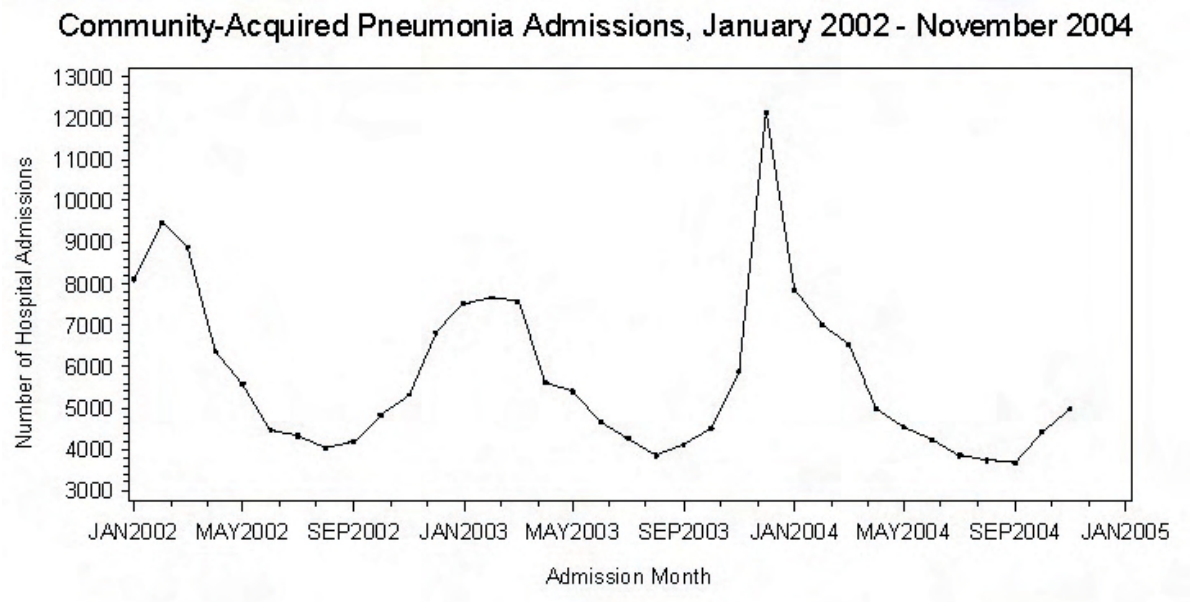
Pneumonia is an acute inflammation of the lung tissue. Cases may result from bacteria (most commonly Streptococcus or Staphylococcus), viruses, fungi, dust particles, or other objects small enough to be inhaled.

Pneumonia is the sixth leading cause of death overall and the number one cause of infectious death.[1,2] It is estimated that there are 2-4 million cases annually in the United States.

Risk of pneumonia is greater for people who have weakened immune systems (for example, due to use of immunosuppression medications or infection with HIV), loss of the ability to clear contaminants in the lungs (due to smoking tobacco or to advanced age), or exposure to dust or other particulates at work or at home. Risk is also increased for people who have respiratory infections, such as influenza. For pneumonia patients who are admitted to the hospital, timely diagnosis and treatment are critical for improving chances of survival.

Community-acquired pneumonia (CAP) is pneumonia that is acquired outside an institutional setting, for example, at home or at work. In contrast, hospital-acquired pneumonia is acquired by patients while they are hospitalized for surgery and other treatments. As shown in Figure 1, hospitalizations for community-acquired pneumonia in California vary by season, with admissions highest in winter months.

Figure 1: Community-Acquired Pneumonia Admissions



[1] Marrie TJ, Community-acquired pneumonia: epidemiology, etiology, treatment, Infectious Disease Clinics of North America, 1998 Sep, 12(3):723-40.

[2] Garibaldi RA, Epidemiology of community-acquired respiratory tract infections in adults: incidence, etiology and impact, The American Journal of Medicine, 1985; 78:32s-37s.

EVALUATING HOSPITAL QUALITY

This report measures the quality of care received by CAP patients in California-licensed hospitals. It has two goals. One is to assist healthcare purchasers and consumers with assessment of the relative value of healthcare delivered to patients with community-acquired pneumonia. The second goal is to support and promote quality improvement by hospitals.

Quality of care was measured by patient outcome, that is, whether the patient died within 30 days of hospital admission. Other quality measures, such as hospital compliance with medical practice recommendations, and other patient outcomes, such as quality of life, were not used because information about these factors is unavailable in the administrative discharge datasets.

Over 203,000 adult patients were admitted to acute care hospitals during 2002-2004 for treatment of community-acquired pneumonia.[1] About one out of eight (12.29%) died within 30 days of admission. The 30-day mortality rate includes deaths that occurred during an episode of hospitalization, as well as deaths occurring up to 30 days after the initial admission (Table 1). This measure is used instead of in-hospital deaths because hospitals vary in the amount of time they keep patients hospitalized before discharging them. Hospitals that discharge patients with a shorter length of stay might under-count the number of deaths in their CAP patients.

Table 1: Statewide CAP Admissions and Mortality, by Admission Year

Year of Admission	Number of CAP Patients Hospitalized	Number of Deaths within 30 days of Admission	30-day Mortality Rate
2002	72,701	9,019	12.41 %
2003	72,353	8,703	12.03 %
2004[1]	58,593	7,305	12.47 %
TOTAL	**203,647**	**25,027**	**12.29 %**

For comparing hospital mortality rates with each other, as well as with the statewide rate, the raw mortality rate is not used. This is because it fails to reflect differences in the severity of patient illness across hospitals. A hospital receiving sicker patients is very likely to have a higher mortality rate, even if the medical care given was appropriate. To provide a fair evaluation, statistical modeling adjusts for patient risk factors.

For this report the modeling was performed twice. The first model included risk factors such as age, gender, and specific health conditions present in the patients before they were admitted for care. In the second model, presence of a Do Not Resuscitate (DNR) order was added to the set of adjustment risk factors. Having a DNR order within 24 hours of admission was included as a risk factor because it indicates the presence of underlying severe illness and because it predicts 30-day mortality.

The effect of risk-adjustment on a hospital's mortality rate depends on the severity of illness in its patients. If the patients are sicker than the statewide average then risk adjustment will shift the hospital's mortality rate downward to a lower (better) rate. On the other hand, if a hospital's patients are comparatively less sick at the time they are admitted, the adjustment will shift the mortality rate upward, "penalizing" them for treating a patient group that is not as severely ill.[2]

[1] For the year of 2004, patients admitted between December 2 and December 31 of the last study year (2004) were excluded since death certificates were not available at the time of analysis to determine 30-day mortality for these late admissions.

[2] Risk-adjusted mortality is comparable within the cohort of the study, but cannot be compared with rates from other studies. It can be compared with the rate of the previous CAP report, by pooling all data together and recalculating rates using the same set of coefficients.

The final quality rating of a hospital depended on the results of both models. Hospitals were defined as "better" if their risk-adjusted mortality rates were significantly lower than the statewide rate in both models. They were defined as "worse" if their rates were significantly higher in both models. If the hospital was rated "as expected" in either model then a final rating of "as expected" was assigned.

To be conservative we used a 98% significance test to rate the hospitals. This means that we are 98% confident that a rating of "better" or "worse" is not arrived at by chance. Smaller hospitals have *less* statistical power to be classified as significantly different from the statewide rate. Thus, their risk-adjusted rates would have to be much higher or lower than the statewide rate for them to be "significantly" different. Conversely, a large hospital is *more* likely to be found significantly different, even with mortality rates that are only moderately higher or lower. For a detailed technical discussion of how statistical significance tests were done, see Appendix A.

Most of the hospitals admitted at least 100 CAP patients across the three year period, some of whom died. For hospitals with very few admissions, the model could not be used to assign ratings of "better" or "worse" due to the effect of small numbers on estimates of statistical significance. (For a list of hospitals that could not be rated, see Table 3).

As shown in Table 2, over eighty-five percent of the California hospitals had risk-adjusted mortality rates that were within the expected range for CAP patients. The analysis also identified 25 hospitals with rates that were "better" than expected (lower) and 28 with risk-adjusted mortality rates that were "worse" (higher).

Table 2: Summary of Hospital Ratings

Hospital Performance Category	Number	Percent
As Expected (one or both models)	309	85.4
"Better" than expected in both models (p<.01)	25	6.9
"Worse" than expected in both models (p<.01)	28	7.7
Total	362	100.0

Note: This table excludes the 28 hospitals that were not rated because of small sample size (see Table 3).

Among the twenty-eight hospitals rated "worse" the average risk-adjusted mortality rate was 17.0% (range: 14.7 – 22.1%) using the model without DNR. This is more than twice as high as the average for the "better" hospitals, which was 7.9% (range: 4.8 – 9.8%). Similarly, using the model that included DNR, the average rate for the "worse" hospitals was 17.2% (range: 14.3 – 23.7%), compared to only 8.1% (range: 5.2 – 9.7%) for the "better" facilities.

How the Healthcare Quality Outcome was Measured

Healthcare quality was measured in this report by calculating risk-adjusted mortality rates. These rates are useful for comparing quality of care because:

- **They have been risk-adjusted**. Risk-adjustment allows readers to meaningfully compare a specific hospital's results to both the statewide benchmark and to the results of other hospitals. The factors that are used in the risk-adjustment models

are: patient age, gender, DNR order in place, number of prior discharges in the previous six months, and co-morbidities at the time of hospital admission.

- **They have been validated**. Before developing the model, OSHPD conducted a validation study to determine whether the data items related to CAP were being reported correctly in the administrative patient discharge data records. The study found that variations in hospital reporting did not significantly affect the risk-adjusted mortality rates. Also, the results were validated by differences in clinical practice; low mortality hospitals were found to treat community-acquired pneumonia more aggressively than high mortality hospitals.[1]

Risk factors such as being male and having lung cancer, which are associated with a higher probability of death, were selected under guidance from a clinical panel of pneumonia experts. Selection of risk factors was based on their importance in the medical literature and on the strength of their statistical association with death in analyses of patient discharge data and state vital statistics records.

Adjustment was only made for co-morbidities, which are conditions present at the time of the admission (CPAA). Complications, which are diagnoses that occur after admission, were not used to "credit" hospitals for the illness level in their patient mix. Fortunately, the California PDD dataset includes an indicator that shows whether each diagnosis was a co-morbidity (i.e., a condition present at admission), or not. Thus, of the many diagnoses that can occur as either complications or as co-morbidities, it was possible to correctly identify those which were truly present at the time of the patient's admission.

Risk Factors for Pneumonia Mortality Outcome

The risk factors included in the adjustment model, with their associated weights, odds ratios (ORs), and confidence intervals, are listed in Tables A.8 and A.9 of Appendix A.

The strongest predictor of death was a diagnosis of respiratory failure at the time of admission. It increased the risk of death by five times (OR = 5.2). Other diagnoses that were strong predictors of death for these patients were lung cancer and other solid cancers (OR = 3.1 and 2.4, respectively), septicemia (OR = 2.8), and coagulopathy (OR = 2.1). (See Table A.9)

Risk of death was also significantly greater for CAP patients who had DNR orders in place (OR = 4.2). About 11.5% of CAP patients had DNR orders. These results are similar to the DNR results reported in 1999-2001.

[1] Hass J, Luft H. Report for the California Hospital Outcomes Project Community-Acquired Pneumonia, 1996: Model Development and Validation. Office of Statewide Health Planning and Development, Sacramento, Nov. 2000. Available at: http://www.oshpd.ca.gov/HQAD/Outcomes/Studies/CAP/index.htm.

CALCULATION OF RISK-ADJUSTED MORTALITY RATES

The outcome measure is based on deaths in CAP patients within 30 days of their initial (index) admission to the hospital to be treated for CAP. The risk-adjusted mortality outcome is calculated in three steps (explained in greater detail in Appendix A):

- First, the actual number of 30-day deaths is divided by the total actual number of cases in the hospital to obtain the observed mortality rate.
- Second, each patient's probability of death is calculated using the risk adjustment model. These probabilities are combined to obtain the expected number of deaths for the hospital. The expected number of deaths is divided by the actual number of cases to obtain the expected mortality rate.
- Third, the observed rate is divided by the expected rate. This ratio is then multiplied by the statewide CAP mortality rate to obtain the hospital's risk-adjusted mortality rate.
- Fourth, a statistical test is applied to determine whether the hospital's risk-adjusted mortality outcome is statistically significantly different from the state average.

If a hospital's observed rate is greater than the expected rate, the hospital had more deaths than expected, given the severity of illness in its patients. In this case the ratio of observed to expected would be greater than 1.0; multiplying this number times the statewide rate would result in a number greater than the statewide rate. That is, the risk-adjusted mortality rate would be higher than the statewide rate.

On the other hand, if a hospital's observed rate is lower than the expected, then the ratio of observed to expected is less than 1.0. Multiplying this number times the statewide rate results in a number lower than the statewide rate. For this hospital, the risk-adjusted mortality rate is lower than the statewide rate.

Whether the hospital's outcome is statistically significant or not depends on three factors: the number of CAP patients at the hospital, the size of the gap between the hospital's risk-adjusted mortality rate and the statewide benchmark, and the confidence level selected for the test. For this report, a conservative 2% level of confidence was used (indicated as $p < .02$). With this level of confidence, there are just two chances in 100 of making an error about whether a hospital's outcome is truly greater or smaller than the statewide benchmark.[1]

It is important to remember that size matters. For hospitals with large numbers of patients the statistical confidence interval will be narrow, so moderate or even small-sized gaps may be significantly different from the statewide rate. For small hospitals, the confidence interval is wider. This means that a risk-adjusted rate must be much larger or much smaller than the statewide rate to be found significantly different.

[1] Luft HS, Brown BW Jr. Calculating the probability of rare events: Why settle for an approximation? Health Services Research 1993; 28:419-439.

Hospitals Excluded Because of Small Numbers of Patients

Some hospitals were excluded from this report because they treated only a small number of CAP patients. Table 3 shows the number of patients and deaths at hospitals that admitted fewer than 30 patients during the three-year period of this report. These small numbers resulted in extremely wide confidence intervals that could not be meaningfully interpreted. These hospitals were not rated as significantly higher or significantly lower than the statewide 30-day mortality rate and are not shown in Chart 1.

Table 3: Number of Observed Deaths Within 30 Days, Hospitals with Fewer Than 30 Admissions, 2002-2004

County	Hospital	Number of CAP Patients	Number Died
Alameda	Children's Hospital Medical Center of Northern California	10	0
Fresno	Fresno Heart Hospital	5	0
Fresno	Sanger General Hospital	12	0
Humboldt	The General Hospital	21	0
Inyo	Southern Inyo Hospital	19	2
Los Angeles	Avalon Municipal Hospital and Clinic	15	1
Los Angeles	Barlow Hospital	7	0
Los Angeles	Children's Hospital of Los Angeles	19	1
Los Angeles	Doctors Hospital of West Covina	17	1
Los Angeles	Earl and Loraine Miller Children's Hospital	5	0
Los Angeles	Lincoln Hospital Medical Center	24	1
Los Angeles	Los Angeles County Rancho Los Amigos Medical Center	12	0
Los Angeles	Orthopedic Hospital	12	1
Los Angeles	Specialty Hospital of Southern California	1	0
Los Angeles	St. Luke Medical Center	12	1
Madera	Valley Children's Hospital	22	0
Merced	Dos Palos Memorial Hospital	3	0
Modoc	Surprise Valley Community Hospital	18	1
Mono	Mammoth Hospital	22	0
Orange	Children's Hospital of Orange County	3	0
Orange	College Hospital-Costa Mesa	7	0
Orange	Orange County Community Hospital-Buena Park	24	4
Sacramento	Shriners Hospital-Northern California	1	0
San Diego	Children's Hospital-San Diego	9	0
San Diego	Sharp Mary Birch Hospital For Women	2	0
San Mateo	Seton Medical Center-Coastside	2	1
Santa Clara	Lucile S. Packard Children's Hospital at Stanford	6	0
Shasta	Patient's Hospital of Redding	1	0

FINAL RESULTS: RISK-ADJUSTED MORTALITY RATES FOR CAP PATIENTS COMPARED TO STATEWIDE RATE

Chart 1 shows the risk-adjusted mortality rates obtained for each of the hospitals included in the analysis. The hospitals are listed in alphabetical order, by county. Each is represented by two lines, the first showing the results of adjustment without DNR in the model and the second showing results with DNR included. Lower risk-adjusted mortality rates are considered better.

The black solid circle (●) on a row's horizontal bar represents a hospital's risk-adjusted mortality rate and the horizontal bar itself represents its confidence interval. If this bar crosses the dashed vertical line placed at 12.29% (representing the statewide mortality rate) then the hospital's adjusted rate is considered "as expected." Otherwise, it is considered significantly different from the statewide rate.

Symbols on the chart indicate the following:

- Hospitals with significantly lower mortality rates have a "better" quality rating for care of CAP patients and are identified with a plus sign (+).
- Hospitals with significantly higher mortality rates have a "worse" quality rating for care of CAP patients and are identified with a minus sign (-).
- Hospitals that were not significantly different than expected are not assigned a symbol and have an "as expected" quality rating for care of CAP patients.
- If a hospital had a "better" rate on both models (with and without DNR) or had a "worse" rate on both models, it is marked by shading. **Only hospitals that appear with shading are considered performance outliers ("better" or "worse") with respect to this report.**

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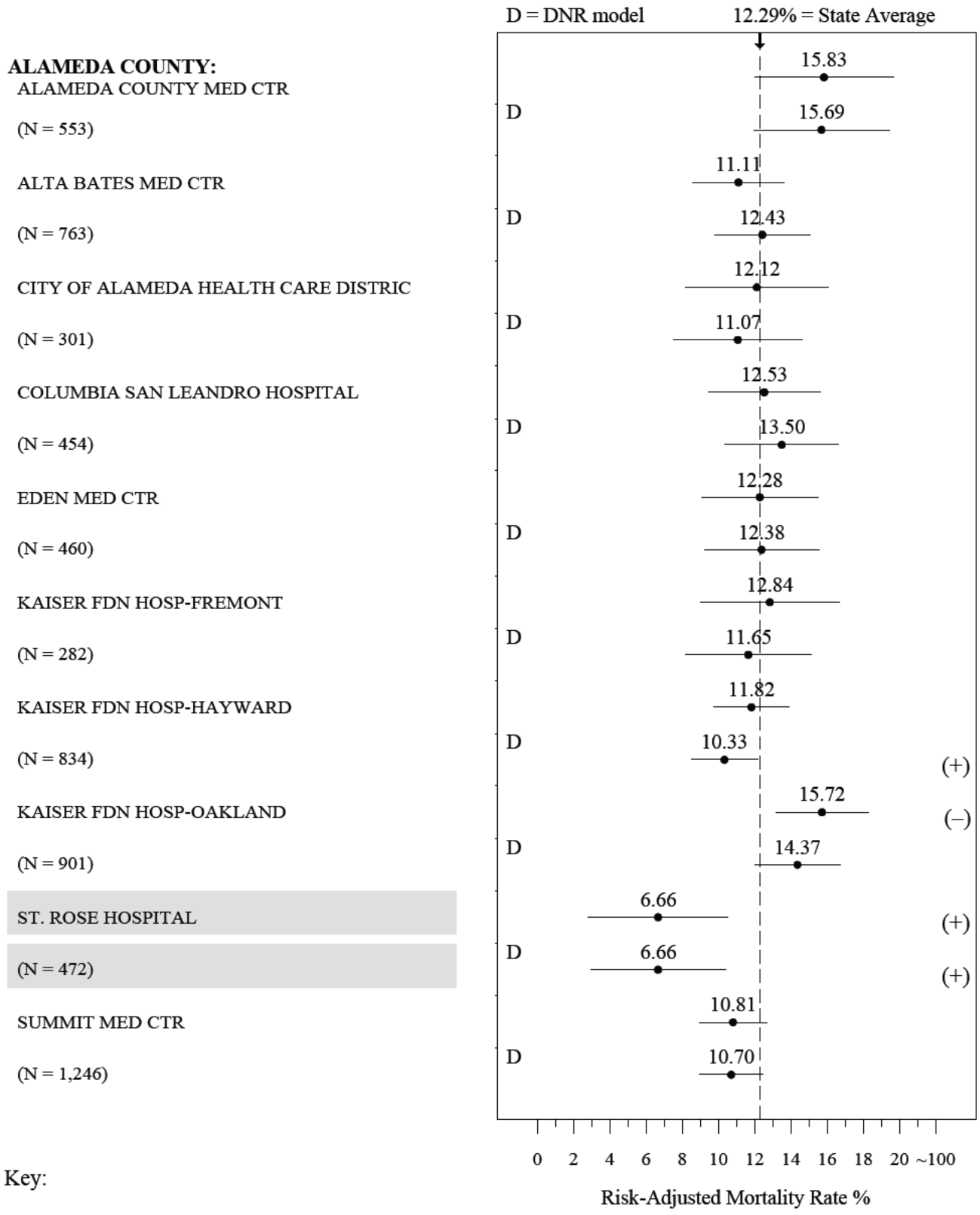
Chart 1: Community-Acquired Pneumonia 30-Day Mortality Rates, 2002-2004



Key:

- —●— Risk-adjusted mortality rate and confidence interval.
- ⟷ Indicates interval extends beyond graph.
- N = Number of patients.
- (+) Mortality rate significantly lower than statewide rate (P-value < .01).
- (–) Mortality rate significantly higher than statewide rate (P-value < .01).
- ** Hospital comment letter received. See Appendix B.

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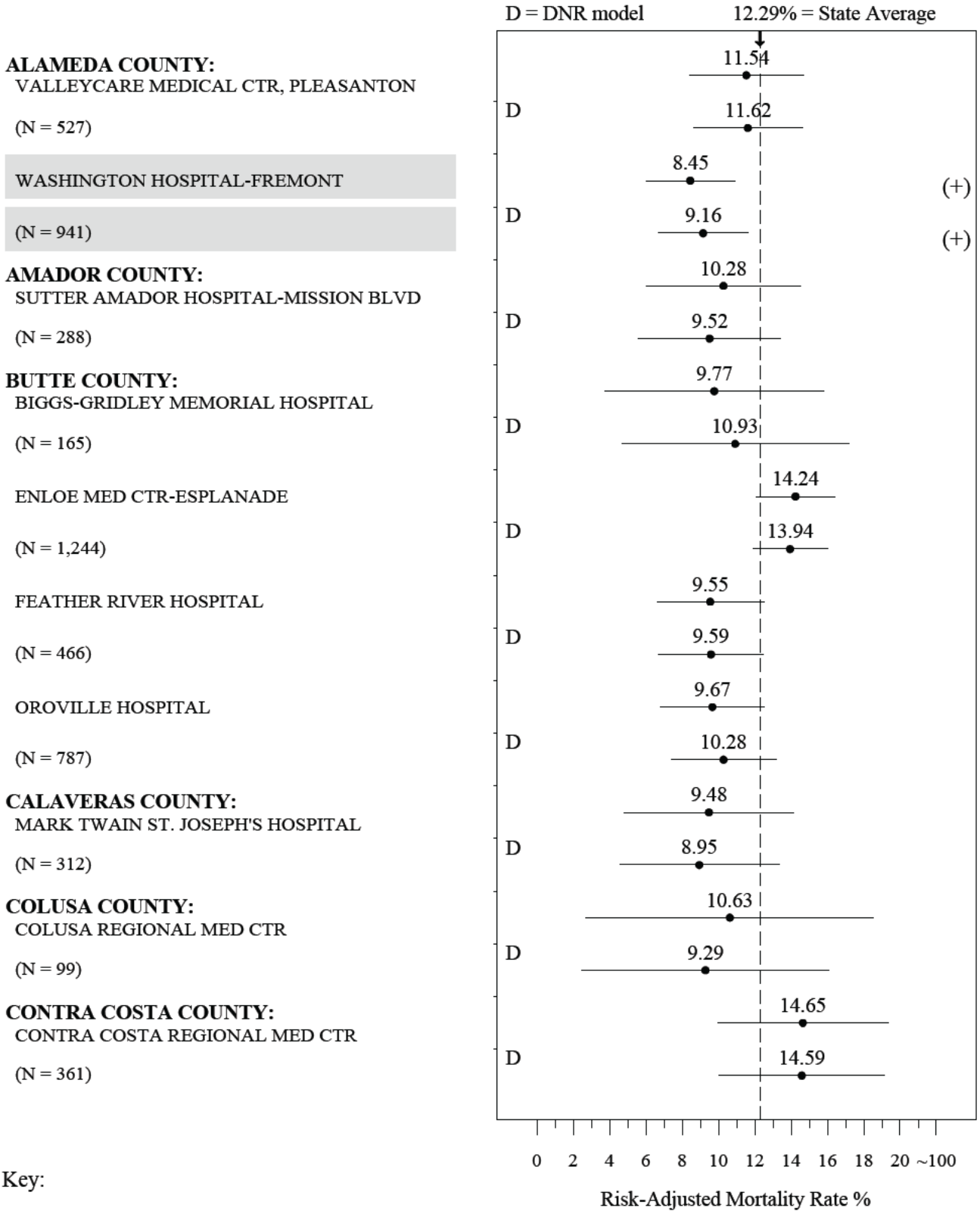

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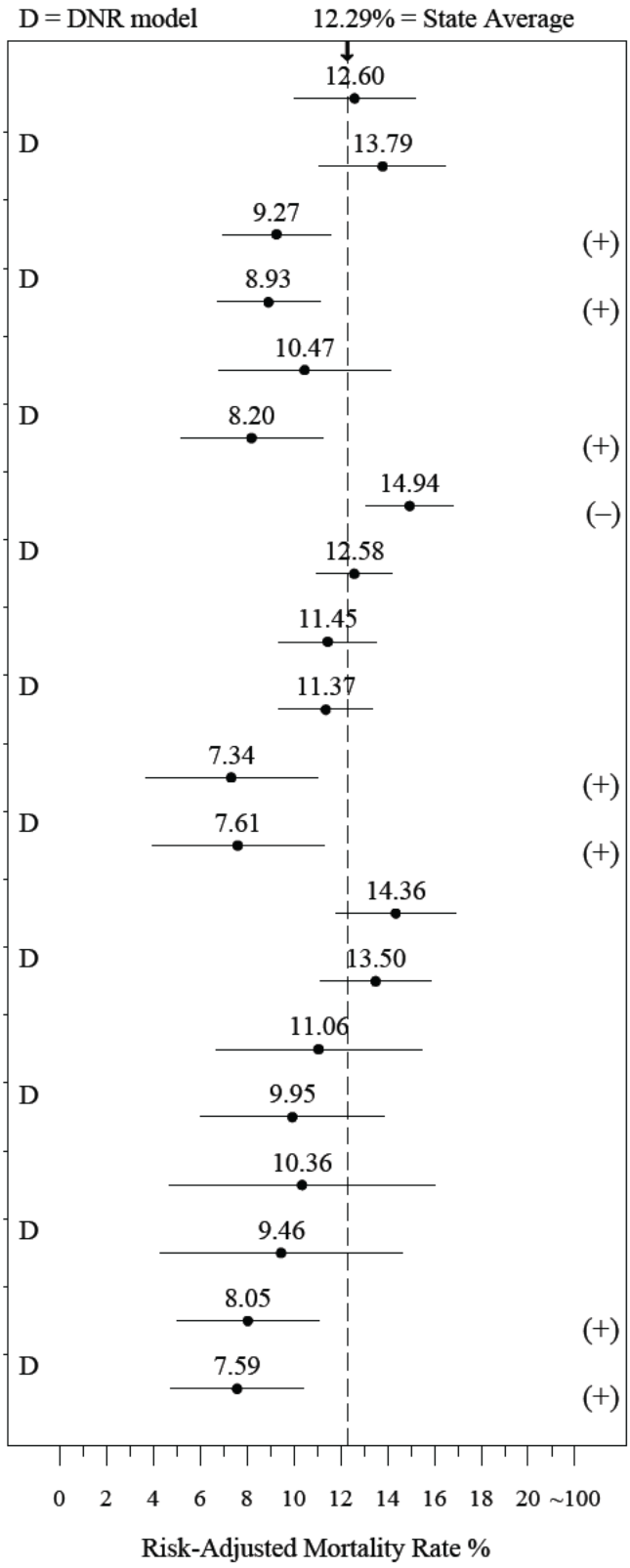

CONTRA COSTA COUNTY:

DOCTORS MED CTR-SAN PABLO

(N = 666)

JOHN MUIR MED CTR **

(N = 782)

KAISER FDN HOSP-RICHMOND(NEVIN AVE)

(N = 401)

KAISER FDN HOSP-WALNUT CREEK

(N = 1,160)

MT DIABLO MED CTR

(N = 905)

SAN RAMON REGIONAL MED CTR

(N = 371)

SUTTER DELTA MED CTR

(N = 629)

DEL NORTE COUNTY:

SUTTER COAST HOSPITAL

(N = 290)

EL DORADO COUNTY:

BARTON MEMORIAL HOSPITAL

(N = 228)

MARSHALL HOSPITAL

(N = 577)

