

# Association Between US News & World Report Medical School Ranking and Physician Opioid Prescribing for New Low Back Pain, 2011–2014



Dan P. Ly, M.D., M.P.P.

Interfaculty Initiative in Health Policy, Harvard University, Cambridge, MA, USA.

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## INTRODUCTION

Prior research has found significant physician variation in opioid prescribing.<sup>1</sup> Some research has found that primary care physicians (PCPs) who attended a higher-ranked medical school wrote significantly fewer opioid prescriptions overall than PCPs who attended a lower-ranked school.<sup>2</sup> Whether an association persists between medical school ranking and opioid prescribing when examining a more clinically defined scenario—patients who develop new low back pain—is unknown.

## METHODS

We performed analyses using 2010–2014 claims data for a random 20% sample of Medicare beneficiaries. We included beneficiaries aged 66 and over continuously enrolled in Medicare Parts A, B, and D the year prior, year of, and year subsequent to their episode of new low back pain with no opioid exposure in the prior 365 days. We excluded patients with history of cancer or a hospice claim. The outcome was opioid use in the subsequent 365 days, defined both as a binary variable for ever received and as a continuous variable for the number of morphine equivalents (MEs) received (including zeros for patients who received no opioids). We

converted opioids to MEs using standard conversion tables.<sup>3</sup>

We focused on PCPs, the greatest prescribers of prescription opioids.<sup>2</sup> We defined PCPs as physicians in general practice, family practice, internal medicine, geriatric medicine, and preventive medicine. We obtained medical school attended from the Physician Compare National file.<sup>4</sup> We obtained US News & World Report “Best Medical Schools: Research Rankings” from Schnell and Currie,<sup>2</sup> who averaged a school’s rankings from 2010 to 2017 and re-ranked schools according to this average (1 for highest average ranking, 2 for second highest, etc.); 92 schools were ranked.

We estimated a multivariable regression (linear probability model for opioid receipt; linear for MEs) of each outcome as a function of ranking (entered categorically). We included physician age and experience, along with current zip code fixed effects to compare physicians of different medical school ranking within the same zip code. We controlled for patient age, sex, race/ethnicity, Elixhauser comorbidity score,<sup>5</sup> dual eligibility for Medicaid, and originally being in Medicare for disability; we chose covariates consistent with prior opioid literature.<sup>1</sup> We clustered standard errors at the physician level. We tested for a monotonic trend by re-estimating the regression model using categorical ranking as a continuous variable.<sup>6</sup> We obtained study approval from the National Bureau of Economic Research, where the data are housed.

## RESULTS

The sample included 93,739 patients with new low back pain cared for by 32,102 physicians (Table 1). There was an average of about 1000 patients per ranked medical school. In total, 9.1% of all patients received an opioid and 13.1% of those with two or more visits for new back pain received an opioid.

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Table 1 Sample Patient Characteristics, 2011–2014

	All patients (n = 93,739)	Patients of physicians who went to medical school ranked 1–30 (n = 23,560)	Patients of physicians who went to medical school ranked 31–60 (n = 33,795)	Patients of physicians who went to medical school ranked 61–92 (n = 36,384)
Age (year)	77.3 (77.3–77.4)	77.4 (77.3–77.4)	77.4 (77.3–77.5)	77.2 (77.1–77.3)
Female (%)	68.2 (67.9–68.5)	67.5 (66.9–68.1)	68.3 (67.8–68.8)	68.5 (68.0–69.0)
Minority (%)	13.8 (13.5–14.0)	16.4 (15.9–16.8)	14.3 (14.0–14.7)	11.6 (11.2–11.9)
Elixhauser score	2.97 (2.95–2.98)	2.94 (2.91–2.97)	2.97 (2.95–2.99)	2.99 (2.96–3.01)
Medicare-Medicaid dual eligible (%)	15.6 (15.4–15.8)	17.0 (16.5–17.5)	16.6 (16.2–17.0)	13.8 (13.5–14.2)
Disabled (%)	8.2 (8.0–8.3)	7.5 (7.2–7.9)	8.1 (7.8–8.4)	8.7 (8.4–9.0)
Patients with 1 or more visits for low back pain				
Received opioid (%)	9.1 (8.9–9.3)	8.6 (8.2–9.0)	8.9 (8.6–9.2)	9.7 (9.4–10.0)
Number of morphine equivalents	72.0 (68.6–75.5)	62.3 (56.9–67.6)	71.7 (66.4–77.0)	78.7 (72.2–85.1)
Subset of patients with 2 or more visits for low back pain				
Received opioid (%)	13.1 (12.8–13.4)	12.5 (11.9–13.0)	12.8 (12.3–13.3)	13.8 (13.4–14.3)
Number of morphine equivalents	111 (105–117)	92.9 (84.0–102)	110 (101–120)	122 (111–134)

