Appendix A. Calculating tapering rates.

Rapid tapering was identified using an approach determined by Fenton *et al.* (2019) (1), which calculates a rate of tapering based on the mean starting and ending dosages at two time points, and the corresponding duration of taper. We defined the baseline dosage, D_b, as the mean daily dosage during the final 30-day window of the baseline period (month 3). We calculated the overall monthly taper rate, $V_{overall}$, between this baseline dosage and either the first 30-day window during the follow-up period with zero MME daily dosage, or the final 30-day window (month 12) during the follow-up period, defined as D_f. A small daily dosage of two MME was added to both D_f and D_b to avoid an undefined logarithm for patients who were tapered to zero MME at the end of the follow-up period. This taper occurred over either the time between the end of the baseline period (i.e., month 3) and first 30-day observation period with zero MME, or an effective duration of T=9 months (to the end of the follow-up period), respectively.

$$V_{overall} = 100 * (1 - e^{\frac{\log\left(\frac{D_f+2}{D_b+2}\right)}{T}})\%$$

Appendix B. Payment types in the LRx database.

Primary payer was determined based on the most frequent payer type across all prescriptions for a patient during the 12-month study period. Payment types captured in the LRx database were combined into six payer categories: private/commercial, self-pay, Medicaid, Medicare, assistance, and unknown. Private/commercial included prescriptions paid for by several forms of employer-sponsored health insurance, plans purchased through health insurance exchanges, and those administered by pharmacy benefit managers. Self-pay indicates a prescription was paid for entirely with cash. Medicaid includes prescriptions paid by Medicaid managed care or fee-for-service Medicaid. Medicare includes prescriptions paid by Medicare Part D. Assistance indicates prescriptions paid for using a discount card (including non-Medicare senior discount cards), a coupon, or a voucher. The unknown category was comprised of prescriptions that were missing payer information or had a payer type of "unspecified third party" or "unknown" in the data (7.7% of the study population). For a small number of patients, we could not determine a primary source of payment due to multiple, equally common payer types across all prescriptions and payer type was not reported for these patients (1.2% of the study population).

Appendix C. Characteristics of individuals in population compared to analytic sample, by mean daily baseline dosage category.

	Mean Daily Baseline Dosage, N (%)							
	<50 MME		50-89 MME		90-149 MME		≥150 MME	
Characteristic	Population (n=194,942; 70.1%*)	Sample (n=10,000)	Population (n=40,774; 14.7%*)	Sample (n=10,000)	Population (n=22,276; 8.0%*)	Sample (n=10,000)	Population (n=19,975; 7.2%*)	Sample (n=10,000)
Sex								
Male	82,304 (42.2%)	4,226 (42.3%)	18,494 (45.4%)	4,510 (45.1%)	10,538 (47.3%)	4,728 (47.3%)	10,206 (51.1%)	5,041 (50.4%)
Female	111,969 (57.4%)	5,743 (57.4%)	22,140 (54.3%)	5,461 (54.6%)	11,646 (52.3%)	5,230 (52.3%)	9,672 (48.4%)	4,910 (49.1%)
Age Group								
18-35	15,241 (7.8%)	765 (7.6%)	3,039 (7.5%)	762 (7.6%)	1,714 (7.7%)	770 (7.7%)	1,457 (7.3%)	709 (7.1%)
36-65	120,058 (61.6%)	6,199 (62.0%)	28,442 (69.8%)	6,910 (69.1%)	16,083 (72.2%)	7,218 (72.2%)	14,773 (74.0%)	7,446 (74.5%)
66+	59,643 (30.6%)	3,036 (30.4%)	9,293 (22.8%)	2,328 (23.3%)	4,479 (20.1%)	2,012 (20.1%)	3,745 (18.7%)	1,845 (18.4%)

MME = oral morphine milligram equivalent.

*Percentages reported as a proportion of the total study cohort (n = 277,967).

Appendix D. Results of sensitivity analysis on number of clusters identified across ten random samples, by mean daily baseline dosage category.

	Mean Baseline Daily Dosage			
	<50 MME	**50-89 MME**	**90-149 MME**	**≥150 MME**
Silhouette width, mean (proportion of samples with highest avg. Silhouette width)				
No. of clusters, n				
n = 2	0.504 (90%)	0.527 (100%)	0.506 (90%)	0.433 (50%)
n = 3	0.402 (10%)	0.412 (0%)	0.426 (10%)	0.382 (20%)
n = 4	0.348 (0%)	0.376 (0%)	0.376 (0%)	0.376 (0%)
n = 5	0.346 (0%)	0.337 (0%)	0.326 (0%)	0.364 (20%)
n = 6	0.315 (0%)	0.278 (0%)	0.305 (0%)	0.322 (10%)

MME = oral morphine milligram equivalent.

REFERENCES

1. Fenton JJ, Agnoli AL, Xing G, Hang L, Altan AE, Tancredi DJ, et al. Trends and Rapidity of Dose Tapering Among Patients Prescribed Long-term Opioid Therapy, 2008-2017. JAMA Network Open. 2019;2(11):e1916271.