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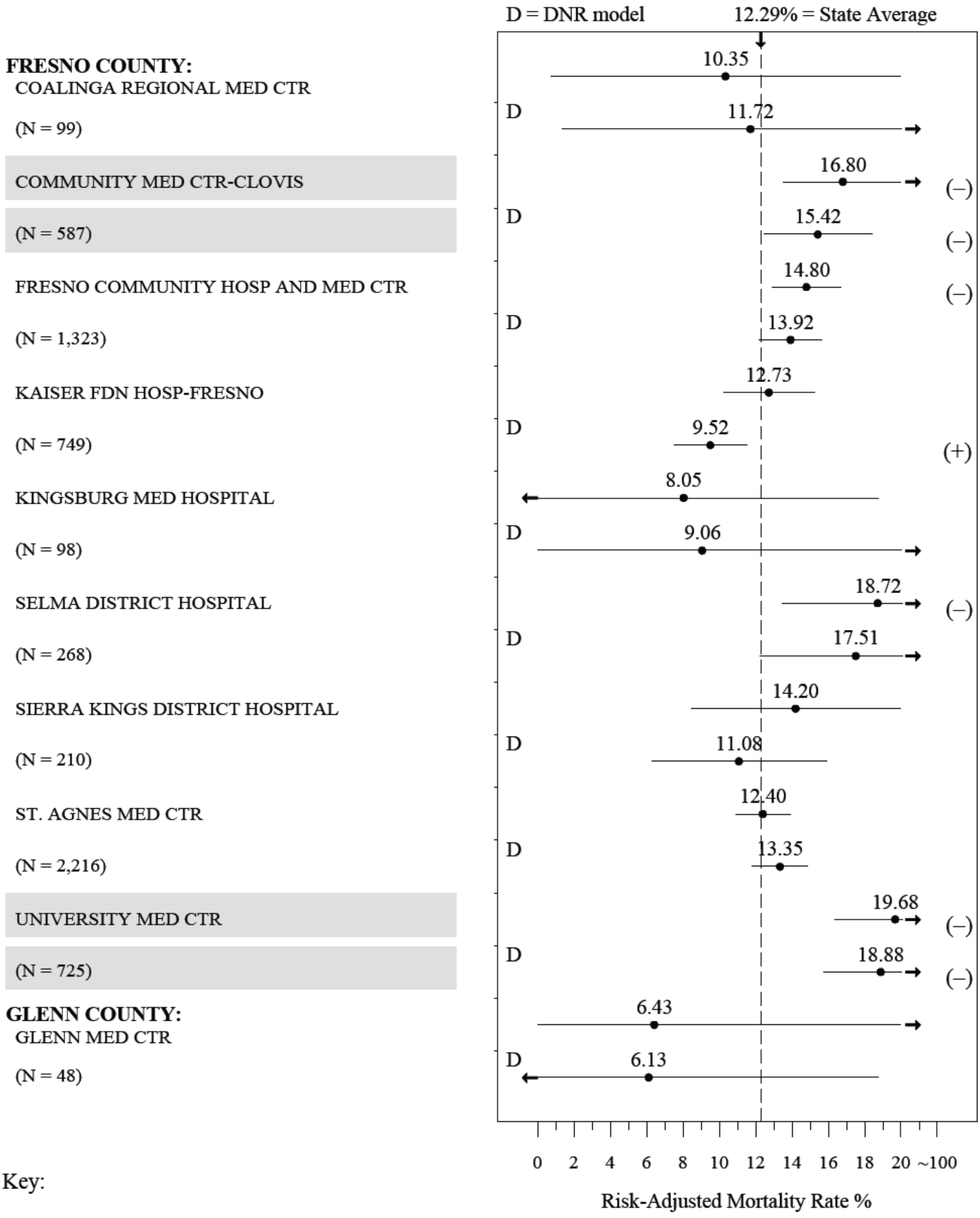

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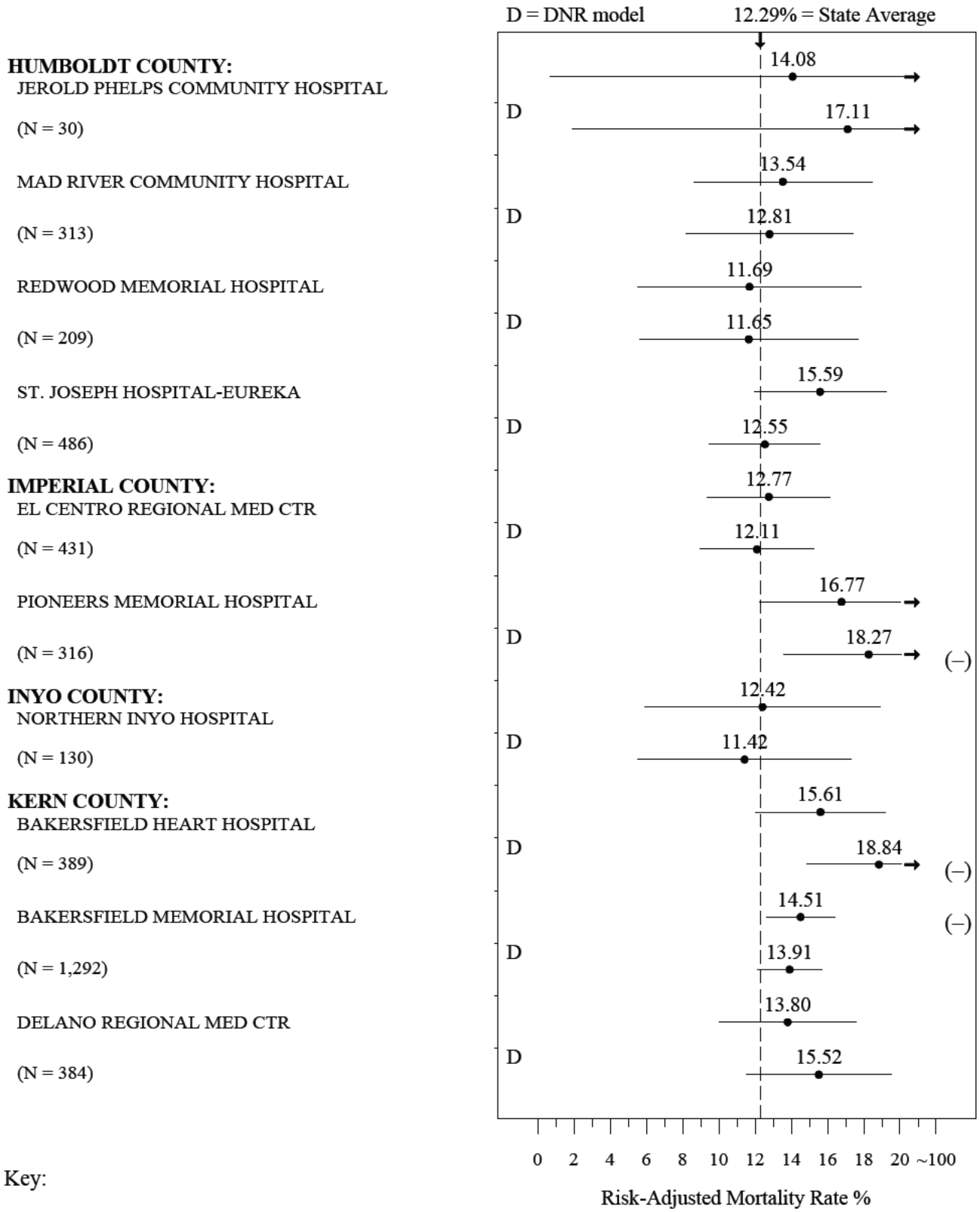

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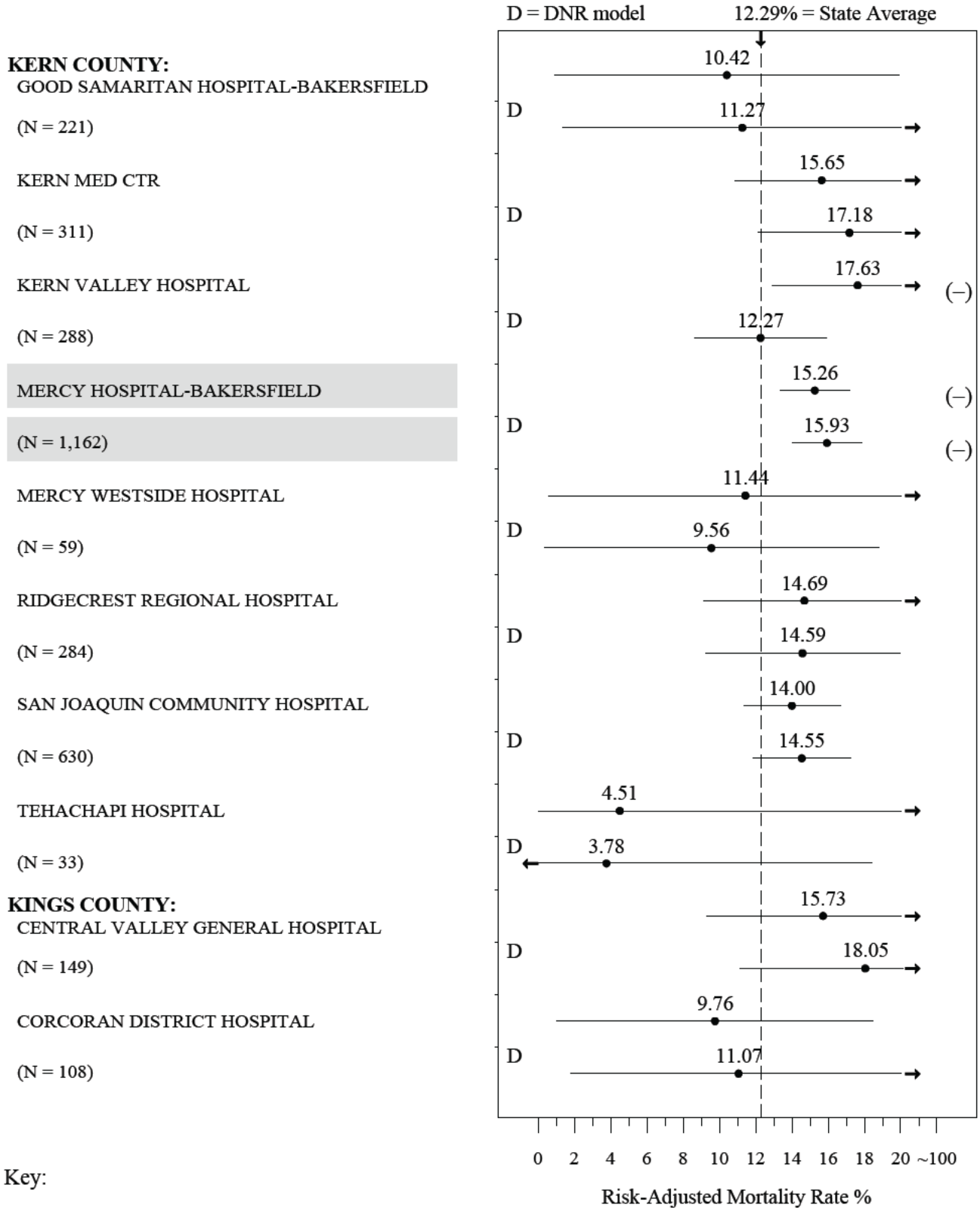

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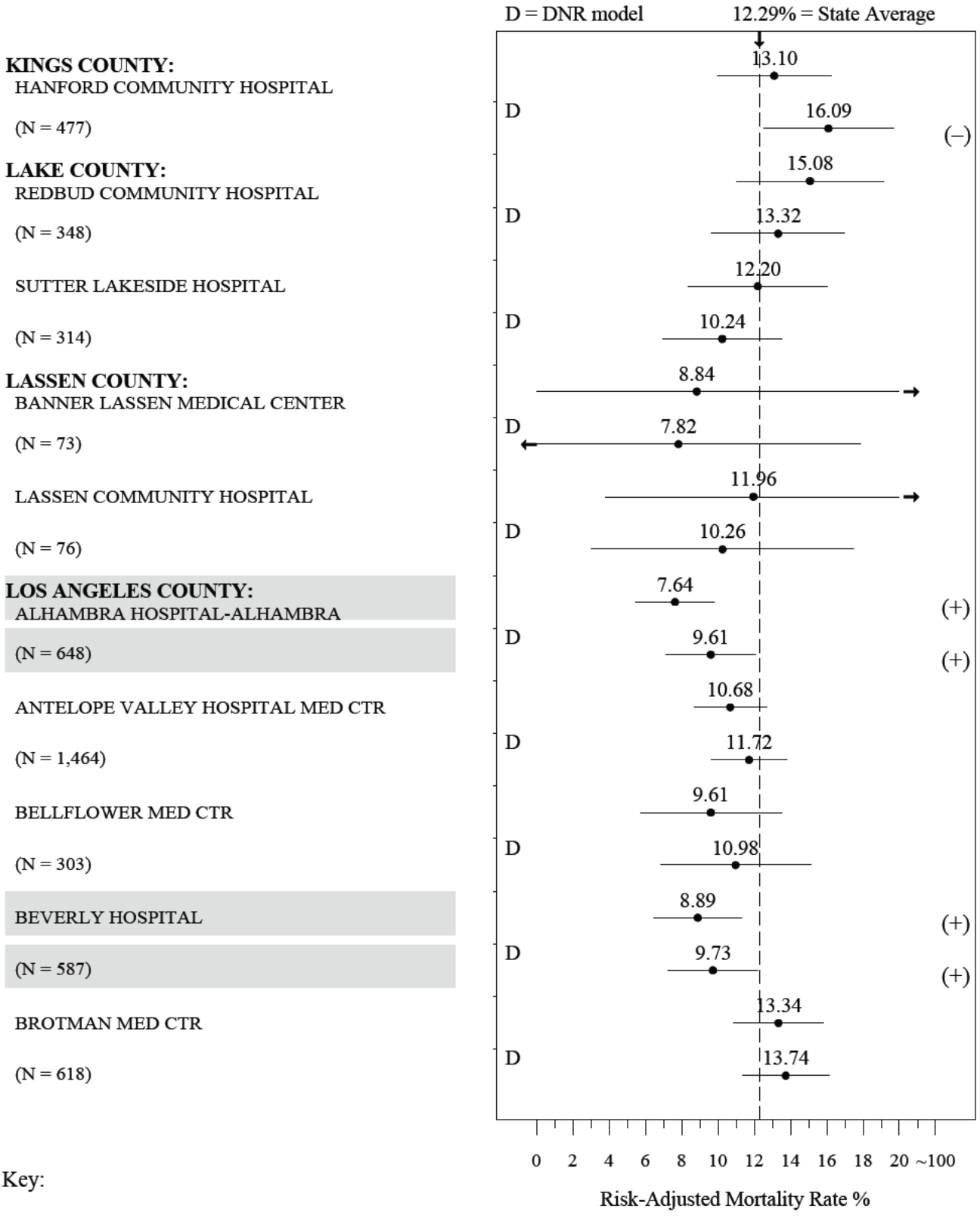

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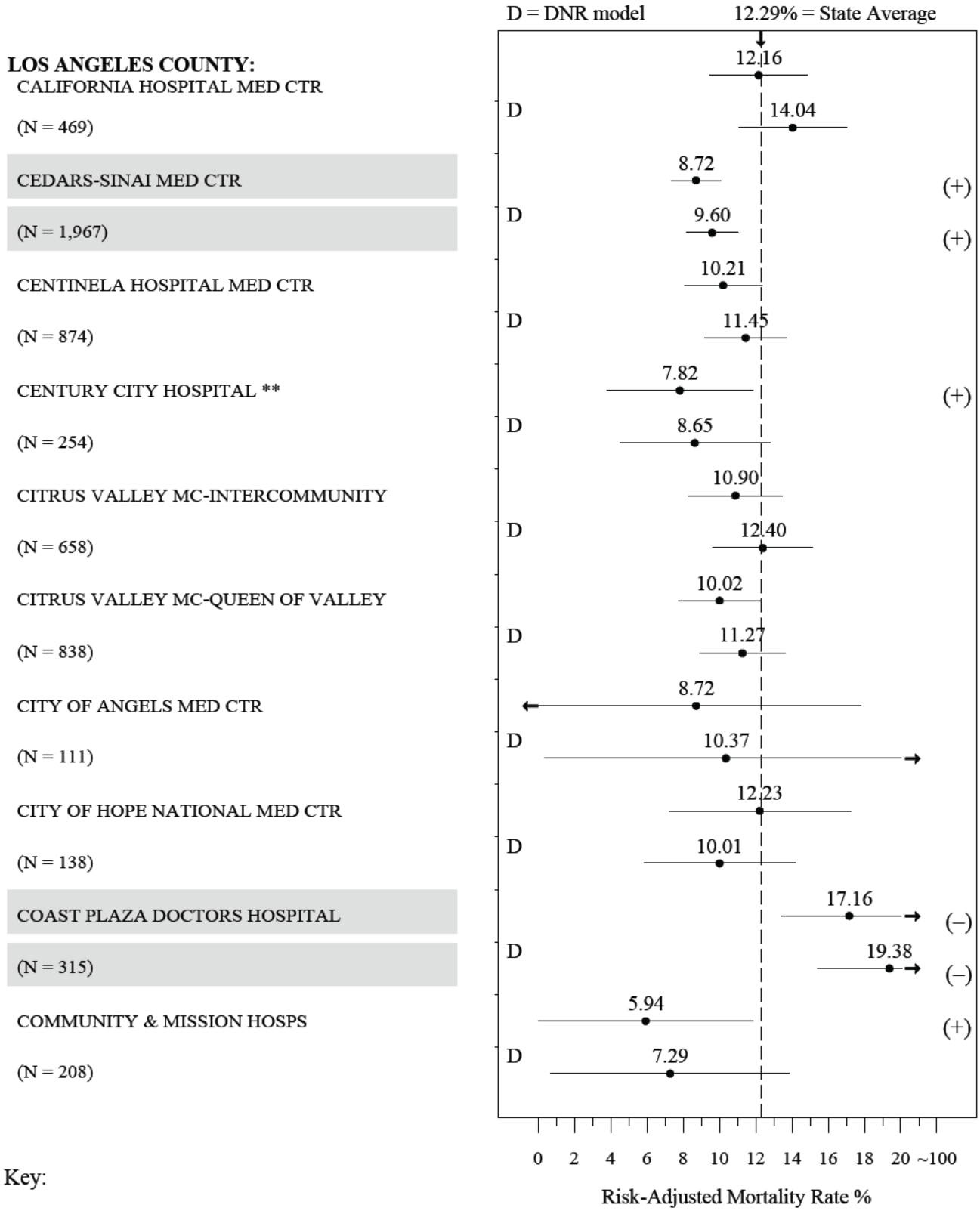

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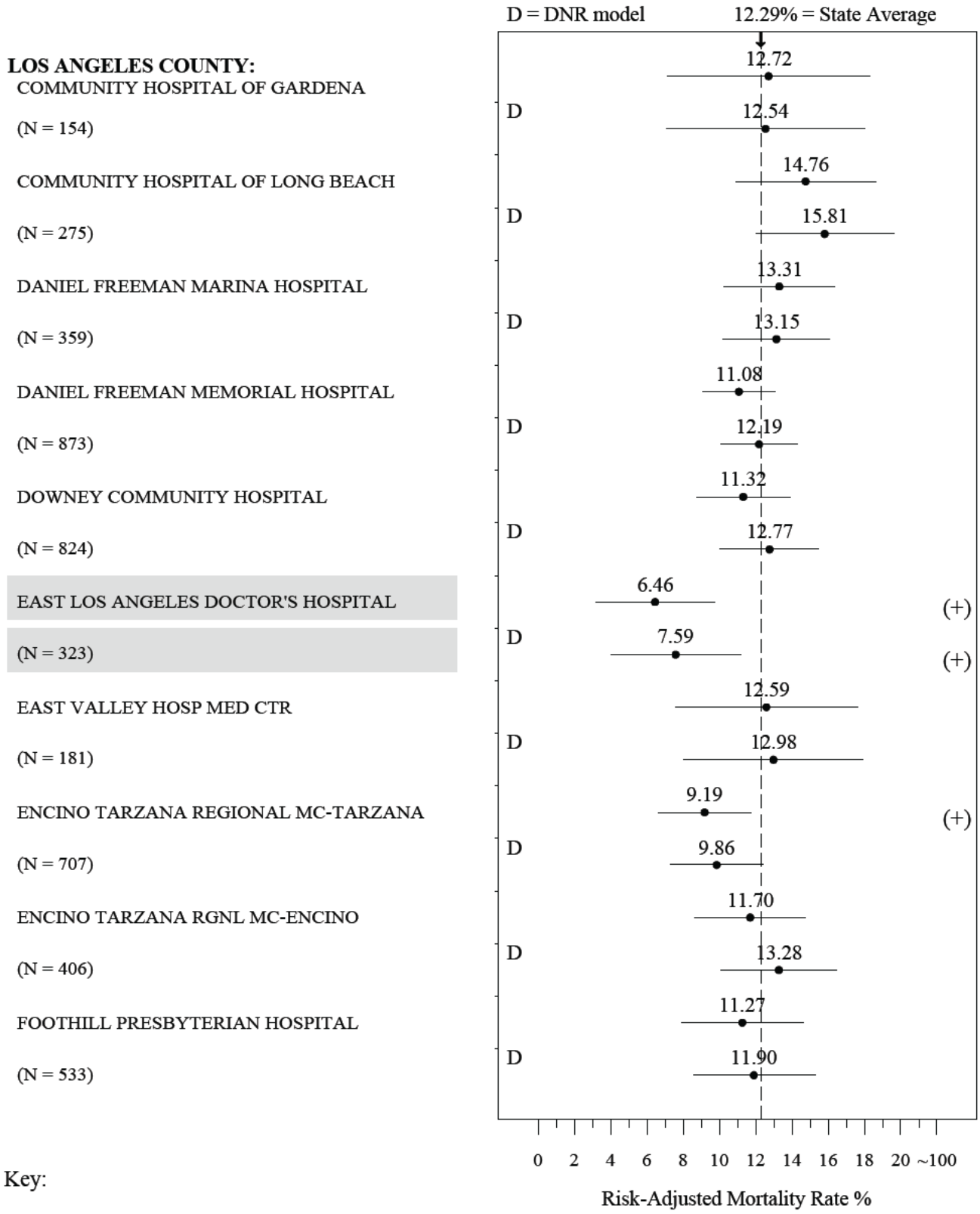

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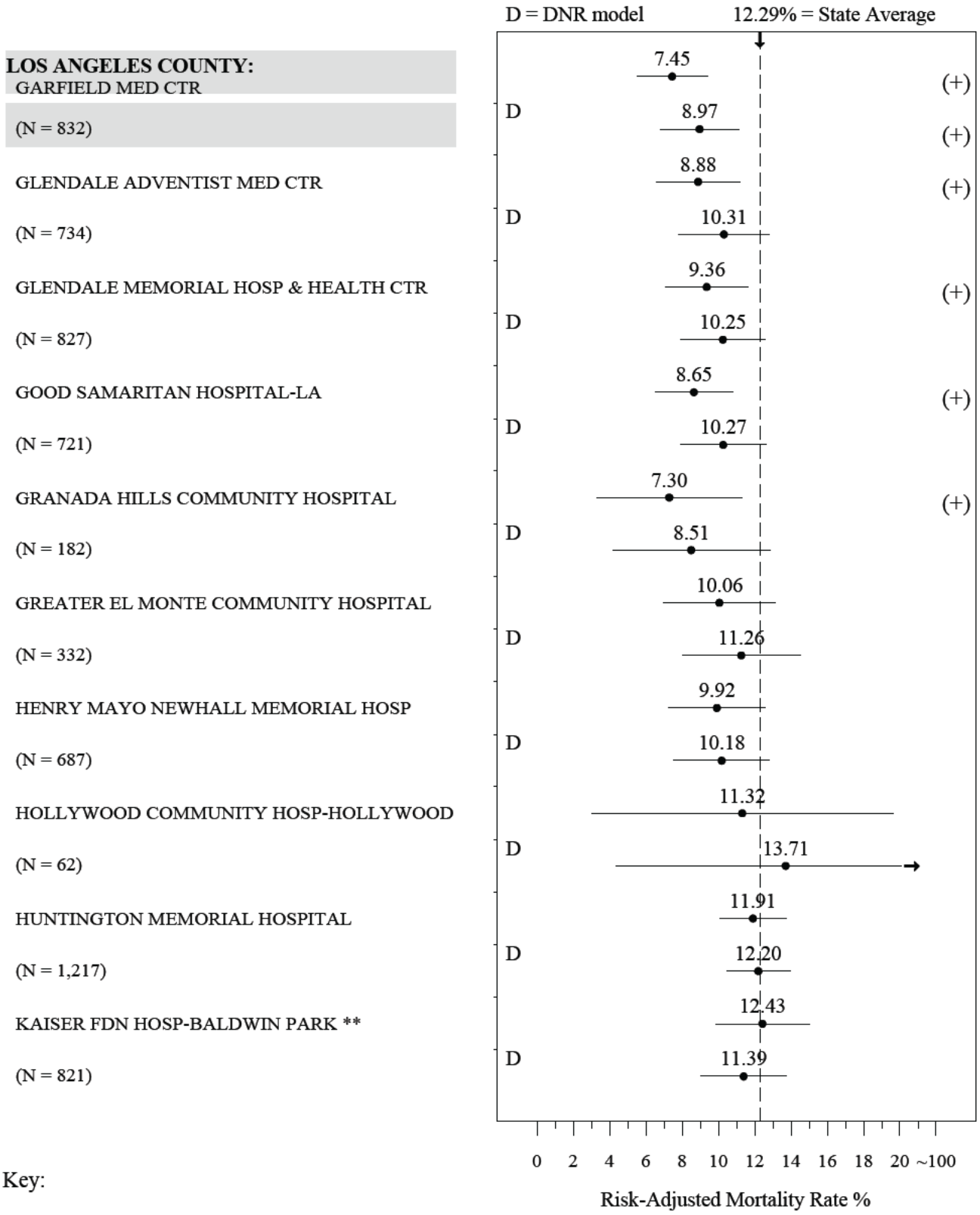

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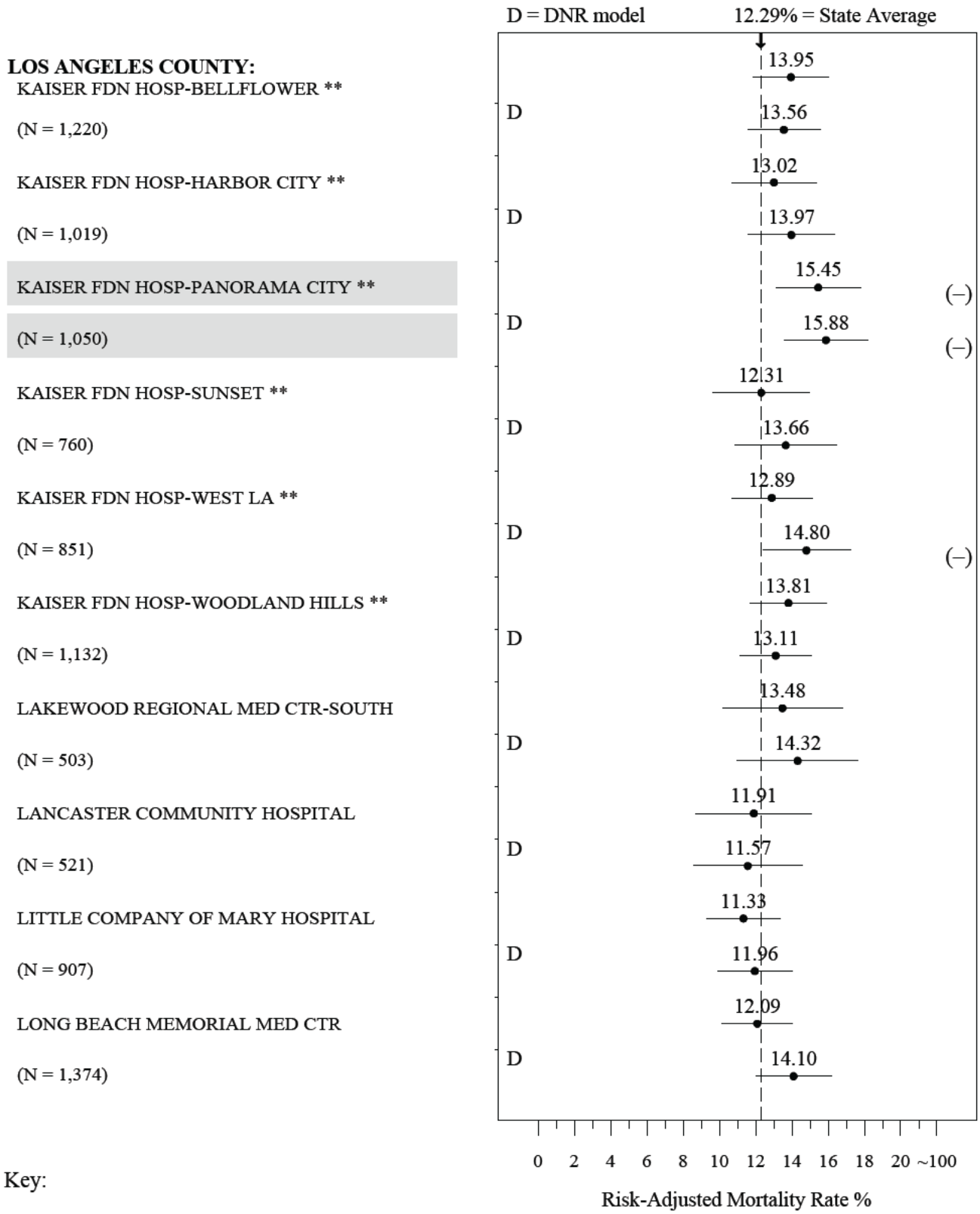