Author's calculation using data from Medicare from 2010 to 2014. Percentages are scaled out of 100. Medical school ranking refers to the average of a school's US News & World Report "Best Medical Schools: Research Rankings" from 2010 to 2017. This ranking ranges from 1 to 92. Minority refers to not a non-Hispanic white. The Elixhauser Comorbidity software identifies up to 28 non-cancer patient comorbidities, such as hypertension and diabetes, based on diagnosis codes found in administrative data, and the Elixhauser score is the sum of these comorbidities. "Number of morphine equivalents" include zeroes for those who received no opioids. 95% confidence interval in parentheses

The average number of MEs was 72.0 for all patients and 111 for those with two or more visits. We did not find a statistically significant association between medical school ranking and either receipt of opioid or MEs received, either for all patients with new back pain or for those with two or more visits (Table 2); *p* values for trend ranged from 0.50 to 0.83 across the 4 specifications (results not shown). Using a model with ranking entered linearly, we can rule out clinically significant associations; for example, we can rule out an association of a one-unit change in ranking with a greater than 0.01 percentage point change in opioid receipt at the 5% level (results not shown). Our results were substantively unchanged when including a ranking-squared variable, including HRR fixed effects, excluding zeros (when examining MEs), and estimating a Poisson model (when examining MEs).

## DISCUSSION

We did not find an association between the ranking of the medical school attended by PCPs and their opioid-prescribing patterns for new low back pain among a national sample of Medicare patients. Medical school ranking may not be a useful proxy for identifying higher opioid-prescribing physicians. Results are limited to low back pain in the elderly Medicare population and may not generalize to younger populations. Another limitation is our data had few physician characteristics that we could control for. Differences from prior literature may be due to our focus on a more clinically defined scenario, use of an outcome that is defined per patient, inclusion of zip code fixed effects, adjustment for patient covariates, or focus on an older patient population.