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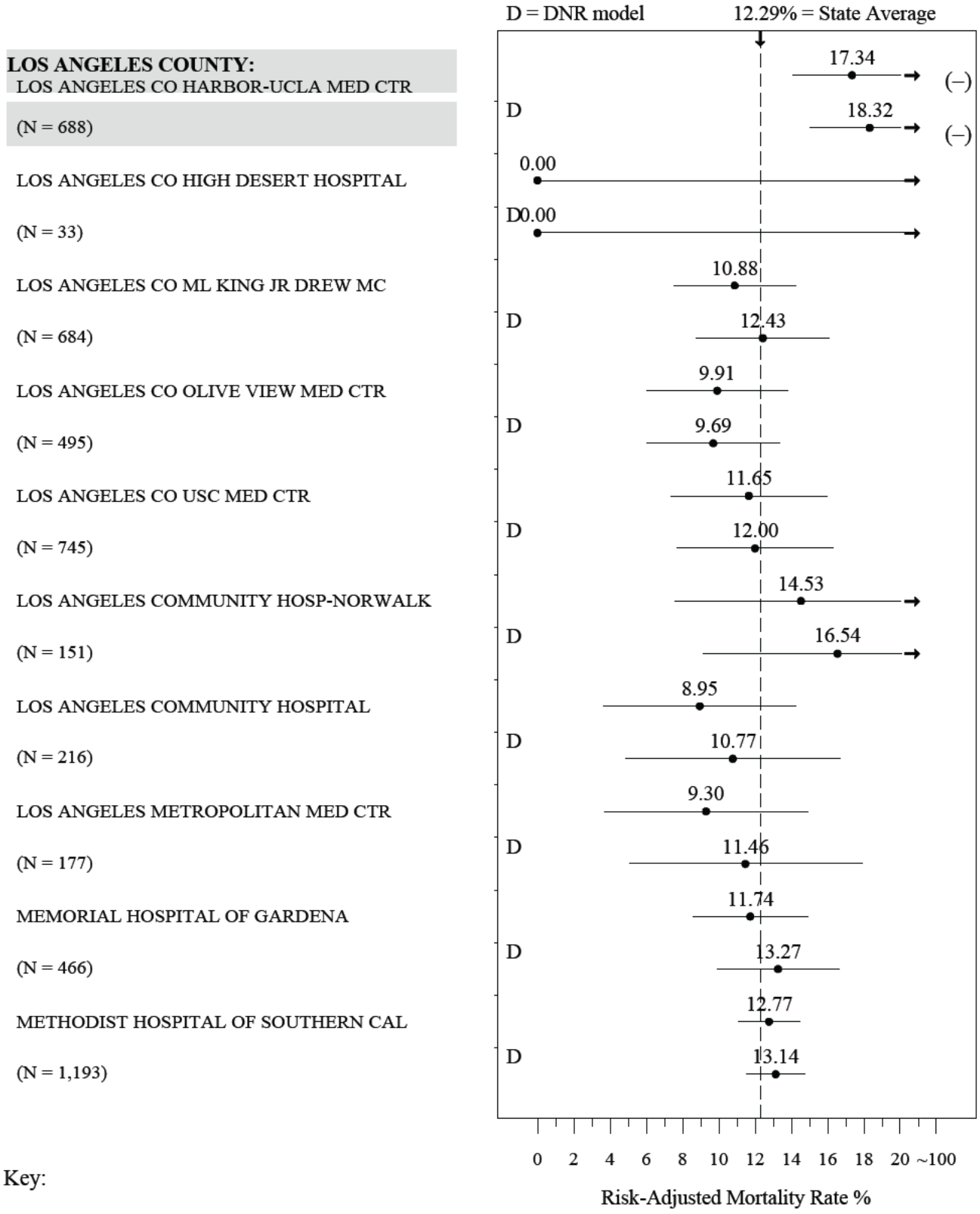

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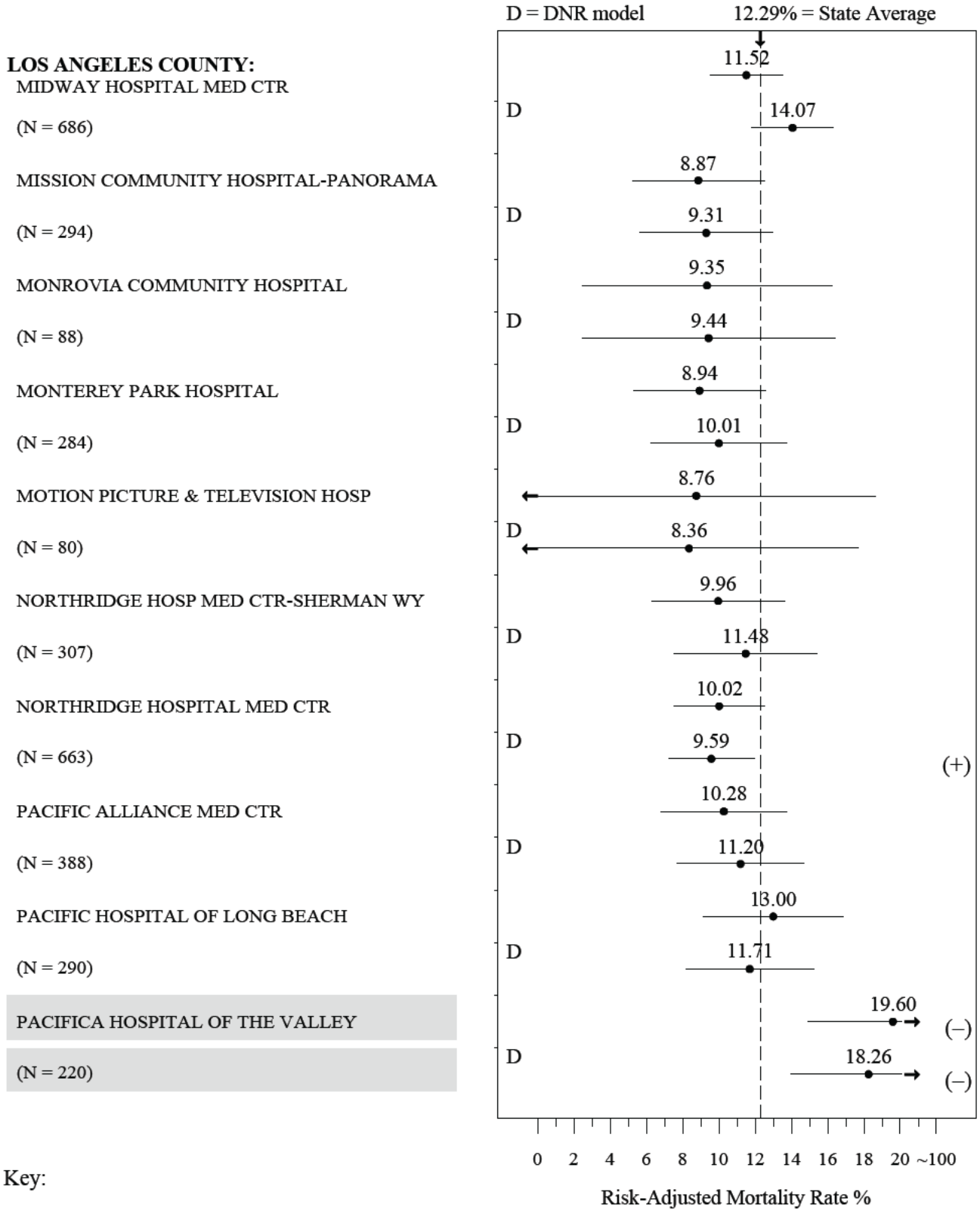

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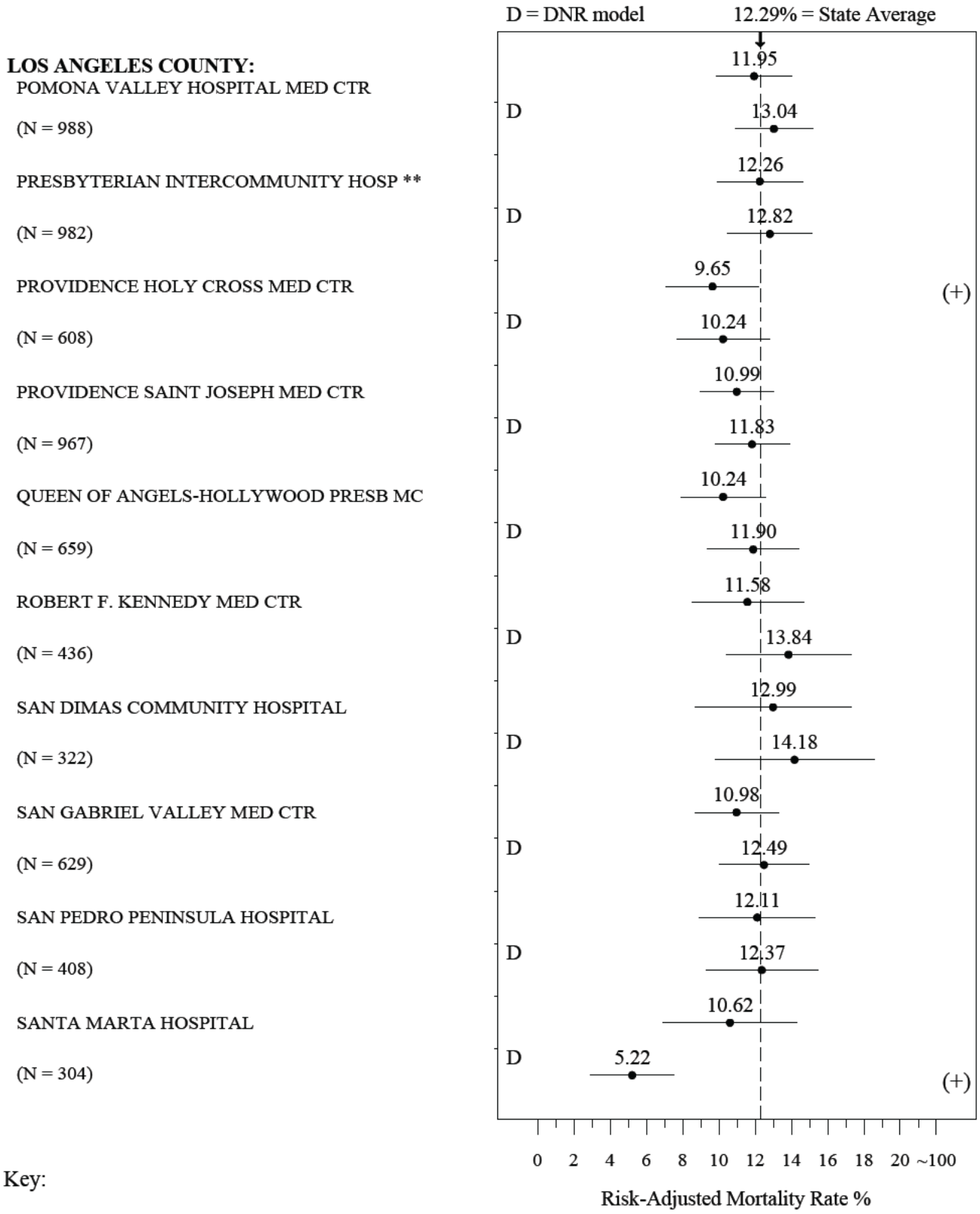

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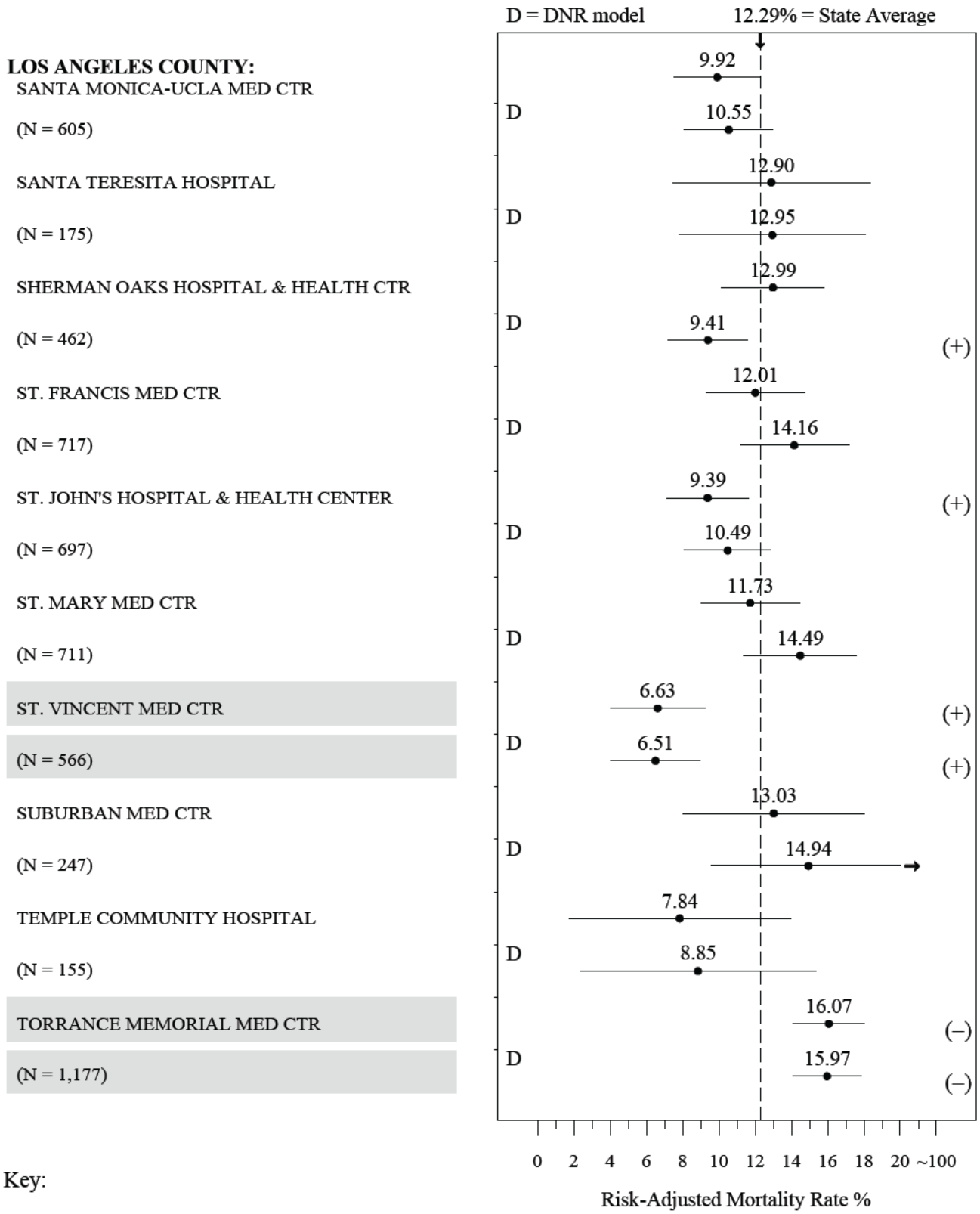

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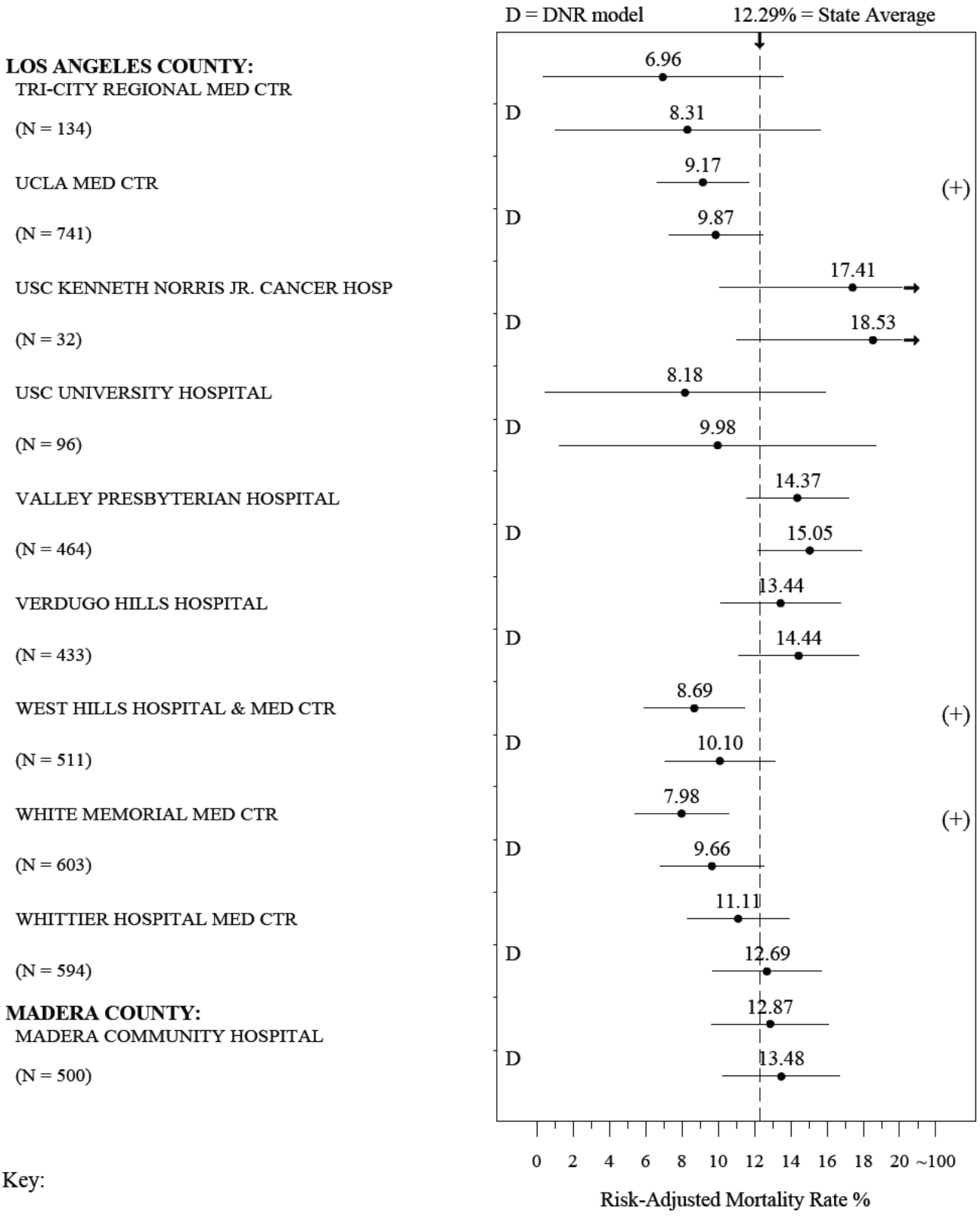

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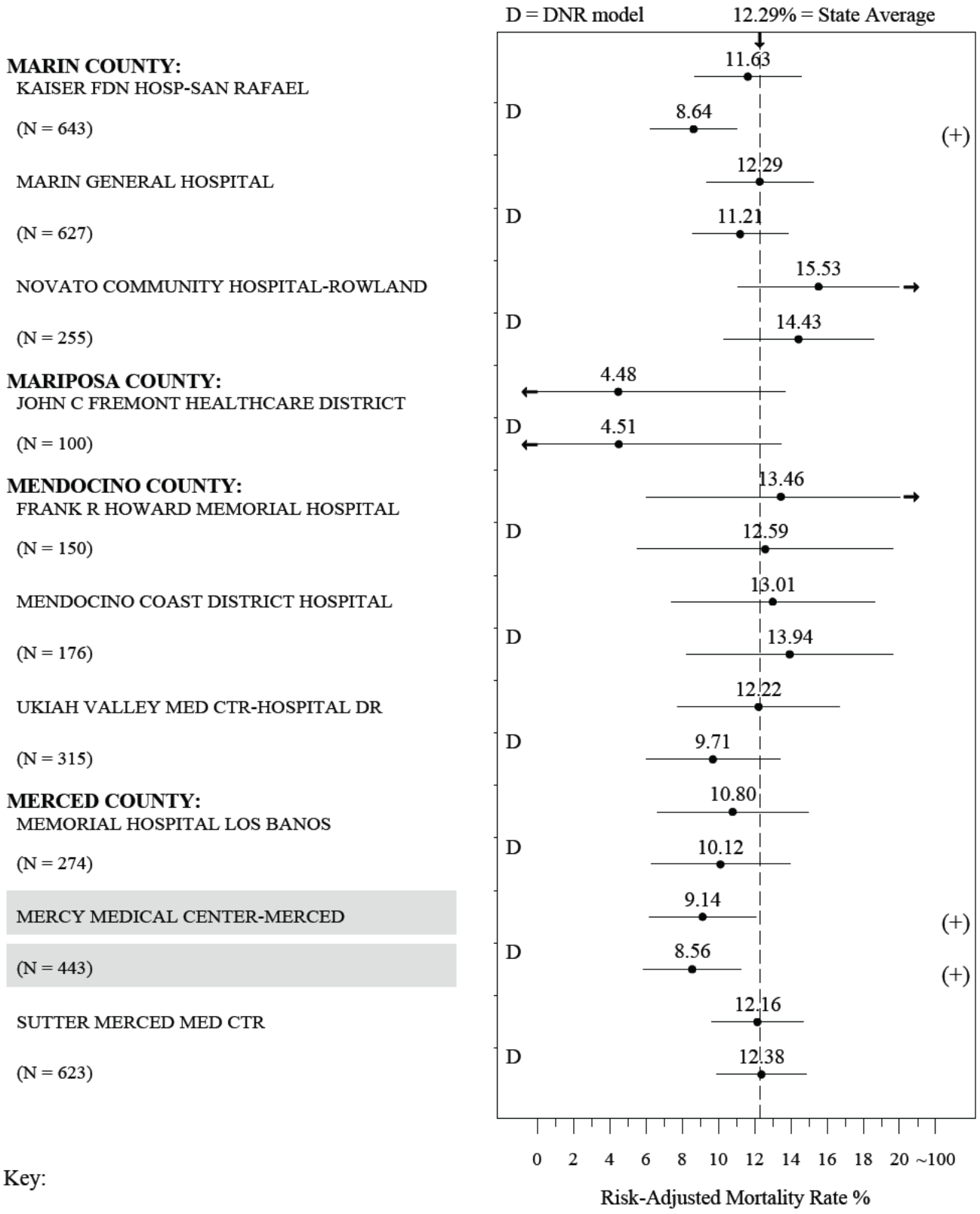

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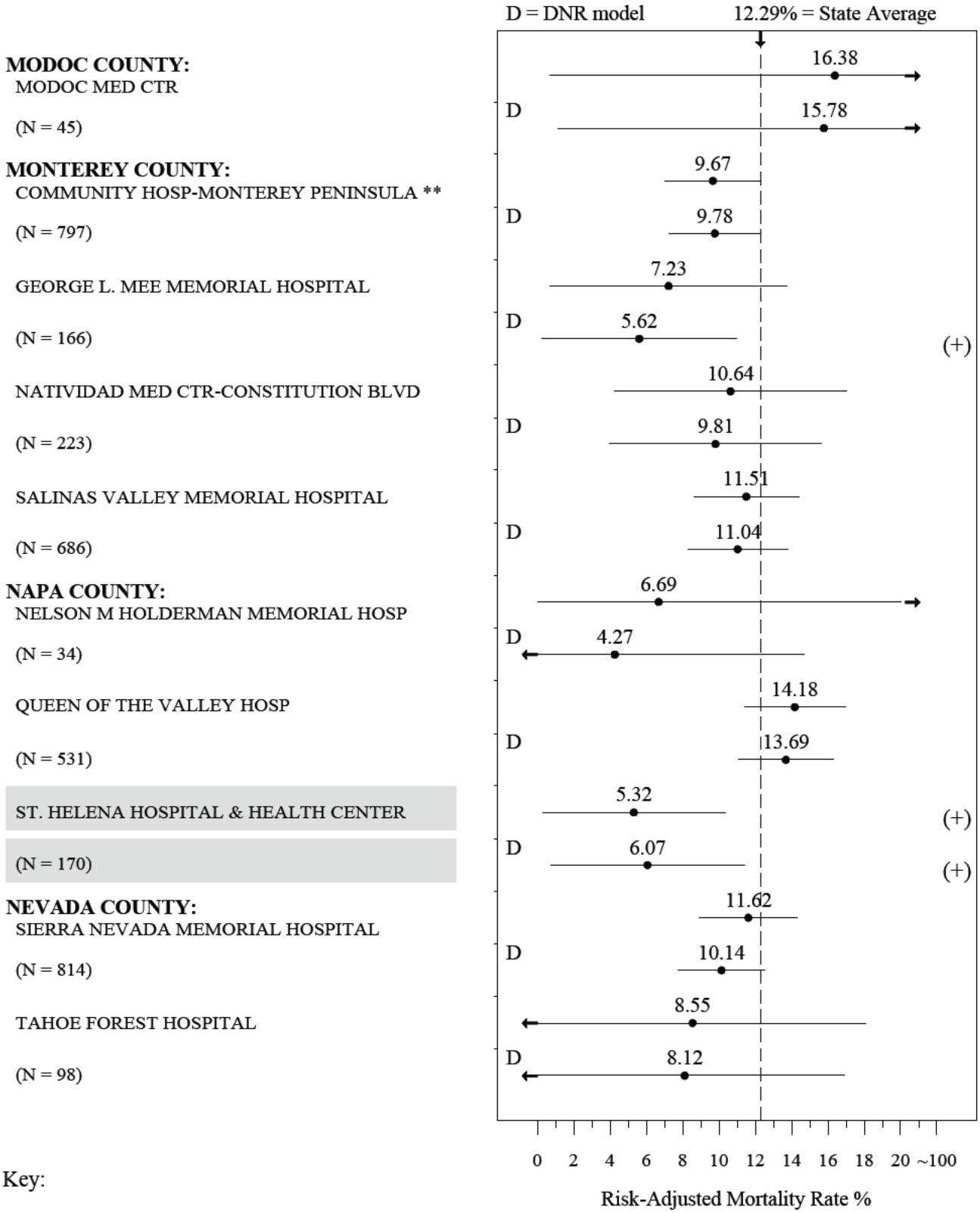

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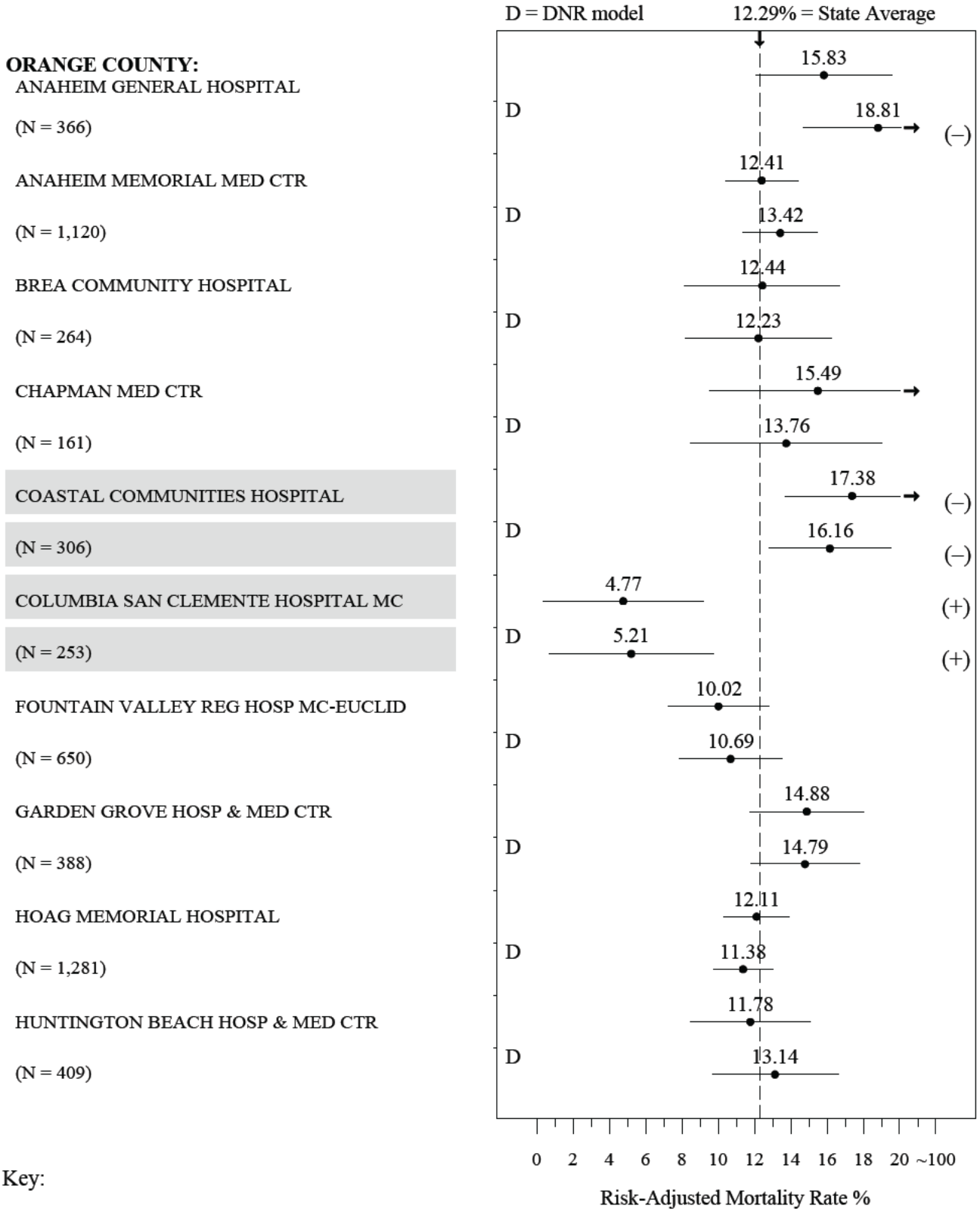

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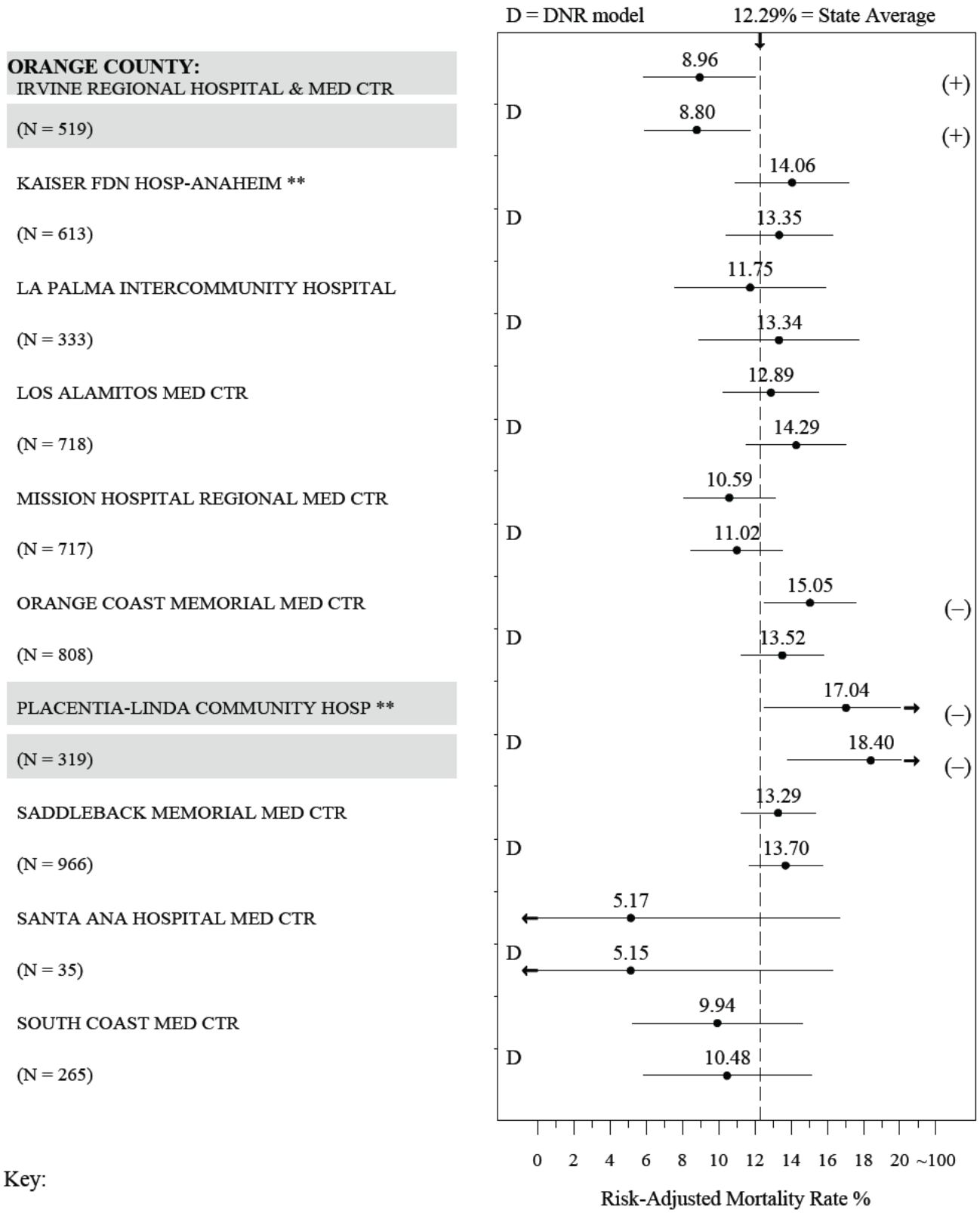

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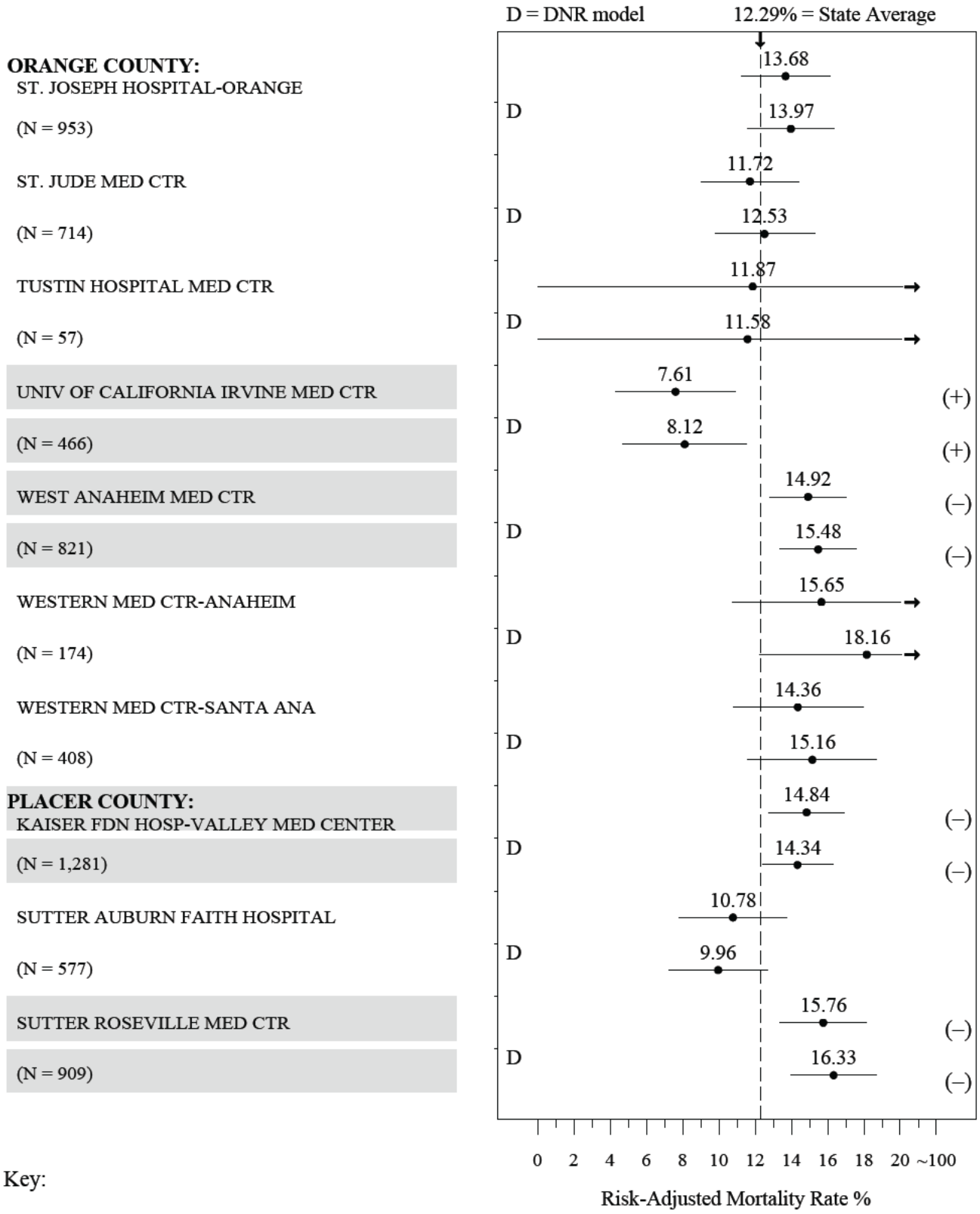

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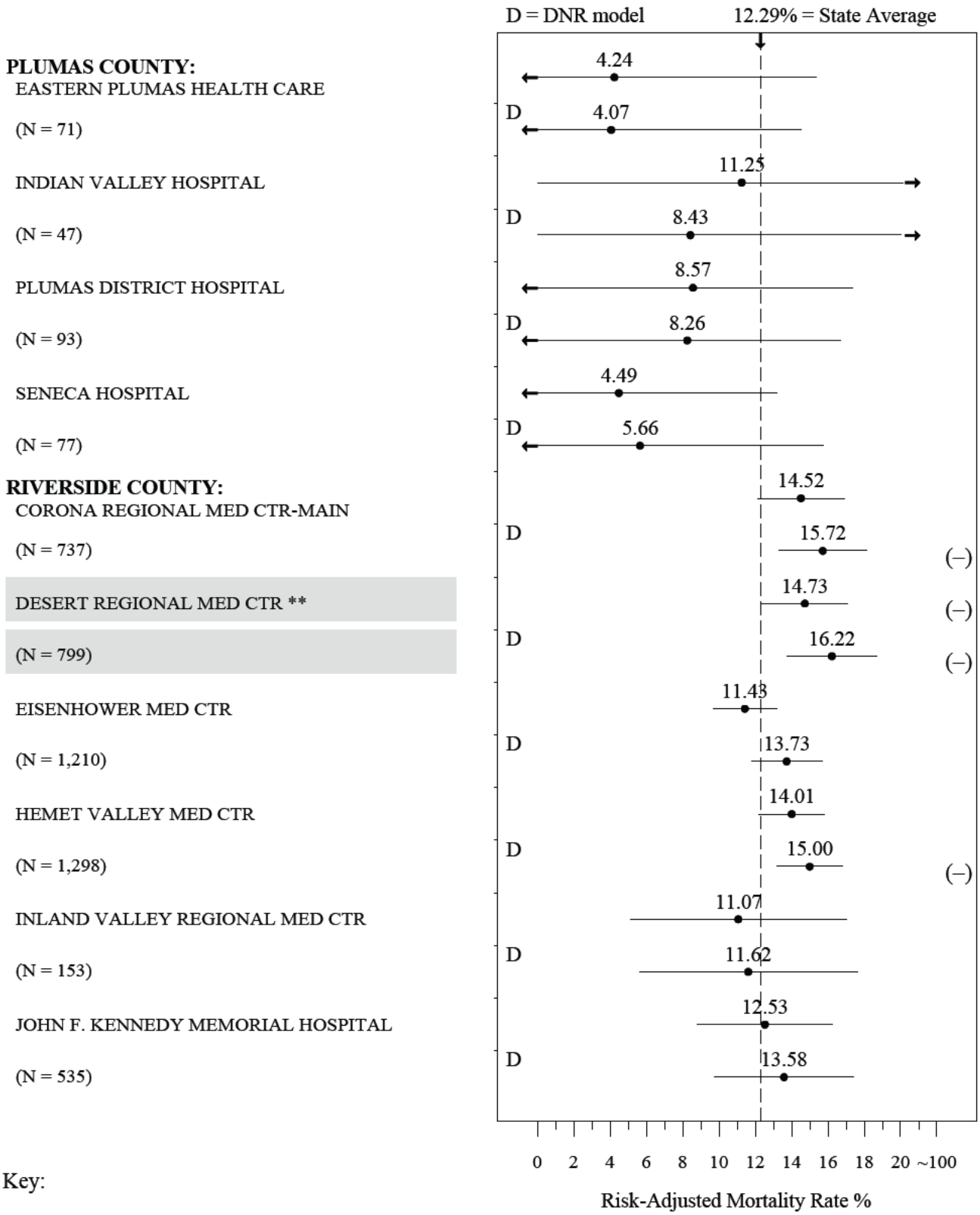

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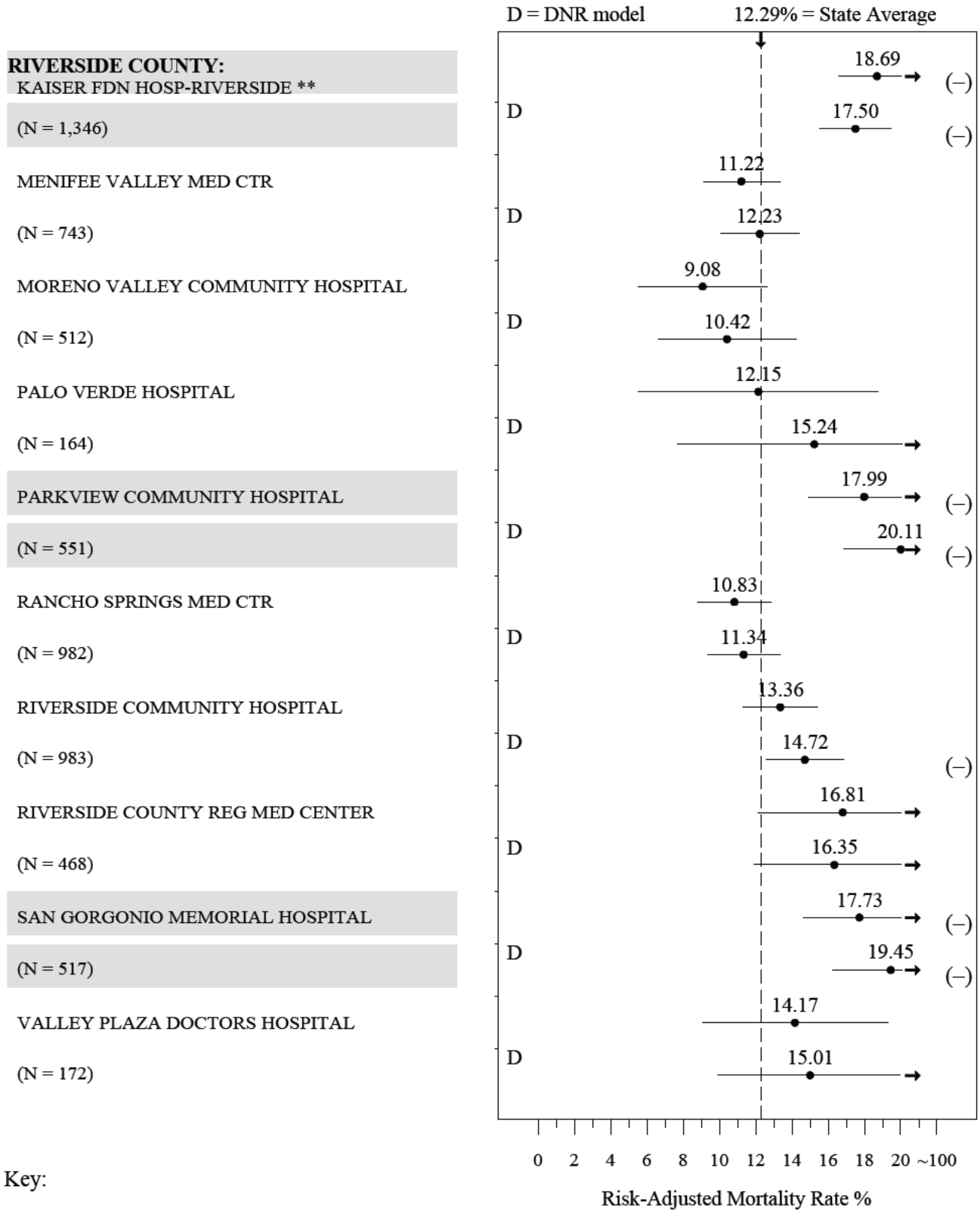

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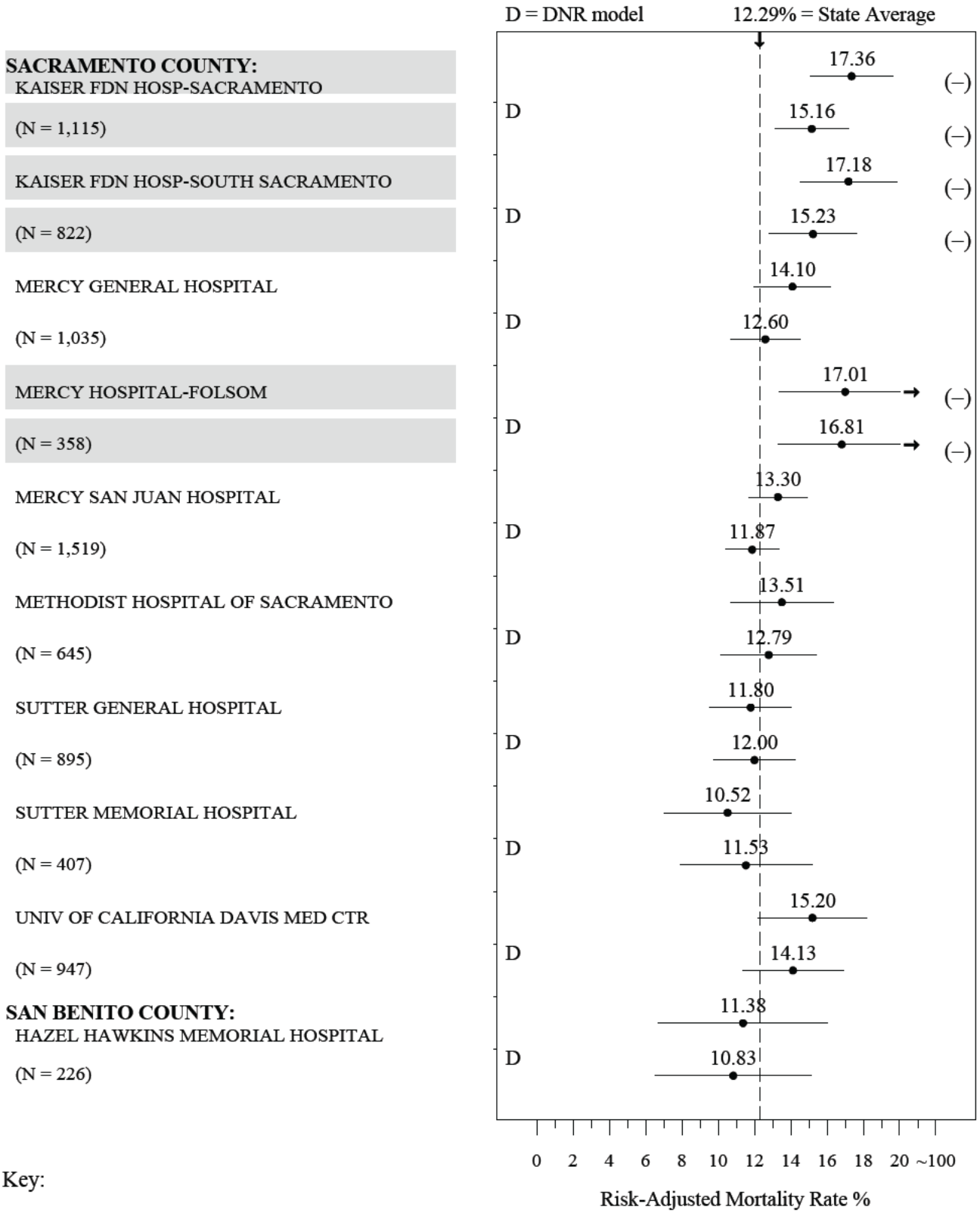

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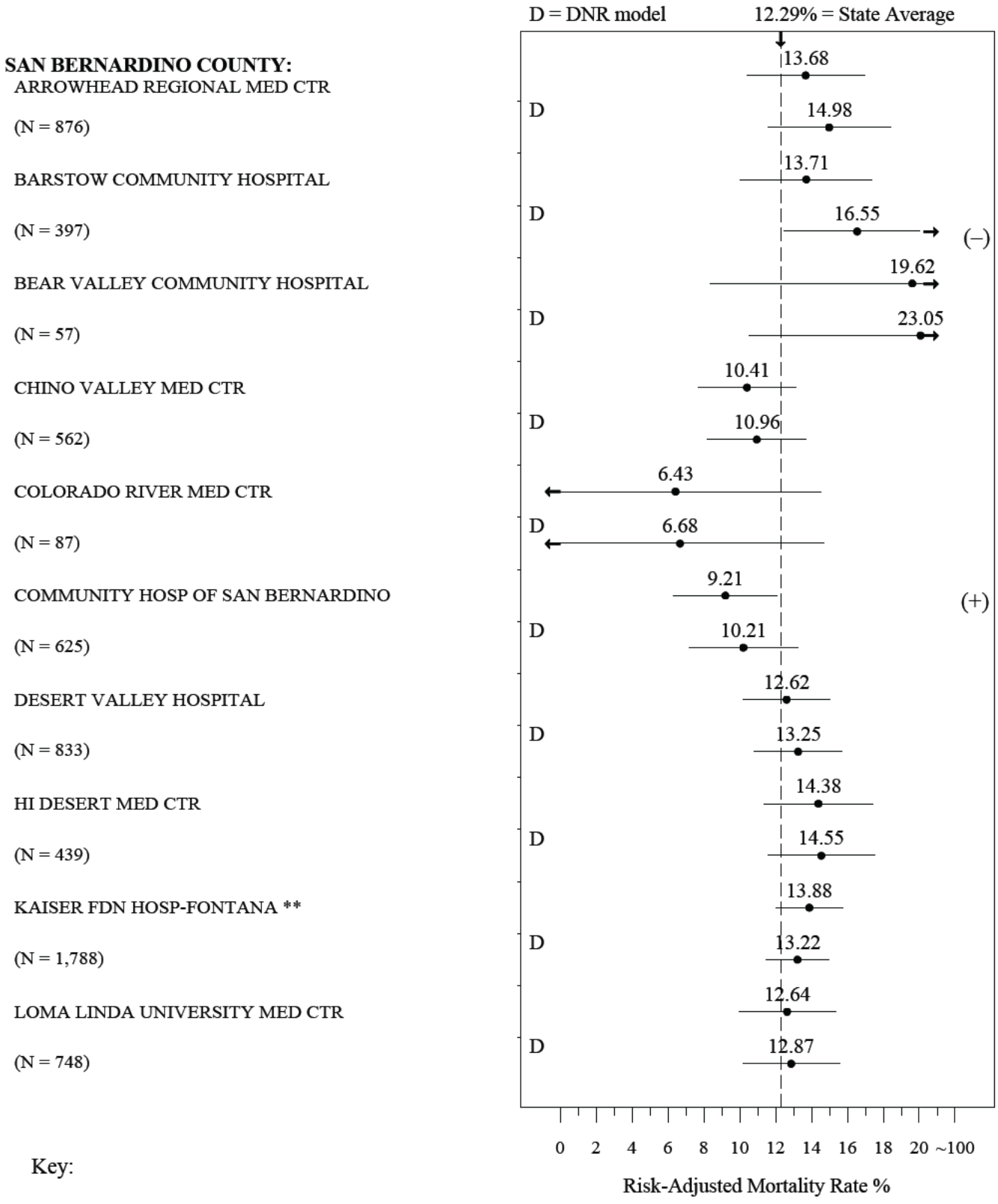

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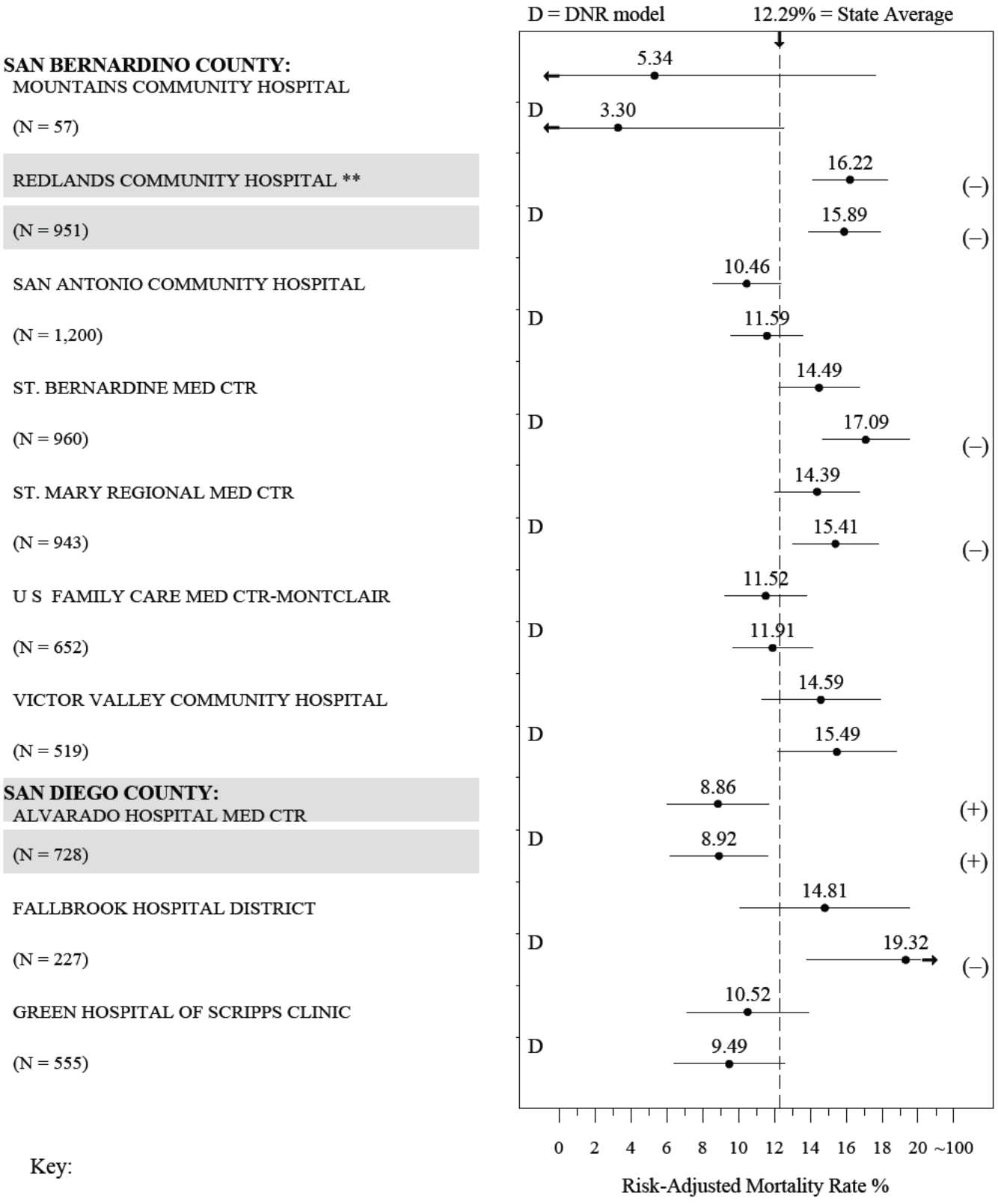

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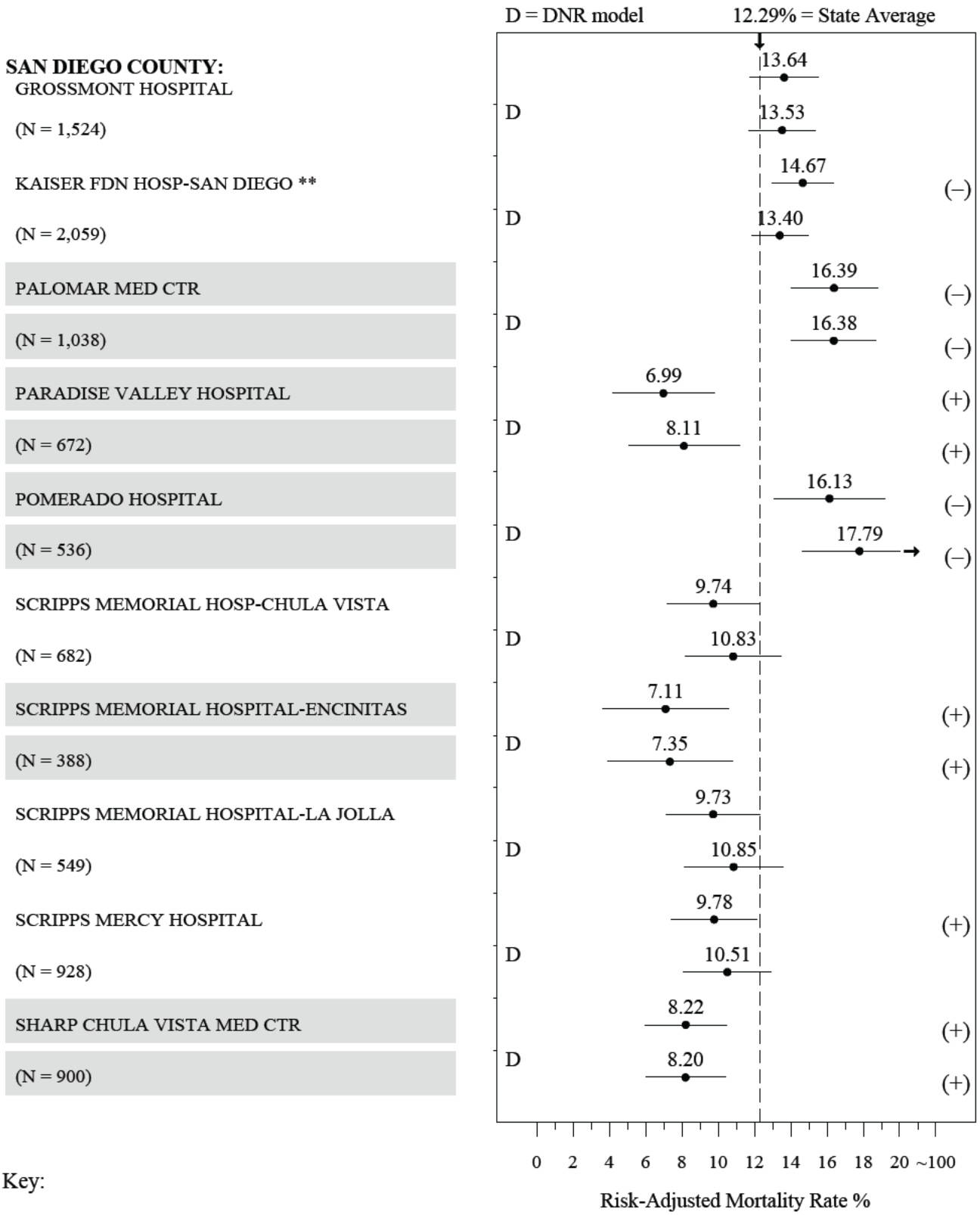