**Table 2 The Association Between Medical School Ranking and Receipt of Opioids for New Low Back Pain, 2011–2014**

	Patients with 1 or more visits for low back pain (n = 93,739)			Subset of patients with 2 or more visits for low back pain (n = 49,022)		
	Ever received (%)	p value	Number of morphine equivalents	Ever received (%)	p value	Number of morphine equivalents
<b>Physician characteristics</b>						
<b>Medical school ranking</b>						
11–20	– 0.3 (– 1.4 to 0.8)	0.63	– 12 (– 28 to 3.7)	0.2 (– 1.6 to 2.0)	0.82	– 12 (– 39 to 15)
21–30	– 0.8 (– 1.9 to 0.2)	0.12	– 0.03 (– 18 to 18)	– 1.1 (– 2.8 to 0.7)	0.22	– 2.5 (– 32 to 27)
31–40	– 0.3 (– 1.4 to 0.7)	0.53	– 3.6 (– 19 to 12)	– 0.6 (– 2.3 to 1.2)	0.52	– 4.2 (– 34 to 26)
41–50	– 0.6 (– 1.7 to 0.4)	0.23	1.8 (– 17 to 14)	– 1.0 (– 2.8 to 0.7)	0.23	– 5.5 (– 37 to 26)
51–60	– 0.2 (– 1.3 to 0.8)	0.68	– 1.9 (– 17 to 14)	– 0.8 (– 2.5 to 0.9)	0.37	– 3.9 (– 32 to 24)
61–70	– 0.7 (– 1.8 to 0.3)	0.17	7.5 (– 12 to 27)	– 1.1 (– 2.8 to 0.7)	0.23	16 (– 22 to 53)
71–80	– 0.6 (– 1.6 to 0.5)	0.30	– 8.1 (– 26 to 9.7)	– 0.9 (– 2.6 to 0.9)	0.33	– 13 (– 42 to 17)
81–92	0.3 (– 0.9 to 1.4)	0.62	– 3.8 (– 23 to 15)	– 0.2 (– 2.0 to 1.7)	0.87	– 2.3 (– 38 to 34)
Female	– 0.7 (– 1.2 to – 0.2)	0.005	– 6.1 (– 15 to 3.2)	– 1.1 (– 1.9 to – 0.2)	0.01	– 14 (– 30 to 2.9)
<b>Experience</b>						
<b>11–20 years</b>						
11–20 years	– 0.2 (– 0.8 to 0.5)	0.64	– 15 (– 33 to 1.9)	0.4 (– 0.7 to 1.5)	0.46	– 11 (– 45 to 22)
21–30 years	– 0.4 (– 1.1 to 0.3)	0.28	– 9.9 (– 26 to 6.1)	0.1 (– 1.0 to 1.2)	0.87	– 1.3 (– 30 to 27)
31–40 years	– 0.06 (– 0.8 to 0.7)	0.87	– 10 (– 27 to 6.7)	0.4 (– 0.9 to 1.7)	0.56	– 1.9 (– 33 to 29)
41+ years	– 1.0 (– 2.4 to 0.5)	0.19	– 31 (– 54 to – 7.7)	– 0.2 (– 2.6 to 2.1)	0.83	– 29 (– 73 to 14)
<b>Patient characteristics</b>						
<b>Age</b>						
Age	– 0.007 (– 0.04 to 0.02)	0.63	– 0.03 (– 0.59 to 0.53)	0.006 (– 0.04 to 0.05)	0.81	0.20 (– 0.79 to 1.2)
<b>Female</b>						
Female	– 0.1 (– 0.5 to 0.3)	0.63	– 4.5 (– 12 to 2.9)	– 0.4 (– 1.1 to 0.3)	0.23	– 6.3 (– 19 to 6.7)
<b>Minority</b>						
Minority	– 1.0 (– 1.7 to – 0.3)	0.005	– 14 (– 27 to – 1.7)	– 1.0 (– 2.2 to 0.1)	0.09	– 14 (– 36 to 8.3)
<b>Elixhauser score</b>						
Elixhauser score	1.0 (0.9 to 1.1)	<	12 (10 to 14)	1.1 (0.9 to 1.3)	<	16 (12 to 19)
<b>Medicare-Medicaid dual eligible (%)</b>						
Medicare-Medicaid dual eligible (%)	0.1 (– 0.6 to 0.8)	0.001	15 (0.02 to 31)	0.5 (– 0.7 to 1.6)	0.001	26 (– 3.5 to 55)
<b>Disabled (%)</b>						
Disabled (%)	2.1 (1.3 to 2.9)	< 0.001	36 (15 to 57)	1.4 (0.1 to 2.7)	0.03	43 (8.5 to 78)

*Author’s calculation using data from Medicare from 2010 to 2014. Percentages are scaled out of 100. “Number of morphine equivalents” include zeroes for those who received no opioids. Medical school ranking refers to the average of a school’s US News & World Report “Best Medical Schools: Research Rankings” from 2010 to 2017. This ranking ranges from 1 to 92. Minority refers to not a non-Hispanic white. The Elixhauser Comorbidity software identifies up to 28 non-cancer patient comorbidities, such as hypertension and diabetes, based on diagnosis codes found in administrative data, and the Elixhauser score is the sum of these comorbidities. Multivariable linear regressions were performed for each outcome, controlling for the variables listed above (year and zip code are also controlled for, but their coefficients are not reported). For medical school ranking, physicians who attended medical schools ranked 1–10 are the comparison group. For physician experience, physicians with 10 or fewer years of experience are the comparison group. 95% confidence interval in parentheses*

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**Corresponding Author:** Dan P. Ly, M.D., M.P.P.; Interfaculty Initiative in Health Policy Harvard University, Cambridge, MA, USA (e-mail: danly@g.harvard.edu).

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**Data Availability** Dr. Nathalie Moise had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Compliance with Ethical Standards:**

We obtained study approval from the National Bureau of Economic Research, where the data are housed.

**Conflict of Interest:** The author declares that he does not have a conflict of interest.

**Disclaimer:** No funding source played a role in the design and conduct of the study; collection, management, analysis, and interpretation of

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