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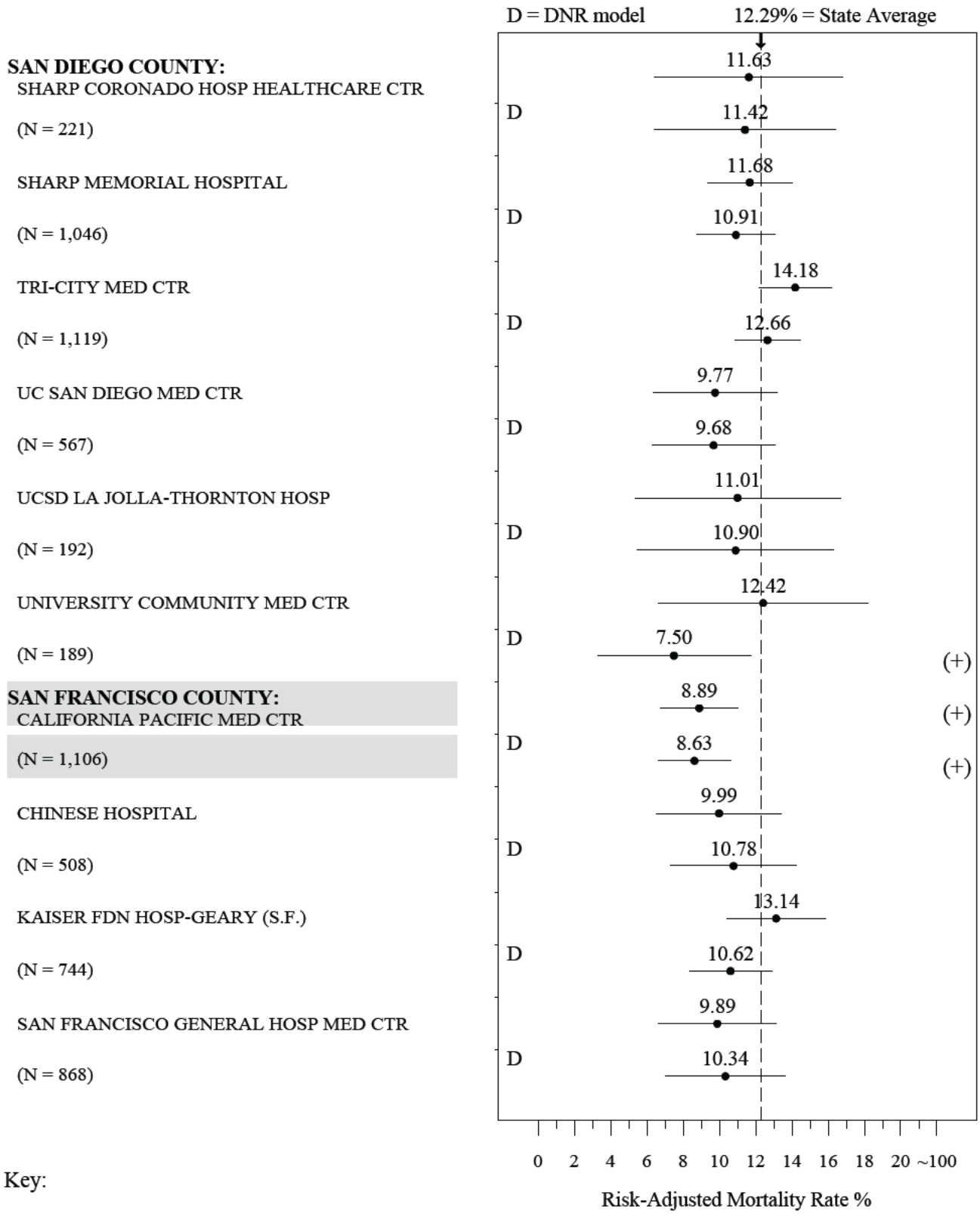

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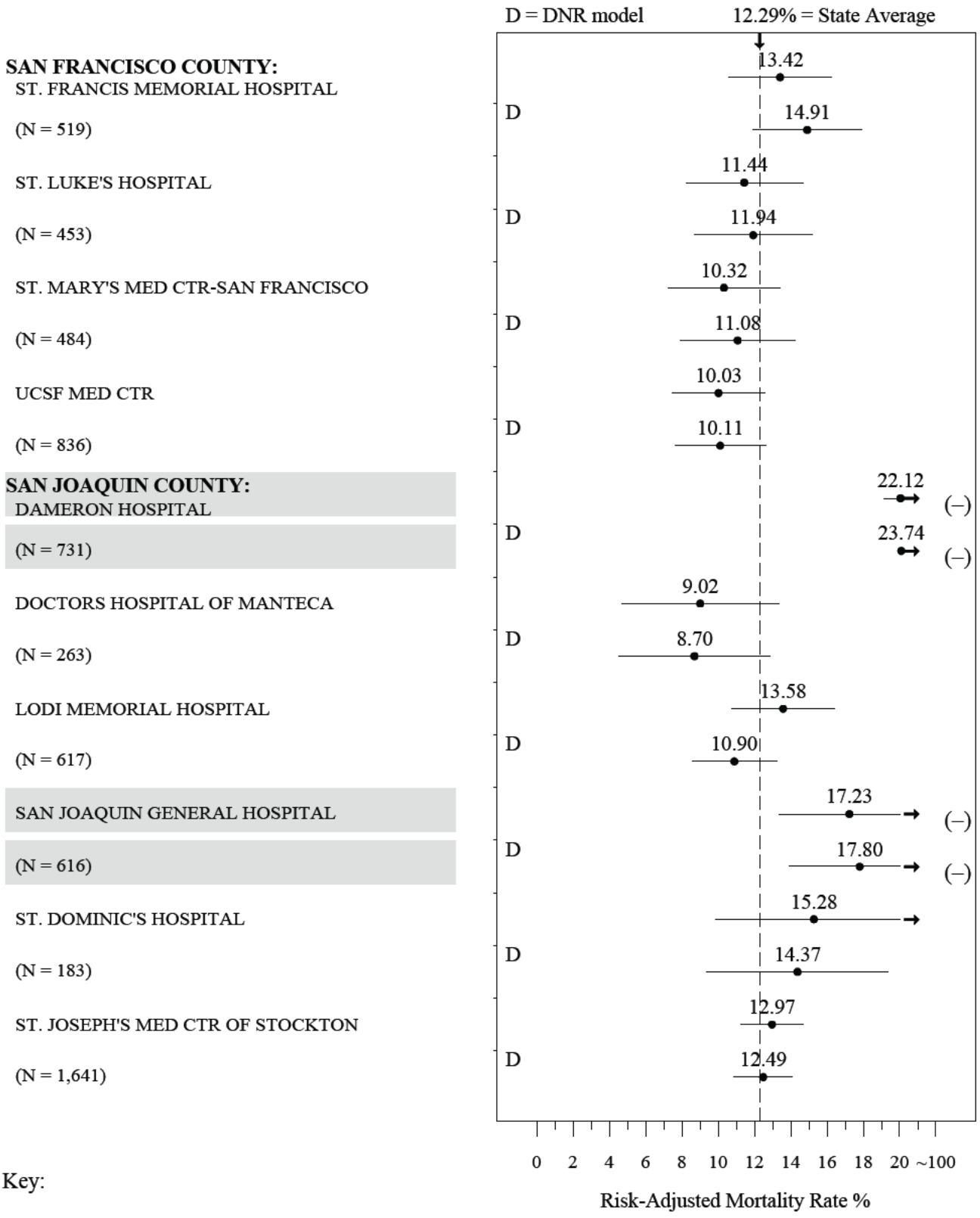

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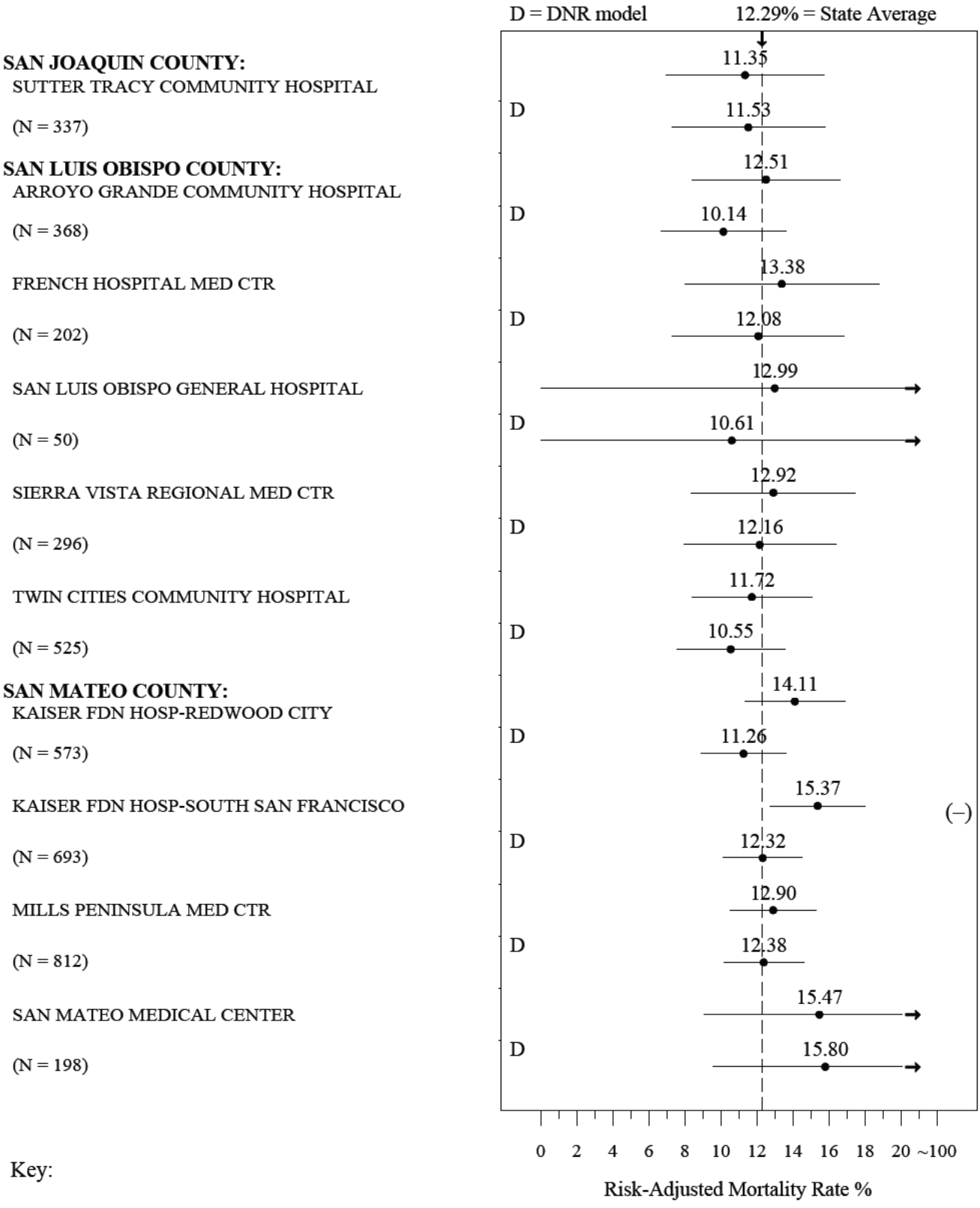

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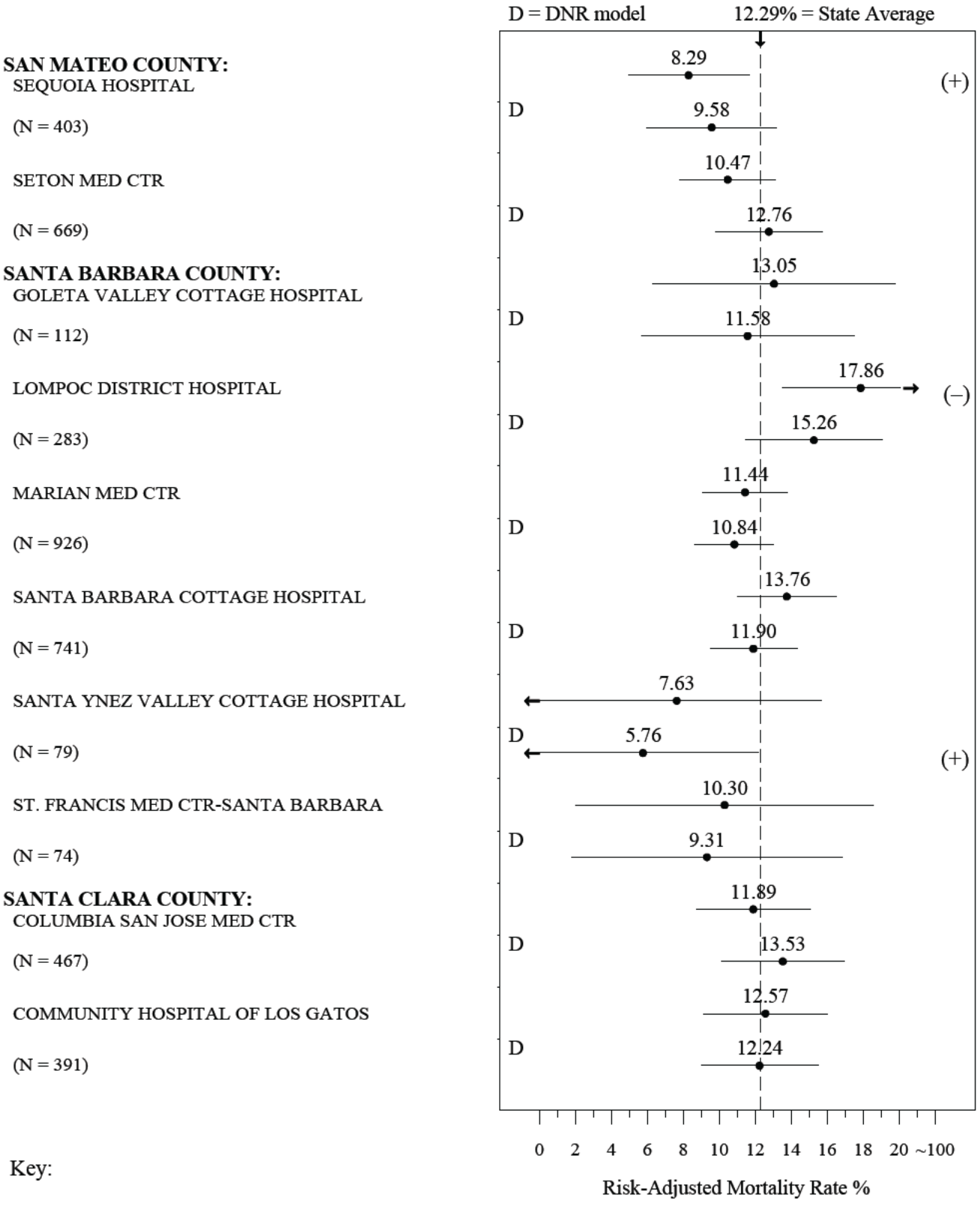

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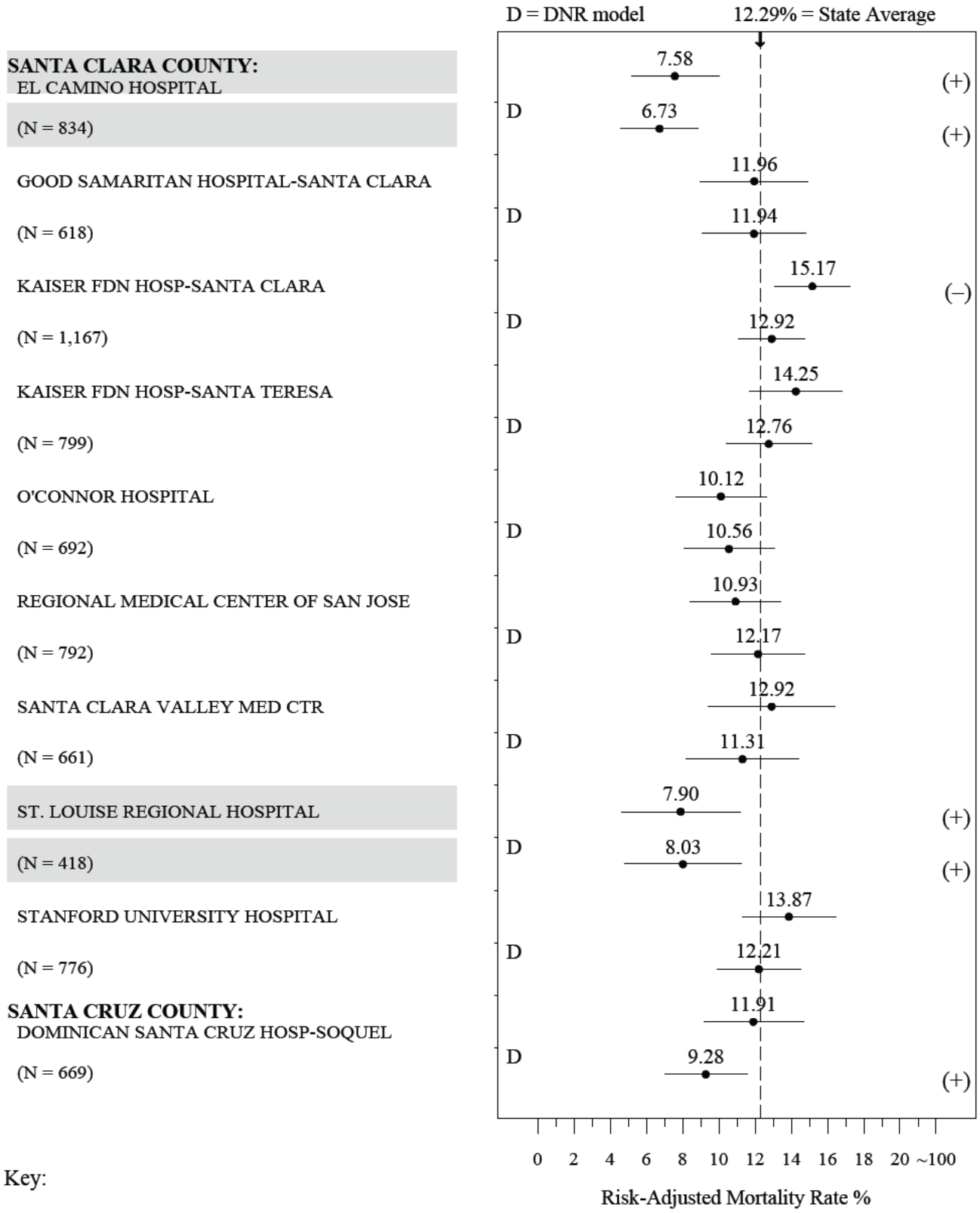

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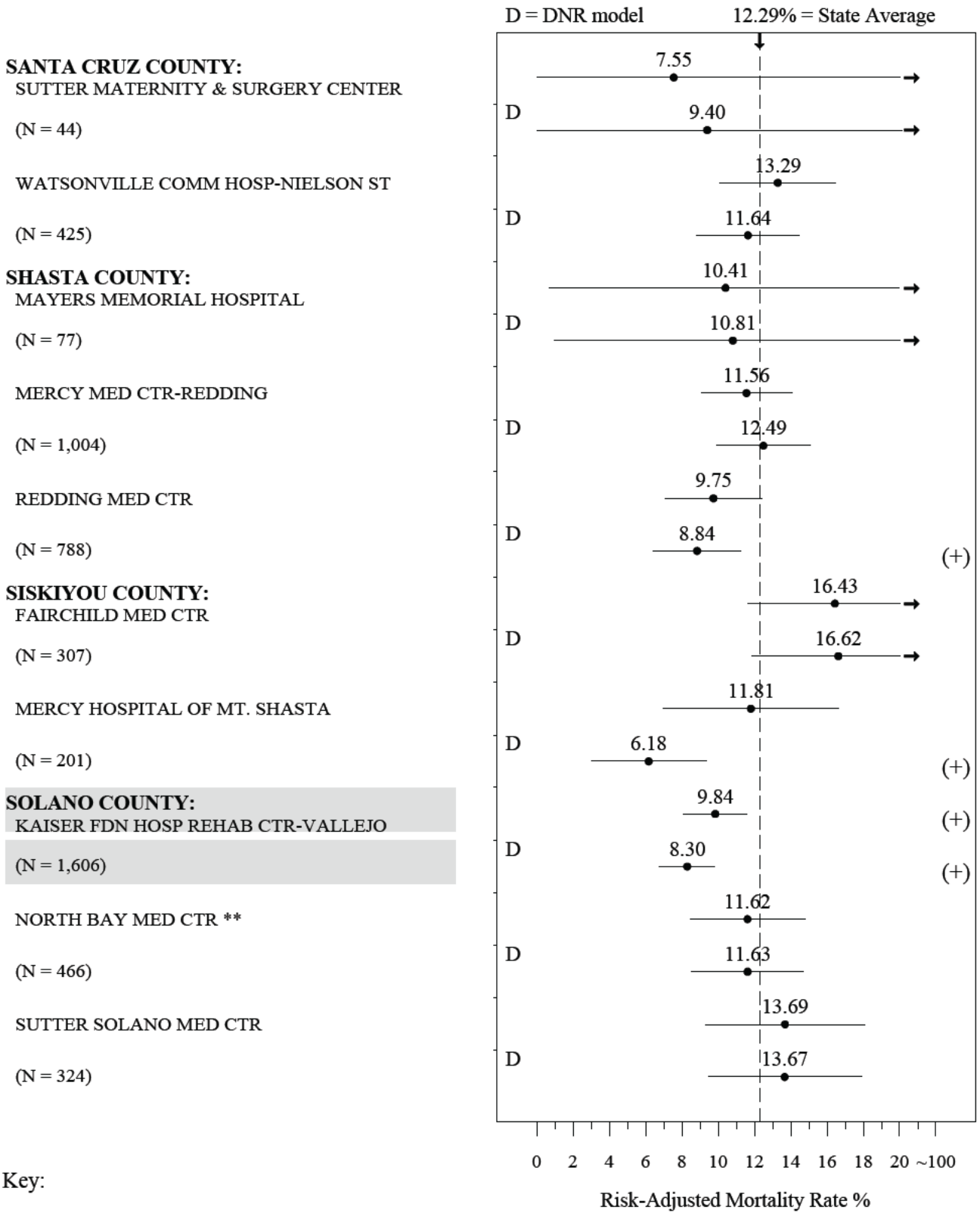

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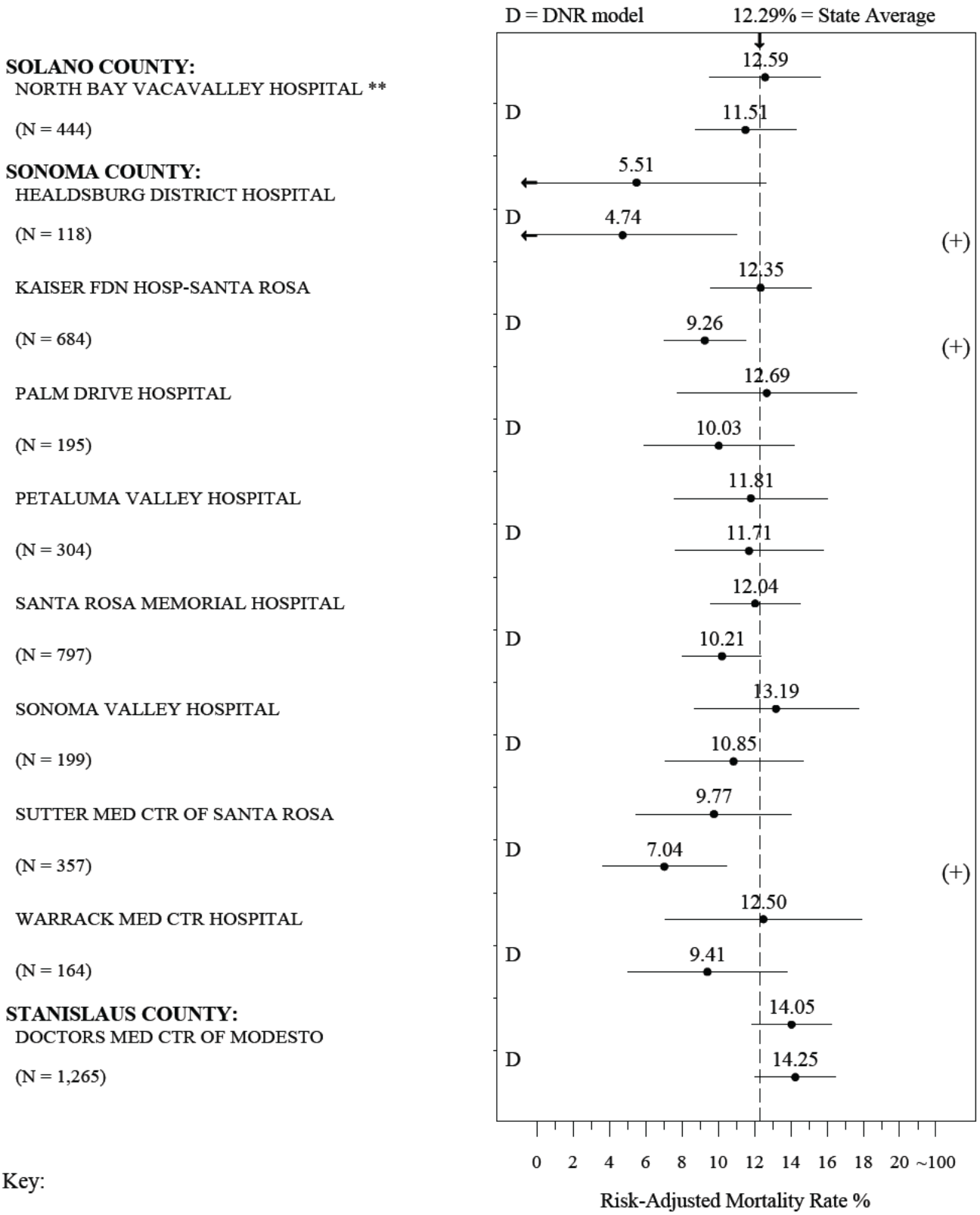

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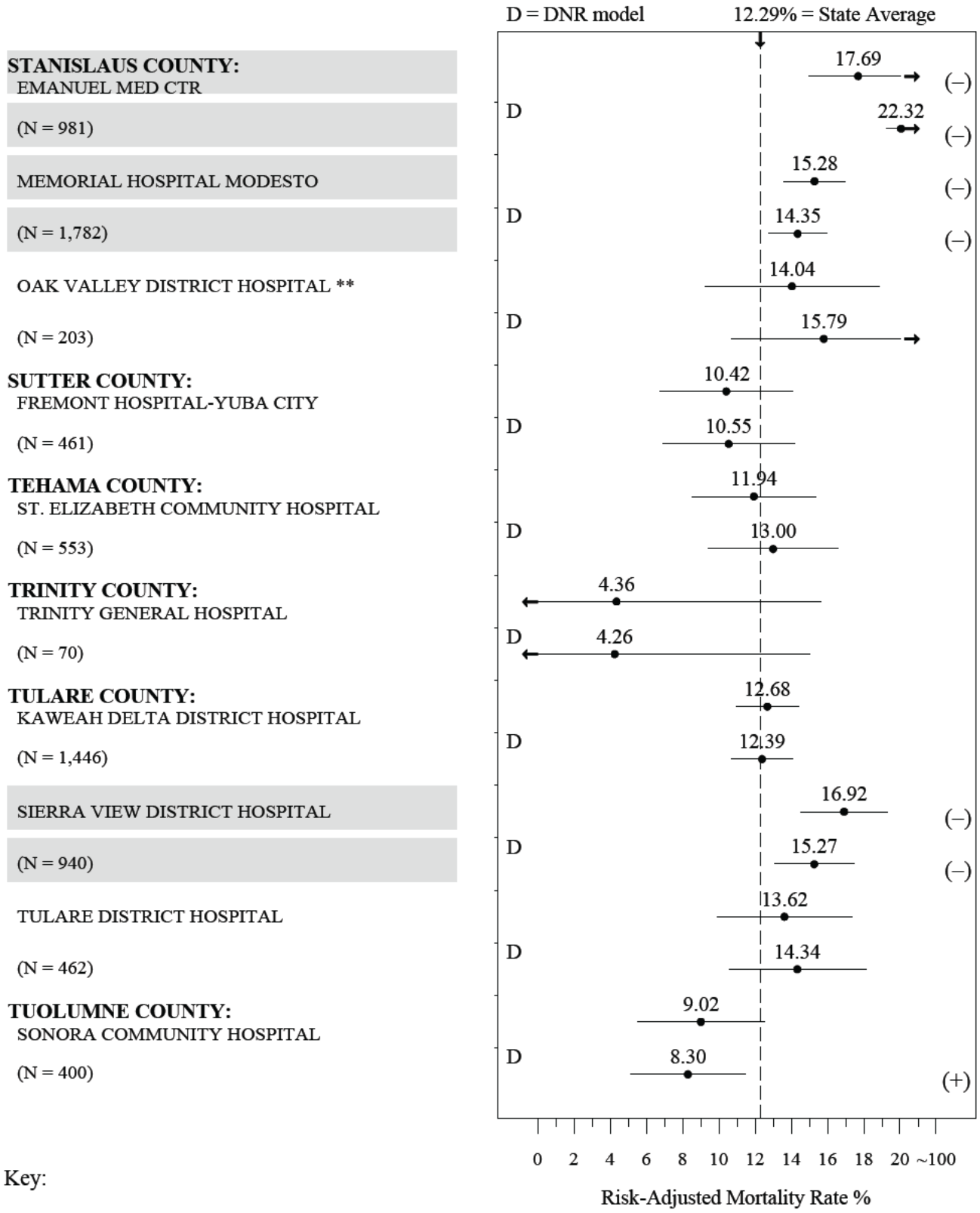

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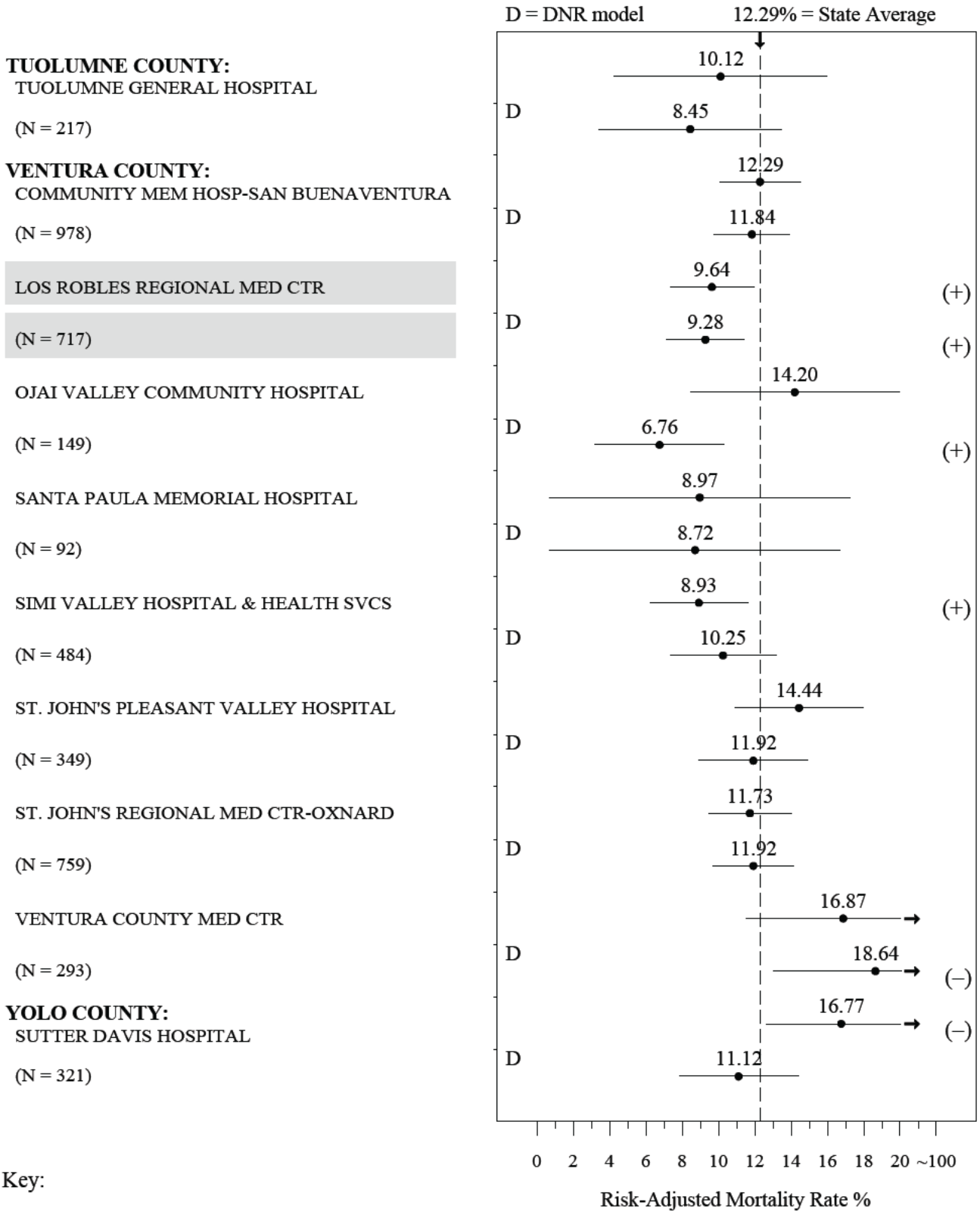

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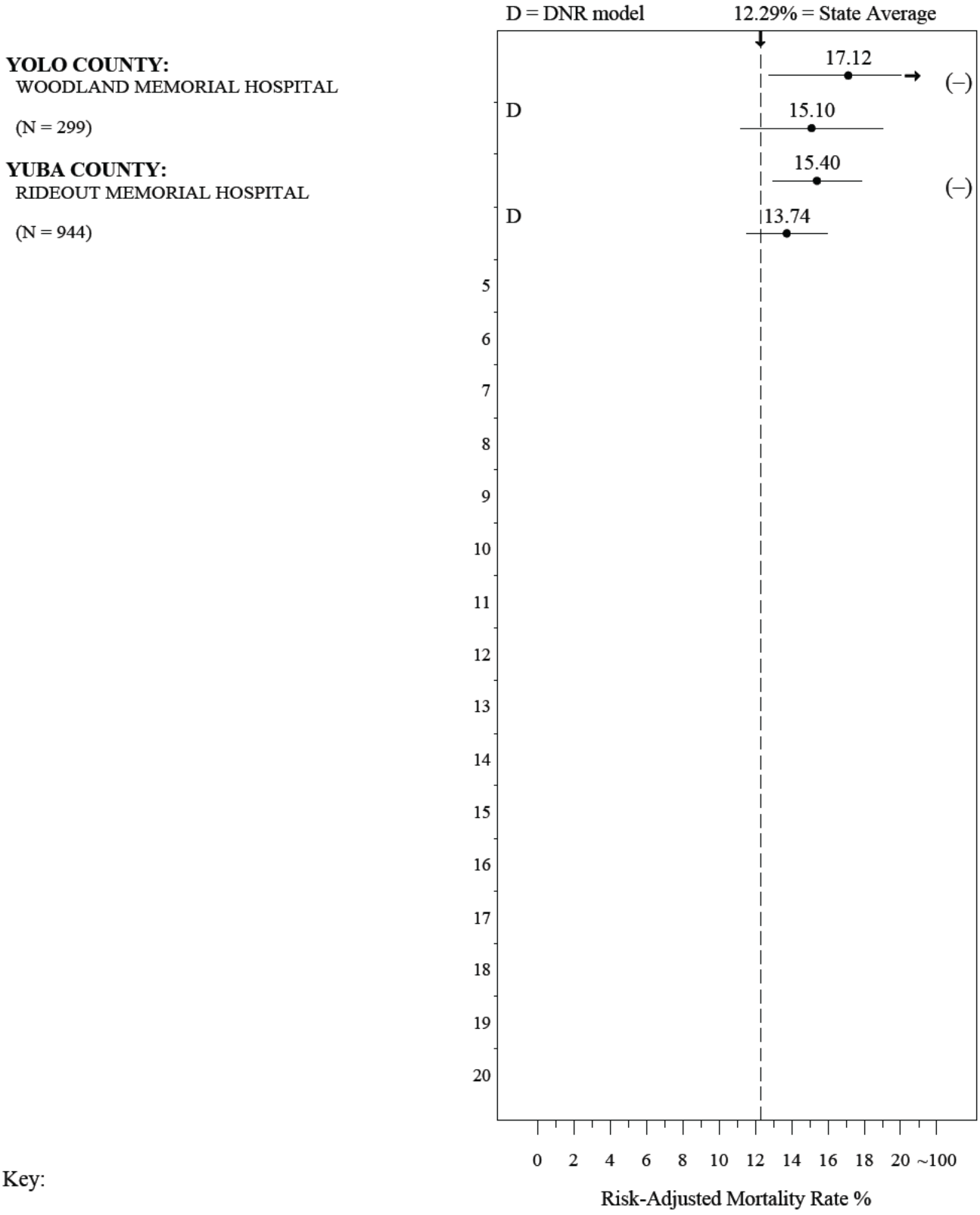

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APPENDIX A: TECHNICAL NOTES

Development of the risk-adjustment model involved selection of an outcome measure, selection of risk factors, estimation and testing the model, and calculation of the outcome measures for CAP admissions (see "Report for the California Hospital Outcomes Program, Community-Acquired Pneumonia, 1996: Model Development and Validation" at the following web site: www.oshpd.ca.gov/HQAD/Outcomes/Studies/CAP/index.htm, click on Model Development and Validation). The original model was developed using data collected in 1996. For this report, risk factor coefficients were recalculated using the discharge data collected in 2002-2004.

DATA SOURCES

The primary data source for this report was the Patient Discharge Data (PDD) collected by OSHPD. The PDD is an administrative abstract of the medical record and is required for each discharge of a patient who has been admitted to any California non-federal acute care hospital. Patients admitted to a non-acute level of care (e.g., skilled nursing, rehabilitation) were excluded. For this report, CAP patients were selected from the 2002, 2003, and 2004 PDD files, with a subsequent match to admissions reported in the 2001 file.

Each patient discharge abstract includes a principal diagnosis and principal procedure, plus as many as 24 other diagnoses and 20 other procedures. For each diagnosis there is a flag to indicate whether the diagnosis was a condition present at admission (CPAA). Each record also includes the patient's Social Security Number, demographic characteristics (e.g., age, gender, race, and ethnicity), and information about the hospitalization episode (e.g., dates of admission and discharge, presence of a DNR order, source of admission, destination of the discharge, and expected source of payment).

In order to identify deaths that occurred after discharge, the PDD analysis files were matched to the Death Master Files for 2002, 2003, and 2004, using Social Security Number as the identifier common to both datasets. The Death Master File includes all death certificate information recorded in California, by year. It is maintained by the California Department of Health Services.

SELECTION OF HOSPITALS

All acute care hospitals reporting discharge information to OSHPD were eligible for inclusion.[1]

If a hospital consolidated with another facility during the report period and stopped reporting discharges from the original hospital, all discharges reported after

[1] This involved selecting all CAP records with a "level of care" code indicating "General Acute Care."

consolidation were attributed to the “new” hospital named in the consolidation. Any discharges prior to consolidation retained their original hospital identification. If a hospital changed location and then reported discharges using a different facility identification, it was reported separately under the same hospital name with a different street address.

SELECTION OF PATIENTS

Inclusion and exclusion criteria were developed after careful review of the medical literature and extensive discussions with an expert panel. The panel included a pulmonologist, a nurse researcher, a pulmonary care nurse, a pharmacist, and a health information management professional.

Inclusion Criteria

Unduplicated CAP patients were selected from the PDD for the years 2002-2004. For patients with two or more CAP admissions during a given year, only the first qualifying admission was considered.[1] This definition fulfills the general requirement of case independence for the statistical analysis model used in this report. The first qualifying admission is referred to as the “index admission.”

Cases selected for this report were required to meet all four inclusion criteria, as follows:

1. **A principal diagnosis of community-acquired pneumonia or a specified pneumonia-related principal diagnosis with a secondary diagnosis of community-acquired pneumonia.**

The principal diagnosis is “the condition chiefly responsible…for hospital admission.” Secondary diagnoses are defined as “conditions that coexist at the time of admission, develop subsequently during the hospital stay, affect the treatment received, or affect the length of stay.”[1] If CAP was the principal diagnosis, the patient was selected. For patients with CAP-related principal diagnoses (e.g., cough), a secondary diagnosis of CAP was required for selection. This approach was used in prior research on community-acquired pneumonia.[2]

Table A.1 shows the ICD-9-CM (International Classification of Diseases - 9th Revision - Clinical Modification) diagnoses that were used to define community-acquired pneumonia.[3]

2. **Age at admission of 18 years or older.**

This study included adults only. The clinical spectrum of pneumonia for children is

[1] Office of Statewide Health Planning and Development, March 2001, 1999 Patient Discharge Data File Documentation.
[2] Iezzoni LI, Shwartz M, Ash A, Mackieman YD. Using severity measures to predict the likelihood of death for pneumonia inpatients.
J Gen Intern Med. 1996; 11:23-31.
[3] Fine M, Singer DE, Hanusa B, et al. Validation of a Pneumonia Prognostic Index Using the MedisGroups Comparative Hospital Database. The American Journal of Medicine. 1993; 94:153-159.

significantly different. In order to include children it would be necessary to develop a second risk-adjustment model and validation instrument.

3. **Source of admission is "Home."**

Because this study is focused on cases of pneumonia that were acquired outside of institutions (i.e., in the community), only patients whose source of admission was "Home" were included in the report. Patients admitted from "Residential Care Facilities," "Long Term Care" and "Other Inpatient Hospital Care," or from "Prison/Jail" may be exposed to organisms with different patterns of antibiotic resistance than individuals living in non-institutional settings. They can cause pneumonia that has a different, often a more severe, clinical course than pathogens typically associated with CAP. Patients transferred from a long-term care facility are also more likely to have "Do Not Resuscitate" (DNR) orders. These patients have a higher risk of serious underlying medical conditions that may not be fully measured in a risk adjustment system using administrative data. Admissions from "Ambulatory Surgery" and "Other" sources were also not included because there was no information available about where these patients normally resided.

4. **Date of discharge between January 1, 2001 and December 31, 2004 plus date of admission between November 1, 2001 and December 1, 2004.**

Patients admitted before November 1, 2001 (two months prior to first study year) were excluded because the analysis was designed to capture CAP patients primarily treated during the years of study. Patients admitted between December 2 and December 31 of the last study year (2004) were excluded since death certificates were not available at the time of analysis to determine 30-day mortality for these late admissions.

Table A.1: CAP Diagnoses Included in the Analysis

ICD-9-CM Code	Principal Diagnosis	Principal CAP Codes	Non-CAP Principal Diagnosis Codes*
480.0	Pneumonia due to adenovirus	X	
480.1	Pneumonia due to respiratory syncytial virus	X	
480.2	Pneumonia due to parainfluenza virus	X	
480.8	Pneumonia due to other virus not elsewhere classified	X	
480.9	Viral pneumonia, unspecified	X	
481	Pneumococcal Pneumonia (*Streptococcus pneumoniae*)	X	
482.0	Pneumonia due to *klebsiella* pneumoniae	X	
482.1	Pneumonia due to *pseudomonas*	X	
482.2	Pneumonia due to *hemophilus influenza*	X	
482.30	Pneumonia due to *streptococcus,* unspecified	X	
482.31	Pneumonia due to *streptococcus*, Group A	X	
482.32	Pneumonia due to *streptococcus*, Group B	X	
482.39	Other s*treptococcus* species	X	
482.4	Pneumonia due to s*taphylococcus* species	X	
482.81	Pneumonia due to other specified bacteria - Anaerobes	X	
482.82	Pneumonia due to *escherichia coli* (E. Coli)	X	
482.83	Other gram negative bacteria	X	

482.84	Legionnaires' disease	X		
482.89	Other specified disease	X		
482.9	Bacterial pneumonia unspecified	X		
483.0	Pneumonia due to other specified organism-*mycoplasma*	X		
483.1	Pneumonia due to other specified organism - *chlamydia*	X		
483.8	Pneumonia due to other specified organism	X		
485	Bronchopneumonia, organism unspecified	X		
486	Pneumonia, organism unspecified	X		
487.0	Influenza with pneumonia	X		
510.0	Empyema with fistula			X
510.9	Empyema without fistula			X
511.0	Pleurisy without mention of effusion or current tuberculosis			X
511.1	Pleurisy with effusion, with bacterial cause other than tuberculosis			X
512.0	Spontaneous tension pneumothorax			X
512.1	Iatrogenic pneumothorax			X
512.8	Other spontaneous pneumothorax			X
513.0	Abscess of lung			X
518.0	Pulmonary Collapse			X
518.81	Respiratory failure			X
518.82	Other pulmonary insufficiency, not elsewhere classified			X
785.5x	Shock without mention of trauma - shock unspecified			X
786.00	Dyspnea and respiratory abnormalities-respiratory abnormality, unspecified			X
786.09	Other dyspnea and respiratory abnormalities			X
786.2	Cough			X
786.3	Hemoptysis			X
786.4	Abnormal sputum			X
038.xx	Septicemia			X

* To be used as an inclusion criterion, a non-CAP principal diagnosis must occur with a secondary diagnosis of CAP.

Exclusion Criteria

Several exclusion criteria, such as a recent history of pneumonia acquired in the hospital, were defined in order to eliminate patients that may not truly represent CAP. Cases with any of the following characteristics were excluded.

1. **One or more prior acute inpatient hospital admissions within 10 days preceding the index CAP admission.**

A CAP admission was excluded from the study if it was preceded by a hospital discharge for any reason within 10 days prior to the CAP index admission. This exclusion is important because recent hospitalizations put a patient at risk for hospital-acquired pneumonia.

2. **Any diagnosis code on the index hospital record indicating trauma.**

Trauma patients were excluded because it was highly likely that an accident victim would have acquired pneumonia in the hospital.

3. **Discharges with diagnosis codes indicating that the patient had undergone organ transplant, had human immunodeficiency virus (HIV) or AIDS, had cystic fibrosis, tuberculosis, post-operative pneumonia, certain unusual pathogens as the cause of the pneumonia, or other diagnoses identified by clinical consultants to OSHPD.**

Individuals with AIDS or HIV infection are susceptible to a wider variety of pneumonia-causing pathogens than are non-immune suppressed patients and their clinical course may be different from other pneumonia cases. Similarly, organ transplant patients receive medications to suppress the immune system, making them susceptible to pathogens that do not normally cause pneumonia acquired in the community. Patients with cystic fibrosis are not able to clear bacteria effectively from their lungs and are as a result more susceptible to pneumonia. The frequency with which they develop pneumonia and receive associated courses of antibiotics increases their risk of infection by antibiotic-resistant bacteria. This increases their risk of acquiring infection with an antibiotic resistant pathogen, which makes their treatment more difficult. Patients with tuberculosis were excluded because this type of pneumonia requires specific antibiotics and has a very different clinical course than patients with CAP. Patients with postoperative pneumonia are clinically classified as having hospital-acquired pneumonia. Some unusual pneumonias (e.g., anthrax) were also excluded because these organisms are treated with specific antibiotics and have a different clinical course.

Table A.2 lists the pneumonia diagnoses that were excluded because their etiologies and treatment regimes are clinically distinct from most cases of CAP.

4. **Other exclusions.**

Patients were also excluded if they had: (a) a missing, invalid, or uncertain Social Security Number (because their data records could not be linked); (b) missing or unknown gender data; (c) an error in the date of death (date was missing or preceded the date of admission); (d) an out-of-state ZIP code (because they might or might not have a death certificate filed in California).

Table A.2: Pneumonia Diagnoses Excluded from Analysis

ICD-9-CM Code	ICD-9-CM Description
Fungal Pneumonia	
112.4	Candida species
114.0	Primary Coccidioimycosis
115.05, 115.15, 115.95	Histoplasmosis Pneumonia
484.6	Aspergillosis Pneumonia
484.7	Pneumonia from Other Systemic Mycoses
Other Miscellaneous Pneumonias	
136.3	Pneumocystis carinii
484.1	Pneumonia from Cytomegalovirus
484.3	Pneumonia from Whooping Cough
484.5	Pneumonia from Anthrax
484.8	Pneumonia in other Infectious Disease
73.0	Ornithosis with Pneumonia
39.1	Primary Actinomycosis
55.1	Post-Measles Pneumonia
003.22	Salmonella Pneumonia
130.4	Pneumonia Due to Toxoplasmosis
21.2	Pulmonary Tularemia
52.1	Varicella Pneumonitis

*To be used as an inclusion criterion, a non-CAP principal diagnosis must occur with a secondary diagnosis of CAP.

LINKING HOSPITALIZATION AND DEATH FILES

Linking the index admission (first CAP admission for the patient) with subsequent hospital discharge records, as well as the death certificate file, provided the basis for detecting deaths that occurred within 30 days after the index admission. Linkage with prior hospitalizations provided the basis for identifying cases that were acquired in a healthcare setting and for information about clinical risk factors and co-morbidities that might have been absent from the index record. Co-morbidities, such as asthma and liver disease, may not always be coded on the index CAP discharge record even though they were present.

The Record Linkage Process

The record linkage process was performed in order to identify records from different data files for the same individual and to create an analysis file with a single record ("line") for each case. This was accomplished through the following steps:

1. Index admissions were identified that met the selection criteria.

2. Eligible index admission records were linked to the California death certificate records. Each death certificate was linked to all applicable records in the patient discharge data files, but each patient discharge data record was linked to either one death certificate or no death certificate. A deterministic linkage was performed using the patients' social security number as the primary linkage key. A detailed description of the algorithm is in the technical guide of OSHPD's report on heart attacks for 1996-1998. (This is available at www.oshpd.ca.gov/HQAD/Outcomes/Studies/HeartAttacks/index.htm)

3. Additional discharge records for each patient that occurred within six months prior to the index admission were located and linked with the appropriate index records. The patients' social security numbers served as the primary linkage key.

MEASUREMENT OF 30-DAY MORTALITY

Although "improved health" and "improved ability to do everyday tasks" are desirable outcome measures, mortality was chosen as the outcome measure for this report because it is important, definitive, and readily available. Furthermore, death is an appropriate measure of quality of care because prevention of some of the deaths is possible through medical interventions. Therapies that have been shown to be useful in prevention of death for CAP patients include appropriate use of antibiotics[1] and performance of sputum cultures at admission.[2]

[1] Meehan TP, Fine MJ, Krumholz HM, et al., "Quality of Care, Process, and Outcomes in Elderly Patients with Pneumonia." *JAMA*. 1997; 278(23): 2080-4.

[2] Haas J, et. Al., "Report for the California Hospital Outcomes Project: Community-acquired Pneumonia, 1996," Sacramento, California: Health Policy and Planning Division, California Office of Statewide Health Planning and Development, November 2000: page 12-9.

The thirty-day mortality rate is used because it is a more robust and complete measure than the in-hospital mortality rate. It is not biased by variation among facilities in how decisions are made about the timing of patient discharge; the in-hospital mortality rate will be undercounted in hospitals that discharge ill patients early.

Among the CAP patients admitted during 2002-2004, there were a total of 25,027 deaths within 30 days of the index admission. Of these, 15,444 (61.7%) died during the index hospitalization. The remaining 9,583 deaths (38.3%) occurred after discharge.

Deaths were determined using the linked hospital discharge abstracts and vital statistics records (death certificates). The hospital discharge abstracts include only deaths occurring in the hospital. A death certificate is generated whenever a California resident dies, regardless of where death occurs. In a previous validation study of this linkage, OSHPD found that 98.8% of the in-hospital deaths were also reported in the death certificate files.

RISK FACTORS IN THE MODEL

Risk factors were defined as characteristics or conditions that existed at the time of admission and possibly influenced the patient outcome. Hospitals in which a high percentage of the patients had these risk factors (that is, hospitals with a high risk case mix) would be likely to have higher mortality rates, apart from the quality of care provided.

Four types of risk factors were considered:

- Demographic characteristics, such as gender and age;
- Hospitalization characteristics, such as number of prior admissions;
- Chronic clinical risk factors, such as asthma, liver disease, and lung cancer;
- Acute clinical risk factors, such as respiratory failure, coagulation deficit, and acute cerebrovascular accident, that may or may not be present at admission to a hospital.

All clinical risk factors were based on diagnoses and procedures listed on discharge abstracts and coded using the International Classification of Diseases-9th Revision-Clinical Modification (ICD-9-CM).

Demographic and Hospitalization Characteristics

Table A.3 details the demographic characteristics of the CAP patients selected for this report. Only age and gender are included in the CAP risk-adjustment model because they were the only demographic variables found to be sufficiently predictive of 30-day mortality.

Table A.3: Demographic Characteristics of CAP Patients (after exclusions)

Characteristic		2002		2003		2004 (Jan.-Nov.)	
		Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Total Patients		72,701		72,353		58,593	
Gender							
	Male	34,489	47.4	34,287	47.4	28,043	47.9
	Female	38,212	52.6	38,066	52.6	30,550	52.1
Race/Ethnicity							
	Caucasian	48,941	67.3	47,635	65.8	38,617	65.9
	African American	6,041	8.3	5,983	8.3	4,702	8.0
	Latino	10,639	14.6	11,422	15.8	9,151	15.6
	Native American	213	0.3	192	0.3	147	0.3
	Asian/Pacific Islander	5,216	7.2	5,386	7.4	4,559	7.8
	Other	1,242	1.7	1,315	1.8	1,069	1.8
	Missing/Unknown	409	0.6	420	0.6	348	0.6
Age							
	Mean	70.0		69.5		69.6	
	Standard Deviation	16.8		17.1		16.9	

Table A.4 provides the characteristics of the hospitalization events experienced by the CAP patients. Of these, the only characteristic that was selected by the validation study for inclusion in the model was the number of prior discharges within the previous six months.

Table A.4: Hospitalization Characteristics of CAP Patients (after exclusions)

Characteristic		2002		2003		2004 (Jan.-Nov.)	
		Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Total Patients		72,701		72,353		58,593	
Admission Type							
	Scheduled	1,754	2.4	1,756	2.4	1,306	2.2
	Unscheduled	70,923	97.6	70,475	97.4	57,248	97.7
	Missing/unknown	24	0.0	120	0.2	39	0.1
Payment Source							
	Missing	9	0.0	5	0.0	13	0.0
	Medicare	48,156	66.2	47,681	65.9	38,676	66.0
	Medi-Cal	8,139	11.2	8,286	11.5	6,612	11.3
	Private Coverage	12,790	17.6	12,550	17.4	10,047	17.2
	Worker Compensation	66	0.1	54	0.1	61	0.1
	County Indigent Programs	1,179	1.6	1,222	1.7	963	1.6

	Other Govt	284	0.4	330	0.5	283	0.5
	Other Indigent	182	0.3	196	0.3	173	0.3
	Self Pay	1,564	2.2	1,800	2.5	1,516	2.6
	Other Payer	332	0.5	229	0.3	249	0.4
Number of Prior Discharges							
Mean		0.6		0.5		0.5	
Standard Deviation		1.1		1.0		1.0	

Clinical Risk Factors for Mortality

Identification of clinical risk factors for the CAP model was accomplished in two ways. First, as part of the 1996 CAP development and validation study, clinically important factors were identified through a review of recent medical literature plus input from a clinical advisory panel. Second, additional risk factors were identified by selecting factors in the 1996 data that had significant correlations with 30-day mortality.

Factors were selected for consideration if their prevalence was greater than 1% among CAP patients and if the validation study found them to be reliably coded in the PDD. They were eliminated if the correlation with mortality (in univariate analyses) was not statistically significant, if they lacked clinical justification, or if they had counter-intuitive associations with mortality. In addition, physiologically related risk factors showing similar associations with mortality were grouped to form new variables in cases where they had low individual frequencies (less than 1% of all cases).

Risk factors were retained if they were significantly associated with 30-day mortality in the full, multivariate model. The clinical risk factors selected for use in the model are shown in Table A.5.

Table A.5: Prevalence of Clinical Risk Factors

Risk Factor	Prevalence (Percent of Patients with the Risk Factor)
CHF	30.10
Asthma	11.95
Do not resuscitate order	11.51
Respiratory failure	10.21
Chronic renal failure	7.12
Solid cancer, non-lung	6.89
Septicemia	6.10
Late effects of CVA	4.99
Hematologic cancers	4.75
Chronic liver disease	4.21
Staph. Pneumonia	3.28
Coagulopathy	3.26
Lung cancer	2.63
Parkinson’s disease	2.24
Gram negative species	2.18
Acute CVA	1.23

DNR as a Risk Factor

In the 1996 validation study, having a DNR order proved to be highly predictive of 30-day mortality. The odds ratio for DNR was the strongest single predictor or mortality. Its odds ratio (OR = 17.0) was higher than the OR for the 23 other risk factors used in the model. Inclusion in an expanded model, along with five other clinical risk factors taken directly from hospital charts, substantially raised discrimination for the PDD-based risk-adjustment models, raising the C-statistic from 0.80 to 0.91.

In the analysis of the 2002-2004 data, reported here, DNR status was also found to be an important predictor of 30-day mortality, second only to respiratory failure in the risk-adjustment model (see Tables A.8 and A.9). Model discrimination increased when DNR was added, raising the C-statistic from 0.797 to 0.824. The observed mortality rates, statewide, were more than four times higher for CAP patients with DNR orders (38.7%) than for those without (9.1%).

Reporting of DNR

The 24-hour DNR reporting rate was 11.5% for the 2002-2004 cases (see Table A.6), compared with 10.7% in the previous report (1999-2001 cases). These percentages are substantially lower than those found in a 1996 review of medical charts by OSHPD (27.0%), and closer to the 14.9% reported by Marrie et al.[1] It appears that hospitals may have underreported DNR orders during the periods of these two CAP reports. A systematic validation study from a sample survey of hospital charts was launched in 2006 to assess the completeness and validity of DNR reporting.

Table A.6: Distribution of Hospitals by DNR Admission Percent

Percent of Admissions with DNR order	Number of Hospitals	Percent of Hospitals
No DNR Cases	14	3.59
0.1 - 3.0	38	9.74
3.1 - 5.0	42	10.77
5.1 - 8.0	70	17.95
8.1 - 10.0	43	11.03
10.1 - 15.0	83	21.28
15.1 - 20.0	47	12.05
20.1 - 25.0	21	5.38
25.1 - 50.0	23	5.90
50.1 – 100.0	9	2.31
All Hospitals = 11.51% (N=390)		

[1] See: Marrie TJ, Fine MJ, Kapoor WN, Coley CM, Singer DE, and Obrosky DS, “Community-acquired Pneumonia and Do Not Resuscitate Orders”, Journal of the American Geriatric Society, 2002, Feb; 50(2): 290-9. Marrie, et al reported a rate of 14.9% for a sample of 1,339 community-acquired pneumonia admissions to hospitals in the United States and Canada.

Construct Validity and the Use of Two Models

In this report, DNR status is used as an indirect indicator of illness severity at time of admission. It is valuable because the dataset lacks any other direct measures of clinical severity, such as laboratory values. However, since DNR is by definition a request from the patient to withhold emergency and/or long-term, life-saving treatments, presence of a DNR order may have an effect on decisions about treatment which we cannot measure with the available data.

If DNR status indicates both underlying illness severity at the time of admission and variation in the treatment received, then its use as a risk factor creates a methodological dilemma. On the one hand, its omission might cause the model to under-adjust for patient severity of illness. On the other hand, adjustment for DNR orders could mask the treatment effects that the model is intended to detect. OSHPD's solution to this dilemma was to rate hospitals using *both* models according to the following rules:

- If the risk-adjusted mortality of a hospital was significantly *lower* than the state average using *both* models, then that hospital's mortality outcome was rated as significantly "better" than expected.
- If the risk-adjusted mortality rates of a hospital were significantly *highe*r than the state average using *both* models, then the hospital's mortality outcome was rated as significantly *"worse" than* expected.
- If a hospital's risk-adjusted mortality was rated *as expected* on *either* model, then that hospital's mortality rate was rated *as expected*.

The effect of using both models to rate hospitals is summarized in Table A.7. In this table, the marginal distributions for the separate models are very similar, with 248 hospitals rated "as expected" for both models and an additional 61 rated "as expected" in only one model. The total number rated "as expected" for the 2002-2004 report is 309. Twenty-five hospitals were rated "better" by both models and twenty-eight were rated "worse" by both. Twenty-eight had too few cases to be appropriately analyzed statistically.

Adding DNR to the model improved the rating for some facilities and had the opposite effect for about an equal number of others. In no case did it change a hospital's rating from "better" to "worse" or vice versa. Specifically, for 279 hospitals rated "as expected" without DNR, adding DNR to the model changed the rating to "better" for 18 and to "worse" for 13. On the other hand, for 83 hospitals rated as outliers (41 "better" and 42 "worse"), adding DNR changed their ratings to "as expected" for about one third.

Table A.7: Comparison of Hospital Ratings, With/Without DNR as a Risk Factor

		Hospital Rating With DNR As Risk Factor			
		"Better" (+)	As Expected	"Worse" (−)	TOTAL
Hospital Rating Without DNR as Risk Factor	"Better" (+)	25	16	0	41
	As Expected	18	248	13	279
	"Worse" (−)	0	14	28	42
	TOTAL	43	278	41	362

Note: This table excludes 28 hospitals that were not rated because of small sample sizes (see Table 3).

Using the model that does not include DNR, the "better" hospitals had an average risk-adjusted mortality rate of 7.9% (range: 4.8 – 9.8%), compared to an average of 17.0% (range: 14.7 – 22.1%) for "worse" hospitals. After adding DNR to the model, the risk-adjusted mortality rates increased to 8.1% (range: 5.2 – 9.7%) for "better" hospitals and 17.2% (range: 14.3 – 23.7%) for "worse" hospitals. That is, after adjusting for DNR, the average risk-adjusted mortality rate for "worse" hospitals was more than twice as high as the rate for "better" hospitals.

TIMING OF CLINICAL RISK FACTORS

Before 1996, California hospital discharge abstracts did not include any information on the timing of diagnoses. Therefore, any acute condition could be either a co-morbidity (e.g., present at admission) or a complication of care (e.g., present only after admission). After 1996, a new "condition present at admission" (CPAA) flag was reported in the abstracted data in conjunction with each recorded diagnosis. This field was used to differentiate co-morbidities from complications.

In addition, pre-existing co-morbidities were identified by linking the index CAP record to any other hospitalization reported during the prior six months. The prior abstracts provided additional information about the presence and timing of clinical risk factors. If a risk factor was noted on a prior discharge abstract then it clearly preceded the index CAP admission and thus did not require reference to a CPAA indicator.

THE RISK-ADJUSTMENT MODELS

Tables A.8 and A.9 show parameter estimates, odds ratios (ORs), and confidence intervals (CIs) for the risk factors in each of the models, with and without use of DNR as a predictor. All of the risk factors were found to be statistically significant predictors of mortality except infection due to gram negative species (Table A.8).

The strongest predictors of death in both models were the following: having a diagnosis of respiratory failure (OR = 5.19), followed by diagnoses of lung cancer, septicemia, non-lung solid cancer, and coagulopathy. The remaining predictors had odds ratios that were significant but less than 2.0. Asthma had a protective effect (OR = 0.5): possibly patients with both asthma and CAP are treated more aggressively and have a lower threshold for hospital admission. In the model that includes DNR, having a DNR order in place is one of the strongest predictors of mortality (OR = 4.2), second only to respiratory failure.

Table A.8: Parameters for Model without DNR as a Risk Factor

Risk Factor	Parameter Estimate	P Value	Odds Ratio	Lower 95% CI For Odds Ratio	Upper 95% CI For Odds Ratio
Intercept	-6.0674	<.0001			
Age	0.0442	<.0001	1.045	1.044	1.046
Male	0.093	<.0001	1.097	1.064	1.132
Septicemia	1.1106	<.0001	3.036	2.895	3.184
Respiratory failure	1.6468	<.0001	5.19	4.997	5.392
Staph. Pneumonia	0.4448	<.0001	1.56	1.457	1.671
Chronic liver disease	0.6259	<.0001	1.87	1.744	2.005
Lung cancer	1.2146	<.0001	3.369	3.14	3.614
Solid cancer, non-lung	0.9322	<.0001	2.54	2.422	2.664
Hematologic cancers	0.5907	<.0001	1.805	1.703	1.913
Chronic renal failure	0.3489	<.0001	1.418	1.347	1.492
Late effects of CVA	0.2298	<.0001	1.258	1.186	1.335
Coagulopathy	0.7142	<.0001	2.043	1.912	2.182
Gram negative species	0.0381	0.4222	1.039	0.947	1.14
CHF	0.1794	<.0001	1.196	1.158	1.236
Parkinson’s disease	0.2524	<.0001	1.287	1.182	1.401
Acute CVA	0.1677	0.0036	1.183	1.056	1.324
Asthma	-0.6696	<.0001	0.512	0.48	0.546
Number of prior discharges	0.1408	<.0001	1.151	1.137	1.166

Table A.9: Parameters for Model with DNR as a Risk Factor

Risk Factor	Parameter Estimate	P Value	Odds Ratio	Lower 95% CI For Odds Ratio	Upper 95% CI For Odds Ratio
Intercept	-5.6516	<.0001			
Age	0.0347	<.0001	1.035	1.034	1.037
Male	0.1428	<.0001	1.153	1.118	1.19
Septicemia	1.038	<.0001	2.824	2.69	2.964
Respiratory failure	1.6457	<.0001	5.185	4.988	5.389
Staph. Pneumonia	0.4638	<.0001	1.59	1.484	1.704
Chronic liver disease	0.607	<.0001	1.835	1.71	1.969
Lung cancer	1.1229	<.0001	3.074	2.861	3.302
Solid cancer, non-lung	0.8678	<.0001	2.382	2.269	2.5
Hematologic cancers	0.5918	<.0001	1.807	1.704	1.917
Chronic renal failure	0.3853	<.0001	1.47	1.396	1.548
Late effects of CVA	0.1577	<.0001	1.171	1.103	1.243
Coagulopathy	0.7324	<.0001	2.08	1.945	2.224
Gram negative species	0.0444	0.3519	1.045	0.952	1.148
CHF	0.1864	<.0001	1.205	1.166	1.245
Parkinson's disease	0.162	0.0002	1.176	1.079	1.282
Acute CVA	0.1927	0.001	1.212	1.081	1.36
Asthma	-0.6266	<.0001	0.534	0.501	0.57
Number of prior discharges	0.1295	<.0001	1.138	1.124	1.153
Do not resuscitate status	1.4333	<.0001	4.193	4.044	4.346

Internal Validity of Risk-Adjustment Models

For this report, internal validity is defined as how well the model controls for differences in patient characteristics that would otherwise confound outcome comparisons across hospitals. Not adequately controlling for such differences may generate biased and misleading estimates of risk-adjusted mortality rates. Internal validity was assessed in three ways: face validity, discrimination, and goodness of fit (i.e., calibration).

Face Validity

Members of the CAP clinical advisory panel and additional consultants reviewed the 1996 CAP risk-adjustment model, including the selection of covariates and model parameters, to ensure that it was both clinically appropriate and consistent with previous research in the field. This panel judged the model to be an adequate representation of risk factors associated with 30-day mortality for CAP. The panel was not reconvened to review the 2002-2004 report because there was no change in the risk-model being applied to the PDD data.

Discrimination

A perfectly discriminating model would be able to correctly predict each death. That is, it could assign every patient an expected probability of either zero (survival) or one (death). We do not expect statistical models to be capable of perfect discrimination, but they should be accurate more often than they are wrong (better that 50-50 guessing).

A commonly used measure of discrimination is the C-statistic. This measure is based on comparisons of all possible pairs of cases involving one decedent and one survivor.[1] In the study reported here, the C-statistic can be interpreted as the proportion of the times that any CAP patient who died had a higher probability of death than a survivor. The C-statistic may show a value between 0.00 and 1.00. A value higher than 0.50 indicates an overall pattern of discrimination in an expected direction, where patients who died had higher expected probabilities of death than survivors. A value of exactly 0.50 would indicate random variation, that is, lack of discrimination. Values less than 0.50 would indicate discrimination in an unexpected direction, where patient outcomes were opposite to the predicted outcomes. There is no widely accepted cutoff for the C-statistic that defines a model as "adequate."

As shown in Table A.10, the current models' C-statistics were approximately 0.80 and 0.82, for models without and with DNR respectively. These are identical to the results reported by the 1996 CAP development validation study, and are comparable to other models used by OSHPD in previous studies.

Table A.10: Discrimination and Goodness-of-Fit Tests for Re-Estimated CAP Risk-Adjusted 30-day Mortality Models

	Without DNR as a Risk Factor	With DNR as a Risk Factor
Number of Cases	203647	203647
Number of Deaths	25027	25027
30-day Mortality Rate	12.29%	12.29 %
Discrimination C-statistic	0.797	0.824
Goodness of Fit Statistic (χ^2)		
Overdispersion Estimate	1.2498	1.1921
P-value	<.0001	<.0001

Goodness of Fit

Goodness of fit (calibration) is the extent to which observed outcomes correspond to predicted outcomes across the full range of outcome values. In a well-calibrated model, there is a close correspondence between the observed and predicted outcomes across the full range of patient characteristics. A lack of such correspondence (called over-dispersion), can occur for several reasons. There may be a false assumption of a linear

[1] The C-statistic is equivalent to the area under a receiver operating characteristic curve, which represents a plot of sensitivity versus 1-specificity at various cutoff values for the predicted probability. See: Hanley JA, McNeil BJ. *The meaning and use of the area under a receiver operating characteristic (ROC) curve*. Radiology 1982; 143:29-36.

relationship between the logit transformation of the dependent variable (i.e., mortality) and its explanatory variables. Alternatively, the model might lack important interaction terms among explanatory variables or might predict extreme values (i.e., outliers) poorly.

The 1996 CAP validation study reported an over-dispersion estimate of 1.18 (statistically significant at $p<0.001$), suggesting that there was an over-dispersion problem in the model. However, there is close correspondence of observed and predicted values across the full range of model outcomes. Thus, the researchers who developed the model hypothesized that the lack of model fit was due to the effect of having a very large numbers of patients in the study data, with possible omission of higher order interactions. To test the latter, they multiplied the estimated variances by the over-dispersion estimate. This increased the widths of confidence intervals by only 9 percent and did not produce any qualitative changes in report findings, indicating that there was no need to model interactions or non-linearity.[1] The present report obtained similar over-dispersion estimates of 1.25 and 1.19 ($p<.0001$ for both) for the non-DNR and DNR models respectively.

EXCLUSION FROM FULL RISK-ADJUSTMENT

The guidelines that professional coders follow when they abstract medical records may be ambiguous and subject to multiple interpretations. Hospitals also face financial incentives that affect how diagnoses are coded, particularly for Medicare beneficiaries. Consequently, the prevalence of various CAP risk factors across hospitals can vary due to coding practices rather than differences in case mix.

There was no evidence of unusual coding practices that would seriously distort comparisons of risk-adjusted mortality across hospitals. However, we examined the CPAA ("condition present at admission") indicators and found a possible pattern of coding error for some hospitals. Generally, a secondary discharge diagnosis for a patient can be present at the time of admission or it can appear after admission, during the episode of hospitalization. It is unlikely that *all* secondary diagnoses for *all* of a hospital's CAP patients would be present at admission or that *none* of them would be present at admission, especially in hospitals with relatively large numbers of CAP patients. Among the 15 clinical risk factors used in the model, three (respiratory failure, coagulation deficit and acute cerebrovascular accident) are regarded as acute. That is, they could either be present either at the time of admission or could develop afterwards. The remaining 12 clinical variables are considered chronic and may be assumed to be present at admission. Consequently, coding errors on CPAA are relevant primarily for these three acute clinical risk factors.

We excluded the three acute clinical risk factors from a hospital's risk adjustment in any of the semi-annual reporting periods for that hospital when its CPAA coding met both of the following criteria:

1. There was a sufficient number of CAP discharges to reliably assess CPAA coding

[1] Haas J, et. Al., "Report for the California Hospital Outcomes Project: Community-acquired Pneumonia, 1996, Sacramento, California: Health Policy and Planning Division, California Office of Statewide Health Planning and Development, November 2000: page 9-2.

(i.e., 80 or more[1]) at a given hospital in a six-month reporting period;

2. CPAA coding for secondary diagnoses showed either none or all as present at admission.

For the periods with suspected CPAA coding errors we used only the 12 chronic clinical risk factors and demographic variables in the risk-adjustment for the hospital, omitting adjustment for the three acute clinical risk factors.

Additionally, the Patient Data Section of OSHPD's Health Information Division checked the logical consistency of the data within each six-month reporting period and noted that some hospitals exhibited unacceptable CPAA indicator coding. We also excluded these hospitals from full risk adjustment during each six-month period with problematic data. Table A.11 lists hospitals and reporting periods that received partial risk adjustment.

Table A.11: Hospitals Excluded from Full Risk-Adjustment

	Six Months Reporting Period					
Hospital Name	**2002-1**	**2002-2**	**2003-1**	**2003-2**	**2004-1**	**2004-2**
Barstow Community Hospital	E		XE		E	
Coastal Communities Hospital		E		E	E	
College Hospital-Costa Mesa	X					
Community Hospital of Long Beach					E	
Desert Valley Hospital	XE	XE				
Emanuel Medical Center	E	E			E	E
Encino Tarzana Rgnl MC-Encino		E	E			
Fallbrook Hospital District					E	
Good Samaritan Hospital-Bakersfield		E	XE			
Granada Hills Community Hospital				X		
Hanford Community Hospital		E				
Lancaster Community Hospital	E					
Los Angeles Co Harbor-UCLA Medical Center	E				E	E
Los Angeles Community Hospital			E		E	
Los Angeles Metropolitan Med Center	X	X	E			
Madera Community Hospital			XE			
Mayers Memorial Hospital	X	X	X	X		
Mission Community Hospital-Panorama	E	E	E			
Mountains Community Hospital				X		
Ojai Valley Community Hospital	E					
Pacific Hospital of Long Beach		E				
Palomar Medical Center	E	E	E	E	E	
Paradise Valley Hospital						E

[1] Haas J, et. al., "Report for the California Hospital Outcomes Project: Community-acquired Pneumonia, 1996," Sacramento, California: Health Policy and Planning Division, California Office of Statewide Health Planning and Development, November 2000: page "5-3."

Parkview Community Hospital		E	E	E		E
Pioneers Memorial Hospital		E				
Pomerado Hospital	E	E		E		
Ridgecrest Regional Hospital	E		E	E	E	
Santa Marta Hospital			E	XE	X	
Santa Ynez Valley Cottage Hospital	X					
Selma District Hospital	E	E	E	E		
Simi Valley Hospital & Health Svcs						E
South Coast Med Ctr		E		E		
St. Luke Med Ctr	X					
St. Mary's Med Ctr-San Francisco	E					
St. Vincent Med Ctr	E					
Sutter Davis Hospital	E	E	E			
Temple Community Hospital			E			
Tulare District Hospital				E	E	E
Vaca Valley Hospital	E					

Key: X = Inaccuracies noted by the Patient Data Section of OSHPD's Health Information Division; E = Possible inaccuracies detected by empirical analysis according to the criteria described above.

Finally, we assessed unusual patterns in the prevalence of "key" risk factors: congestive heart failure, respiratory failure, and septicemia. Table A.12 shows the statewide prevalence and the prevalence range across hospitals, for each of the key factors. A cut-off for under- or over-coding of the key factors based on the distribution of the data was evaluated on a hospital-by-hospital basis. The hospital-specific analyses did not indicate that any hospital should be removed from risk adjustment. This is consistent with the CAP validation study, which found adequate accuracy of coding on key risk factors.

Table A.12: Statewide Prevalence and Range of Key Risk Factors

Key Risk Factor	Statewide Prevalence	Range Across Hospitals
CHF	30.09 %	0.0 % – 71.42 %
Respiratory Failure	10.20 %	0.0 % – 45.45 %
Septicemia	6.10 %	0.0 % – 15.62 %

Note: Range includes only hospitals with more than 30 CAP admissions.

CALCULATION OF HOSPITAL OUTCOME MEASURES

Application of the risk-adjustment model to the 2002-2004 PDD data for CAP patients produced risk-adjusted mortality rates for each California hospital shown in Chart 1. Additional detailed hospital statistics were provided to hospitals showing their own risk-adjusted mortality rates for each separate year.

Observed Deaths: Number and Rate

The number of observed deaths at a hospital is simply the total number of CAP patient deaths that occurred within 30 days after the index admission. These deaths could have

occurred during the index hospitalization, during a subsequent hospitalization, or while the patient was not hospitalized. The observed mortality rate at a hospital equals the number of observed deaths, divided by the total number of CAP patients at that hospital. This quantity was multiplied by 100 to express the result as a percentage.

Expected Deaths: Number and Rate

The number of expected deaths at a hospital is obtained from the risk-adjustment model, in four steps, as shown in the following example:

- First, for each patient, each risk factor is multiplied by its model coefficient, as shown in Tables A.8 and A.9. For example, using the model without DNR (Table A.8) we would calculate the probability of death for a 67 year old man admitted with respiratory failure by multiplying: age 67 x .0442, male gender (1) x .0930, and respiratory failure (1) x 1.6468.
- Second, we add these together with the intercept (-6.0674) and obtain the sum of -1.367 (z) for the patient.
- Third, we apply the formula p=1/(1+e-z). For this patient we find that the estimated probability of death is .203.
- Fourth, after obtaining the estimated probability of death for each patient in this way, we sum these results across all the patients in the hospital. This sum is the expected number of deaths for the hospital.[1]

The expected mortality rate at a hospital equals the number of expected deaths, divided by the total number of CAP patients at that hospital. If a hospital's expected mortality rate is higher than the statewide rate, patients at that hospital were sicker (were more likely to have the risk factors) than the statewide average. If a hospital's expected rate is lower than the statewide, then patients at that hospital were healthier than the statewide average.

Risk-Adjusted Mortality Rate Calculation

The risk-adjusted (or indirectly standardized) mortality rate at a hospital equals the statewide rate, multiplied by the ratio of the number of observed deaths to the number of expected deaths at that hospital,[2]

$$I_i = s\left(\frac{\sum_{j=1}^{n_i} o_j}{\sum_{j=1}^{n_i} \hat{p}_j}\right) = s\frac{O_i}{\pi_i}$$

where Ii is the indirectly standardized outcome rate for the jth hospital, s is the statewide outcome rate, oj is the observed value of the adverse outcome (0 or 1) for the jth patient, and $\hat{p}_j$ is the estimated (expected) probability of the adverse outcome for the jth patient. The latter two variables are summed over all patients at the jth hospital.

---

[1] All analyses in this report were conducted using SAS Statistical Software, Version 9.1, SAS Institute Inc., Cary N.C. Estimated probabilities of death within 30 days of admission were calculated using PROC LOGISTC.

[2] The methodology used to calculate these limits is described on page 93 of Chapter Eleven in the *Technical Appendix for the 1991-1993 Heart Attack Outcomes report* (www.oshpd.ca.gov/HQAD/Outcomes/Studies/HeartAttacks/index.htm).

The ratio of the number of observed deaths to the number of expected deaths at a hospital provides a quick assessment of that hospital's performance. For a hospital with fewer observed than expected deaths, this ratio is less than one; for a hospital with more observed than expected deaths, this ratio is greater than one. This risk-adjusted mortality rate provides a basis for comparing the performance of different hospitals because each hospital's rate is adjusted to reflect what its mortality rate would be if its patients were about as ill as the statewide average.

Confidence Limits for Risk-Adjusted Mortality Rates

Confidence limits are constructed from the standard deviation and the number of observed deaths at each hospital.[2] There is a 98% chance that the true risk-adjusted mortality rate falls within 98% confidence limits, assuming that the model is valid.

The size of the confidence interval indicates the reliability of a hospital's risk-adjusted mortality rate. In general, when the upper and lower confidence limits are far apart, the estimated risk-adjusted mortality rate is less reliable. This occurs if there is wide variation among the hospital's patients and/or a small number of patients are reported from that hospital.

RESULTS: RISK-ADJUSTED CAP MORTALITY RATES

Risk-adjusted hospital outcomes based on both models are summarized in Chart 1. Hospitals are alphabetically listed within each county. Hospitals rated significantly "better" or significantly "worse" than expected using *both* models are highlighted with gray.

The row labeled "D" indicates the risk-adjusted 30-day mortality obtained from the model that *included DNR* status as a risk factor. The row not so labeled indicates the risk-adjusted 30-day mortality obtained from the model that *did not include DNR* status as a risk factor, using the same set of patients. If you cannot find a particular hospital, it is possible that the hospital did not treat community-acquired pneumonia patients during 2002-2004 or that it had a different name at that time.

Comparing Observed and Expected Mortality

For both risk-adjustment models, two separate one-tailed analyses of statistical significance were performed to determine whether hospitals showed mortality rates that were significantly "better" (lower) or significantly "worse" (higher) than expected. Differences (according to statistical theory) that would be expected by chance less than one time in a hundred were considered significant. Such differences are represented by the term "$p<0.01$." This is a relatively strict level of statistical significance that helps to discriminate hospitals that were "better" or "worse" than expected from those that performed "as expected" when compared to the state average.

[1] Williams RL. Measuring the effectiveness of perinatal medical care. Medical Care 1979; 17:95-110.

The exact probability of the number of observed deaths (or a more extreme number) occurring by chance, given the number of expected deaths at a hospital, was used to identify outlier hospitals. This approach differs from the more widely used normal approximation in that it relies on fewer distributional assumptions and gives better estimates for hospitals with relatively few expected deaths.[1]

If the number of observed deaths exceeded the number of expected deaths, an upper probability (p) value was computed. If the number of observed deaths was less than or equal to the number of expected deaths, a lower probability (p) value was computed. The classification of a hospital's CAP mortality rate as "significantly better than expected," "significantly worse than expected," or "not significantly different than expected" was based on a p-value threshold of 0.01. Hospitals classified as significantly "better" than expected had fewer deaths than expected and a p-value less than 0.01. Hospitals classified as significantly "worse" than expected had more deaths than expected and a p-value less than 0.01. This is equivalent to a two-tailed significance test based on a 98% confidence interval.

Hospitals showing mortality rates significantly "better" than expected ($p<0.01$) are represented by a plus sign (+). Hospitals showing mortality rates significantly "worse" than expected ($p<0.01$) are represented by a minus sign (–). Hospitals that were not significantly different than expected (i.e., that were in a middle range because they were neither significantly better nor significantly worse) are not assigned a symbol.

Symbols representing results:

(+) Significantly "better" than expected ($p<0.01$)
(–) Significantly "worse" than expected ($p<0.01$)
Absence of a symbol indicates performance "as expected"

Comparing Risk-Adjusted Hospital Rates with the Statewide Mortality Rate

Chart 1 compares the risk-adjusted mortality rates of hospitals to the statewide rate using both models. The black solid circle (●) on a row's horizontal bar marks the hospital's risk-adjusted mortality rate. The number on the bar is a hospital's risk-adjusted 30-day mortality rate. A vertical hyphenated line extending from the top to the bottom of the chart represents the overall, statewide 30-day mortality rate for CAP admissions.

Two separate one-tailed significance tests, each at the one percent confidence level, were combined to produce the 98% confidence intervals around a risk-adjusted rate. The bars represent the 98% confidence bounds surrounding an adjusted mortality rate. If each hospital's population of CAP patients in this report is viewed as a separate random sample from the state's population of hospital admissions, then the interval

[1] Luft HS, Brown BW Jr. Calculating the probability of rare events: Why settle for an approximation? Health Services Research 1993; 28:419-439.

may be interpreted to mean that there is a 98% probability that any given hospital's true risk-adjusted mortality rate falls somewhere along that bar. Therefore, if the bar crosses the state average, the hospital's 30-day mortality rate is considered “not significantly different” from the state average. If the bar does not cross the state average, then the difference between the hospital’s 30-day mortality rate and the state’s rate is considered statistically significant. In a few instances, the bar representing a hospital’s confidence interval was too wide to completely fit onto Chart 1. When this happened, a portion of the interval on one side of a mortality rate (●) was truncated and represented by an arrow (← or →) at the end of the bar. In general, the more cases a hospital admits, the narrower its confidence interval. According to statistical theory, larger samples yield more reliable results.

There were 28 hospitals that admitted fewer than 30 patients during the three-year period of this report. These small numbers often resulted in extremely wide confidence intervals that could not be meaningfully interpreted. These hospitals were not rated as significantly higher or significantly lower than the statewide 30-day mortality rate and are not shown in Chart 1. They are listed in Table 3 in the main section of the report.

LIMITATIONS OF THE DATA AND MODEL

Quality of care is one reason a hospital’s mortality rate may be unusually high or low. However, there are additional factors that may contribute to the results.

Unmeasured Risk

The hospital administrative records that were used for this report included ICD-9-CM coded diagnoses and procedures. However, these records did not include clinical findings (such as body temperature, X-ray results, or serum sodium levels) or social/economic factors (such as access to preventive medical services and local prevalence of respiratory disease). If these additional factors had been available, it is possible that a model could have been developed to more fully account for differences in the severity of patient risk across the hospitals.

Variations in Reporting (Data Quality)

Variations or errors in reporting practices may affect a hospital’s risk-adjusted outcomes. Hospitals that failed to report important risk factors or had other data quality problems could have received too little “credit” for their patient risk in the risk-adjustment process. Also, their results could be based on patients that should have been excluded. For example, if there were patients admitted from facilities such as board and care homes who were erroneously reported to OSHPD as “admissions from home” they would have met the CAP definition and been included in this report; if they had been coded correctly in the submitted data they would have been excluded.

The CAP validation study based on 1996 admissions, however, found that differences in hospital reporting practices explained little of the variation across hospitals in risk-adjusted mortality.

Process of Care

Hospitals designated as having “better” (or “worse”) outcomes may provide a better (or worse) quality of care than those not so designated. The process of care in hospitals was not measured in this study, so the specific practices that may account for variations among hospital performances are not reported here. However, the validation study for community-acquired pneumonia suggested a possible difference between hospitals with low risk-adjusted mortality and those with high risk-adjusted mortality. For patients without a Do Not Resuscitate order, the best performing hospitals were significantly more likely to perform sputum cultures at admission. The worst performing hospitals were less likely to perform sputum cultures at admission. The sputum culture could be a marker for procedures that the validation study was unable to measure or could be an important procedure in its own right.

Limited Type of Patient Care

This report provides information on only the care of patients with community-acquired pneumonia. It does not address the quality of care for any other condition and should not be used as a general measure of hospital quality.

Second, it addresses only the outcomes of patients hospitalized for pneumonia. Thresholds for admission may differ among hospitals. Some CAP patients may be treated only in outpatient settings. Others may die at home without ever presenting for medical treatment.

Third, this report focuses on a single measure of outcome: 30-day mortality. It does not address other outcomes such as a patient’s quality of life after discharge or likelihood of having subsequent hospital readmissions. Other organizations that monitor different aspects of healthcare quality are listed in Appendix C with contact information.

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APPENDIX B: HOSPITAL COMMENT LETTERS

The law that created the California Administrative Data Program specified that hospitals and their medical staff be given 60 days to review their results before the report is released to the public. Hospitals and their chiefs of staff are encouraged, but not required, to submit written comments.

Issues of Concern in Hospital Comment Letters

For the 2002-2004 CAP Report, a total of ten letters were received. They addressed the following topics:

1. Improved quality assessment and patient services

Four stated that the report prompted them to initiate new programs to improve quality of care and outcomes for CAP patients. These included quality assurance activities such as review of pneumonia order sets, protocols for use of antibiotics, and appointment of a quality assurance team. They also described new patient services that were being implemented, including a public education program concerning pneumonia and increased access to influenza and pneumococcal immunizations.

At least two of the hospitals are participating in the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Core Measure for Pneumonia.

> Response: The Office is very encouraged that these hospitals are using this analysis to take meaningful steps to improve care for pneumonia patients.

2. Concerns about data quality

One hospital, upon reviewing the patient data, found that DNR status had been under-reported in their administrative abstracts. Another expressed concern that the report was based on “old” data.

Three letters stated that after reviewing their CAP patient data they found that patient “source” had been miscoded by their own medical records offices; patients who had transferred to the hospital from board and care or nursing “homes” had been erroneously reported as admissions from “home.” Thus, some high risk patients were included in the analysis that, with correct coding, would not have been. This issue was also reported in the previous CAP report.

> Response: Findings of the previous CAP report were provided to hospitals September 2003, for the required 60-day review period prior to release of the public report. OSHPD sent each facility its own statistical results and a dataset containing all the CAP patient information utilized in the report.
>
> Based on these materials, hospitals that became aware of coding problems in the in-patient discharge data submissions from their facility had an opportunity

to amend any of the 2003 data they had already submitted and could also have remedied any coding problems before submitting data for the remainder of that year. Further, they could have put improved coding practices in place for all data submissions for 2004 and for subsequent years.

Correct coding of "source of admission" is explained for reporting facilities in the *Patient Discharge Data Reporting Manual*. An update of the manual was mailed to each hospital by OSHPD in August 1994, which explained how to code "source of admission." These instructions are still in effect at the time of this writing. The Manual states that source of admission is coded as "Residential Care Facility" for "A patient admitted from a facility in which the patient resides and that provides special assistance to its residents in activities of daily living, but that provides no organized healthcare." It further clarifies that "The facilities are referred to by a variety of terms (e.g., board and care, residential care facilities for the elderly)."

In contrast, source of admission should be coded as "Home" for "A patient admitted from the patient's home, the home of a relative or friend, or a vacation site, whether or not the patient was seen at an outpatient clinic or physician's office, or had been receiving home health services or hospice care at home." It includes patients admitted from "…a half-way house, group home, foster care, women's shelter, Alcoholism or Drug Abuse Recovery or Treatment Facility as licensed by the Department of Alcoholism and Drug Programs, or A mother who delivers at home and the baby born at home."

Facilities that identify shortcomings in their data abstracts may benefit from review of their record abstraction process and introduce changes in staff training or instructions to prevent future errors.

3. Concerns about the model

There was no overall objection to the use of the multivariable risk-adjustment model. Two hospitals stated that use of "all-cause" mortality, instead of just counting deaths directly attributable to pneumonia, was inappropriate.

Response: All hospitals, and the statewide mortality benchmark, are based on the same "all cause mortality" measure. It is possible that some hospitals have a higher proportion of patients at risk for post-discharge trauma or for death from their other illnesses (co-morbidities). In these facilities, mortality may be reduced by improved discharge planning.

Another hospital recommended that the model be risk-adjusted using the All Patient Refined-Diagnostic Related Groups (APR-DRG) system, developed by 3M and used by the Agency for Healthcare Research and Quality (AHRQ) and others for healthcare performance measurement.

Response: The Technical Advisory Committee for OSHPD recommended use of the risk-adjustment methodology reported here. This was based on extensive clinical and statistical analysis of the data and on the clinical management issues related to CAP. The APR-DRG system is not appropriate as a risk-adjustment system for

public reporting because it inappropriately credits hospitals with more complications as having sicker patients. The current report uses the condition present at admission indicator, available only in California and New York states, to separate pre-existing illnesses included in the risk model from post-admission complications.

Finally, one hospital observed that the model omits important risk factors for death that remain outside the control of the hospital, such as patient exposure to pathogens and noncompliance with medical instructions.

Response: This is an important consideration and affects the results for all the hospitals included in this report. The mortality outcomes can only be risk-adjusted for factors that can be measured and are currently available in the patient discharge abstract. As noted above, several of the responding hospitals appear to be addressing this issue by introducing new patient education and immunization programs.

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Century City
Doctors Hospital
Health Information Management

June 30, 2006

Joseph Parker, Ph.D.
Director, Healthcare Outcomes Center
Office of Statewide Health Planning and Development
818 K Street, Room 200
Sacramento, CA 95814

Subject: California Hospital Outcomes Report on Community- Acquired Pneumonia, 2002-2004

Dear Mr. Joseph Parker,

The purpose of this letter is to submit a comment on the OSHPD preliminary report on community acquired pneumonia (CAP) from 2002-2004. We would like to clarify that was purchased by the Salus Group and opened on October 14, 2005. The published results are those from **Century City Hospital** a Tenet facilty. We would like to make sure that the public is aware of this distinction. Please do not use the name **Century City Doctors Hospital** in your published report. Thank you for your help in this matter.

Sincerely,

Joel M. Bergenfeld
CEO, Century City Doctors Hospital

A Member of the Salus Surgical Group

2070 Century Park East, Los Angeles, CA 90067 t: 310.772.4000 fax: 310.220.6530 www.ccdoctorshospital.com

Community Hospital of the Monterey Peninsula®
Innovative healthcare with a human touch

July 6, 2006

Joseph Parker, PhD, Director
Healthcare Outcomes Center
Office of Statewide Health Planning and Development
818 K Street, Room 200
Sacramento, CA 95814

Dear Dr. Parker:

Community Hospital of the Monterey Peninsula strives to be the healthcare organization in our region most concerned for those we serve, most chosen for the quality and value of our services, and most respected for the integrity, competency, and commitment of our employees, medical staff, and volunteers. We thank you for the opportunity to review the outcomes report on community-acquired pneumonia.

We are pleased with our overall results in this study yet we are confident that we will do even better in the future. The physicians and employees of the organization set aggressive targets for clinical improvements, and we are committed to achieving those targets year after year. We have consistently demonstrated appropriate use of antibiotics in target groups of pneumonia patients and our immunization rates are in the upper ten percent of all hospitals. Our teams of physicians, nurses, pharmacists, and other caregivers continue working together to improve the care we provide for patients with community-acquired pneumonia.

We strongly support the public's right to receive information that will assist in making informed decisions about healthcare. We also believe it is important for healthcare consumers to understand the limitations and complexity of this data and encourage OSHPD in its effort to make the information as clear and transparent as is possible. At Community Hospital of the Monterey Peninsula we know that providing quality care requires vigilance and continuous effort. We are never satisfied and always strive to do the best for our community.

Sincerely,

Steven Packer, M. D.
President/CEO

Post Office Box HH, Monterey, California 93942-1085 ▪ (831) 624-5311

C. Barry Dykes
Chief Executive Officer
Tenet California

Desert Regional Medical Center
1150 N. Indian Canyon Dr.
Palm Springs, CA 92262

August 14, 2006

Joseph Parker, Ph.D., Dir. Healthcare Outcomes Center
Office of Statewide Health Planning and Development
818 K Street, Room 200
Sacramento, CA 95814

Dear Dr. Parker:

In response to the OSHPD report on Community Acquired Pneumonia, Desert Regional Medical Center undertook an extensive retrospective review of the 53 mortalities identified. Upon review, several issues emerged which may have significantly contributed to the overall mortality rates.

Desert Regional Medical Center is fortunate to have an inpatient hospice unit. Nine of the 53 cases were either transferred to the hospice unit or admitted directly to the unit for comfort care only. The risk adjustment model does not take hospice care into consideration. We believe that this unique service truly sets our facility apart in terms of the patient population and type of services provided.

A second issue identified was that 12 of the 53 patients are listed in the OSHPD data set as being a full code whereas they actually were Do Not Resuscitate patients within 24 hours of admission.

In addition, two of the 53 patients reviewed were admitted from a nursing home, and therefore should have been excluded from the data set. Another 2 of the 53 patients reviewed left AMA.

While this review allowed us to examine the care that we provided in the past, it is also important to note that we actively participate in the pneumonia core measure set, and have so since 2001. Our data indicates that we are currently 93% compliant with pneumonia core measure guidelines for calendar year 2006.

In summary, we believe that our inpatient hospice unit as well has an inaccurate notation of the code status of our patients contributed to the reported mortality rates for our Community Acquired Pneumonia patients. Desert Regional Medical Center is committed to providing high quality patient care for the patients in the Palm Springs community.

Sincerely,

C. Barry Dykes
Chief Executive Officer

JOHN MUIR HEALTH

1400 Treat Boulevard
Walnut Creek, CA 94597-2142

A not-for-profit organization

August 10, 2006

Joseph Parker, PhD
Director, Healthcare Outcomes Center
Office of Statewide Health Planning and Development
818 K Street, Room 200
Sacramento, California 95814

Dear Dr. Parker,

Thank you for the opportunity to review and comment on the Community-Acquired Pneumonia (CAP) data provided for years 2002-2004. We have carefully reviewed the results and are pleased to find that our outcomes compare favorably with participating hospitals. While the care we provide to our patients is based on best practices, the use of both external and internal benchmarking and performance improvement strategies, allows us a continuous opportunity to evaluate our efforts to provide the best possible care to our patients. Our participation in many national initiatives assists our organization in maintaining a cutting edge approach to quality patient care.

Thank you again for the opportunity to gain perspective on our performance as it related to the larger healthcare community and to participate in this important aspect of patient care.

Sincerely,

Kenneth Meehan
Executive Vice President, Operations

KAISER PERMANENTE®

Kaiser Foundation Health Plan, Inc.

August 14, 2006

Joseph Parker, Ph.D.
Health Care Quality and Analysis Division
Office of Statewide Health Planning and Development
818 K Street, Room 200
Sacramento, CA 95814

Dear. Dr. Parker:

We have reviewed data from the draft of the Community Acquired Pneumonia Outcomes Report. Community Acquired Pneumonia is a serious health problem and it accounts for many deaths among Californians. Kaiser Permanente is committed to actions to improve the care of patients who enter the hospital with this diagnosis. We support wholeheartedly the efforts of the State to provide information that would permit us to identify hospitals where care is suboptimal, in order to address quality issues, and to identify those hospitals that perform above average as a means of identifying best practices. We are concerned; however, that the CAP Outcomes Report may mislead the public about the quality of care provided because of problems with the coding of source of admission.

We have identified that 25-30% of patients admitted to our hospitals from Board and Care facilities were inadvertently given codes that identified them as being admitted from home. Patients admitted with pneumonia from Board and Care facilities are often very high risk for complications and death. The inclusion of these people as cases of community acquired pneumonia along with the people truly admitted from home with pneumonia causes a substantial bias in mortality outcomes for this diagnosis. The risk-adjustment procedure used by the State would not overcome the upward bias in mortality outcomes for community-acquired pneumonia.

We believe strongly that the Community Acquired Pneumonia Outcomes Report does not reflect the reality of hospital quality care, nor the true risk of death following community acquired pneumonia because of inaccuracies in the data on source of admission. The problem with the data could be corrected for our patients and those at other hospitals by requiring verification of admission source for all deaths among patients now classified as community acquired pneumonia. We are currently expending resources to assure that this is done for patients in our hospitals. Unfortunately, this data correction process is not currently permitted to update calculations for the OSHPD report.

Kaiser Permanente is eager to work with OSHPD to assure that the CHOP project is successful and drives quality improvement, and we will continue working to assure that the documentation and coding in our medical records accurately reflects the excellent care provided to our members.

Sincerely,

John Brookey, M.D.
Assistant Medical Director
Quality and Risk Management
Southern California Permanente Medical Group

Patti Harvey
Director, Patient Safety and Risk Management
Kaiser Foundation Hospitals, Southern California

Walnut Center
Pasadena, CA 91188

NORTHBAY HEALTHCARE SYSTEM

23 August 2006

Joseph Parker, Ph.D.
Director, Healthcare Outcomes Center
Healthcare Information Division
Office of Statewide Health Planning and Development
818 K Street, Room 100
Sacramento, CA 95814

Dear Dr. Parker:

The NorthBay Healthcare Group (NorthBay Medical Center and VacaValley Hospital) appreciates the opportunity to review and submit a letter responding to the Community Acquired Pneumonia Report Mortality data for 2002-2004. We are very pleased to see that our performance improvement efforts over the last 2 ½ years are reflected in these numbers.

With the receipt of the 1999-2001 data we performed an in-depth review of our pneumonia cases and established a hospital wide Pneumonia Performance Improvement Team. Since that time we have been monitoring our data and performing in-depth analysis to determine specifically where our process improvement efforts would best be focused. We have implemented many new initiatives and revised several processes. We provide detailed data analysis and focused staff education to all personal that participate in the care of our Pneumonia patients.

We are very please that the 2002-2004 Community Acquired Pneumonia data reflects a marked improvement as a result of our ongoing efforts. Continued improvement remains a focus of our Performance Improvement Team.

Sincerely,

Deborah Sugiyama
President
NorthBay Healthcare Group

Donald M. Denmark MD, FAAFP, FCFP
Vice President Medical Affairs,
NorthBay Healthcare Group,

Compassionate care, advanced medicine, close to home.

1200 B. Gale Wilson Blvd.
Fairfield, CA 94533-3587
Ph 707.429.3600

Oak Valley Hospital District
A Division of Oak Valley Hospital District
An Affiliate of Catholic Healthcare West

August 14, 2006

Joseph Parker, Ph.D.
Office of Statewide Health Planning & Development
Healthcare Quality and Analysis Division
818 K Street, Room 200
Sacramento, CA 95814

RE: California Outcomes Report on Community-Acquired Pneumonia, 1999-2001

Dear Mr. Parker,

Oak Valley Hospital District (OVHD) is a 35 acute-bed rural facility located in the San Joaquin Valley. As a rural facility, the number of cases seen is limited. Despite the relative low incidence of patients with a diagnosis of pneumonia, Oak Valley Hospital District is committed to ongoing clinical quality improvement not only for patients with pneumonia, but all patients.

We support the analytic approach undertaken by the Office of Statewide Health Planning and Development with this project. The California Hospital Outcomes Project on Community-Acquired Pneumonia provides a unique opportunity to evaluate our performance in relationship to hospitals across the state. While we applaud the efforts to obtain information of this nature from hospitals, one of the limitations is that this data reflects patient care rendered from 2002-2004.

Over the last several years, OVHD has moved to a focus of continuous quality improvement. Data is now assessed on a continual basis and strategies are implemented and modified continuously to improve processes and outcomes. During the data collection period, Oak Valley Hospital focused on Community-Acquired Pneumonia as one of the core measures reported to the Joint Commission on Hospital Accreditation (JCAHO). Overall, OVHD realized a risk-adjusted observed death slightly higher than expected. Since the time of this study continuous improvement activities have been initiated to decrease the death rate and optimize patient outcomes.

An additional concern with release of this information to the lay public relates to the implication that patient outcomes, such as mortality, are solely due to the interventions initiated by the treating facility, when in fact the patient's own

350 South Oak Avenue • Oakdale, CA 95361• Phone: (209) 848-3011

health maintenance and willingness to comply with the treatment regime is key to long term survival. Despite these few identified concerns, we feel that the information presented to the public from this project will be favorable. Our participation in the California Hospital Outcomes Report on Community-Acquired Pneumonia demonstrates our commitment to the residents of our community to provide optimum care.

Sincerely,

John Friel
Chief Executive Officer

Placentia Linda
Hospital
Tenet HealthSystem

1301 Rose Drive
Placentia, California 92870
Tel 714.993.2000

August 25, 2006

Joseph Parker, Ph.D
Director of Healthcare Outcomes Center
818 K Street, Room 200
Sacramento, CA 95814

Dear Mr. Parker:

RE: California Hospital Outcomes Report On Community-Acquired Pneumonia, 2002 – 2004

Placentia-Linda Hospital received and reviewed the letter, addressing Community Acquired Pneumonia Mortality - Outcome Data, you sent to us on June 23, 2006. Our Hospital Administrative Team and members of our Medical Staff reviewed the risk-adjusted statistics enclosed, and all agreed to offer the Office of Statewide Health Planning and Development some clarification and explanations for our "above State Average Mortality Rate" related to the years 2002 through 2004. When we inquired about time limits for our "comment letter", we were informed by Niya Fong, that we had until August 30, 2006 to respond to your findings. Your original letter states that the deadline for response was August 15, 2006, but Ms. Fong informed me on July 7, 2006, that we had a two (2) week extension due to "system failure".

As I am sure you are aware, Placentia Linda Hospital participates in the JCAHO CORE Measure & other Regulatory Agency Reporting, and Community Acquired Pneumonia is incorporated in those studies. Together with our Medical Staff, we have been steadily developing methodology to ensure that all of our patients receive the highest quality standard possible. Our hospital is poised for continued growth and service to the community and surrounding areas we serve. The population in North Orange County is gradually evolving to increases in Residential Care and Assisted Living Services. Additionally, our neighbor hospital, Brea Community Hospital, recently closed its doors, which increased the elderly population admissions to our hospital.

We noted, that of the three hundred and nineteen (319) Community Acquired Pneumonia Diagnoses, that twelve (12) cases had died at discharge, and seven (7) had died within 30 days of discharge, to total nineteen (19). The average age of these patients was 78 years. The average length of stay was 2.6 days. Of the nineteen cases, twelve were DNR Status on admission. When you consider the population age we are currently serving, we feel that your reference on page 4 (Clinical Risk Factor (s) not included in the Model) has a tremendous bearing on our numbers. **We have attached our Comment Letter to be included in the final report.**

We thank you for your Report and allowing our hospital the opportunity to respond and clarify the above State Average Mortalities we are currently experiencing. Our hospital is striving to decrease our associated mortality numbers, by initiating methodology/protocols and following all the regulatory clinical mandates that will improve outcomes for the population we serve. If you have any questions you may reach me at (714) 524-4801, or speak with Erlene Tarr, our Quality Manager, at (714) 524-4841.

Sincerely,

Kent Clayton

Kent Clayton, Chief Executive Officer

Cc: Paul Weinstein, MD, Quality/Utilization Physician Advisor
Erlene Tarr, MN, RN – Director of Clinical Quality Improvement
Patricia Scott, RN – Director of Nursing

TENET

Placentia Linda
Hospital
Tenet HealthSystem

1301 Rose Drive
Placentia, California 92870
Tel 714.993.2000

Comment Summary Letter of Clarification on Clinical Risk Factors of Population contributing to Community Acquired Pneumonia Mortalities.

August 25, 2006

Placentia Linda Hospital would like to offer a clarification on the Hospital's reported Risk Adjusted Pneumonia 30 - Day Mortality Rates for 2002 through 2004. In North Orange County there has been a significant growth in Residential Care and Assisted Living Services, thus increasing the population of those elderly residents, who are at risk for Community Acquired Pneumonia. Our Hospital is one of three hospitals that serve this area, and we receive many elderly patients in our Emergency Department, with an average age of 78 years.

In order to serve our population with protective quality care, we have initiated and implemented an education program, which provides the public with information and access to Influenza and Pneumococcal Vaccine. Our caring nursing and medical staff have been trained to provide detailed information on Pneumonia Prevention, and to assist our community in obtaining the necessary preventive medicine, to insure Pneumonia Prevention. Going forward, we are confident, that this will decrease the Community Acquired Pneumonia rates for our population.

TENET

PRESBYTERIAN INTERCOMMUNITY HOSPITAL

PRESBYTERIAN HEALTH

12401 Washington Boulevard
Whittier, California 90602-1099
(562) 698-0811
Hearing Impaired TDD (562) 696-9267

August 8, 2006

Joseph Parker, Ph.D.
Director, Healthcare Outcomes Center
Office of Statewide Health Planning and Development
818 K Street, Room 200
Sacramento, CA 95814

Dear Dr. Parker,

Thank you for the opportunity to review and respond to the California Hospital Outcomes Report on Community Acquired Pneumonia (CAP). Presbyterian Intercommunity Hospital is committed to continuously seeking opportunities to further improve and validate the quality of care it provides.

We have carefully reviewed our hospital's results in OSHPD's Report on CAP mortality. We are pleased to see that our mortality rates are better than the state average excluding DNR as a risk factor. We do note however, our opportunity for improvement in the model including DNR as a risk factor. In this light, Presbyterian is participating in the Joint Commission on Accreditation of Healthcare Organization's Core Measure program which identifies Community Acquired Pneumonia guidelines. In doing so, we will be able to continually monitor several process and outcome indicators associated with CAP and benchmark our performance. In collaboration with the medical staff, we have recently revised our CAP order sets. The revisions are based on best practices and will standardize the care and treatment of these patients and ultimately improve outcomes such as 30-day mortality rates.

One final comment regarding the methodology utilized in this study. We recognize that death within 30 days of admission is an important data point: however, we have significant concerns that a death from any cause or location is linked to the initial hospitalization. Some patient deaths occurring after discharge may not relate to the patient's pneumonia or to the quality of care during the patient's hospitalization.

Again, thank you for the opportunity to review and comment on this CAP report. Presbyterian Intercommunity Hospital remains committed to providing high quality healthcare to the communities we serve.

Sincerely,

J.R. Hamilton MD

J. R. Hamilton, MD
Vice President, Medical Affairs

Redlands Community Hospital

350 Terracina Blvd.
P.O. Box 3391
Redlands, CA 92373-0742
909-335-5500
Fax 909-335-6497

August 15, 2006

Joseph Parker, Ph.D., Director, Healthcare Outcomes Center
Office of Statewide Health Planning and Development
818 K Street, Room 200
Sacramento, CA 95814

Dear Mr. Parker,

This is in response to OSHPD's Draft Community Acquired Pneumonia (CAP) report, which we recently received. Thank you for providing us a copy of the data utilized by OSHPD for this study. After careful review of Redlands Community Hospital (RCH) data, please accept our response based on our analysis of the data for CAP patients identified during years 2002-2004.

RCH Data

This second CAP study appears to be constructed very similar to the first CAP study submitted for publication by OSHPD in 2003. The details of how this study was conducted were not provided to hospitals as was for the first OSHPD CAP study. Both CAP studies included only those patients whose admission source was "home". During our review of the 1st CAP study data, our analysis revealed some data abstracting errors as related to the "admission source". At that time we had requested, but were denied, the opportunity to resubmit the data as the error would have excluded half of the patients included in the study. Since the publication of the 1st CAP study, we have since made significant efforts to ensure accurate data abstraction. However, some of the data errors we had discovered in our 2002 data are still present in this 2nd CAP study since the deadlines for data submission had long passed. Thus we feel the results being represented of Redlands Community Hospital are not accurate and should not be published as such.

Since we assume the second CAP study will also be published, we reviewed the OSHPD report and analyzed our 2002-2004 data very closely. We analyzed our patient data, utilized in this study, with the widely accepted APR-DRG methodology for severity and risk adjustment. This method is utilized by hundreds of hospitals nation-wide as well as governmental agencies and commercial healthcare data entities, such as Solucient. APR-DRGs provide scores for both the severity of illness and risk of mortality on a patient level. Each CAP case was reviewed with findings as follows.

- CAP Patients who expired at RCH (2002-2004):
  - 92% had a severity of illness of either major or extreme. This would be the expected severity of illness for any inpatient death.
  - 89% had a risk of mortality of either major or extreme. Again, combine with the above severity of illness scores; this is to be expected for any inpatient death.

- CAP Patients who expired post discharge from RCH (2002-2004):
  - 77% had severity of illness of either major or extreme.
  - 54% had a risk of mortality of either major or extreme.

Post Hospitalization Care

Once determining the severity of illness and risk of mortality experienced by or CAP patient population, our next concern raised the question of the quality of healthcare provided by post discharge care providers. Since the majority of our CAP patients who did not expire in the hospital were discharged to skilled nursing facilities for post discharge care, how well do SNF's provide care to our discharged

patients? Clearly, a hospital cannot control the quality of care provided by SNFs; yet, hospitals could review report cards provided by Medicare and determine if some do provide better care than others and adjust practices accordingly.

Concerns re: Study Design

Another concern was raised regarding the design of this study. In this OSHPD CAP model, any death of a CAP patient is counted against that hospital as long as they expire within 30 days of being admitted to the hospital. The study does not consider what the death was due to. It does not consider whether or not the pneumonia led to the death, rather, only that the patient died. A patient could die of something totally unrelated, yet the death would be counted against the hospital.

Our analysis revealed that the CAP patients who expired either in the hospital or post discharge were generally extremely sick upon admission with multiple comorbidities and often diseases of multiple body systems. The APR-DRG system fully considers all contributing comorbid conditions as opposed to a few select conditions used by the OSHPD risk adjustment model.

If one considers a short stay patient with a length of stay of 3-5 days and is subsequently discharged to a skilled nursing facility, remains there for the next three weeks and subsequently dies, how can it be fair to count the death is against the hospital while never disclosing to the public that the patient(s) have received post discharge care by other healthcare providers? When publishing the results to a healthcare study intended for general public, it is important to disclose all the facts, not mislead the public with a couple of percentage numbers or misrepresent the quality of care provided the hospital.

Recommendation

We support OSHPD's desire to assist the public in making informed healthcare decisions. As all of us in the healthcare industry are aware, identifying and agreeing to definitions of quality and providing the data to measure and compare against these definitions can be difficult. However, utilizing industry recognized severity and risk adjustment methodologies would be one step forward towards standardizing quality of care measurements. We recommend that in the future OSHPD utilize severity and risk adjustment systems that have been developed by physicians and account for all clinical conditions of a patient, not just a few select conditions.

We further recommend OSHPD should not publish this second CAP study knowing that some raw data was erroneous during the first study and subsequently during the second study since hospitals could not resubmit corrected data. Contrary to OSHPD's intent, this report misrepresents hospitals and their medical staffs and does a disservice to the general public. Rather than assisting individuals in making more informed decisions about healthcare, this report is inaccurate, and not in keeping with the level of service and quality the public expects from its government officials.

Sincerely,

James R. Holmes
CEO / President

cc: OSHPD Director; HASC President

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APPENDIX C: ADDITIONAL SOURCES OF INFORMATION

Bay Area Consumers Checkbook 52 Sylvan Way Oakland, CA 94610 (510) 763-7979 www.checkbook.org	Rates the quality and prices of local service firms ranging from auto repair shop to hospitals
California Department of Managed Healthcare 980 9th Street Suite 500 Sacramento, CA 95814 1-888-HMO-2219 www.dmhc.ca.gov	Licenses HMOs that meet specific standards
California Medical Review, Inc. 1 Sansome Street, Suite 600 San Francisco, CA 94101-4448 (415) 677-2000 www.cmri-ca.org	Reviews quality for Medicare programs
California Public Employees Retirement System 400 P Street Sacramento, CA 95814 (916) 326-3000 www.calpers.ca.gov	Publishes a report card on health plans
Office of the Patient Advocate 1-866-HMO-8900 TTY 1-866-499-0858 (1) 980 9th Street, Suite 500 Sacramento, CA 95814 (916) 324-6407 (2) 320 W 4th Street, Suite 880 Los Angeles, CA 90013-2347 (213) 897-0579 www.opa.ca.gov	Independent office in state government charged with informing and educating consumers about their rights and responsibilities as HMO enrollees
Joint Commission on Accreditation of Healthcare Organizations One Renaissance Boulevard Oakbrook Terrace, IL 60181 (630) 792-5862 www.jcaho.org	Accredits hospitals that meet specific standards
National Committee on Quality Assurance 1350 New York Avenue, NW Suite 700 Washington, DC 20005 (202) 628-5788 www.ncqa.org	Accredits health plans that meet specific standards
Pacific Business Group on Health 221 Main Street, Suite 1500 San Francisco, CA 94105 (415) 281-8660 www.pbgh.org	Works to improve the quality of healthcare for its 2.5 million represented employees, dependents, and retirees
U.S. Agency for Healthcare Research & Quality 540 Gaither Rockville, MD 20850 (301) 594-1364 www.ahrq.gov	The federal government's lead agency supporting research to improve quality of healthcare

Internet Links to Further Information about Community-acquired Pneumonia:

www.lungusa.org/diseases/lungpneumoni.html
www.mayoclinic.org
www.cdc.gov/nchs/fastats/pneumonia.html
www.lungusa.org/diseases/pneumonia_factsheet.html