

Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to: Kim HS, Hall KE, Monte AA, et al. Marijuana tourism and emergency department visits in Colorado. *N Engl J Med* 2016;374:797-8. DOI: 10.1056/NEJMc1515009

Supplemental Appendix

Marijuana Tourism and Emergency Department Visits in Colorado

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We collected clinical and demographic data on ED visits presenting to University of Colorado Hospital (UCH) ED with ICD-9 codes for cannabis use from 2012 to 2014, capturing progression from the medical marijuana through the retail marijuana period. UCH is a quaternary care referral center for adult patients in close proximity to a major children's hospital, therefore few children are evaluated at UCH. See Table 1 for a summary of clinical and demographic information.

The crude relative risk (RR) of ED visits with cannabis related ICD-9 codes in out-of-state (OS) residents compared to Colorado (CO) residents was 1.06 (95% CI 0.88, 1.28). We found no confounding due to year of visit (RR 1.07 by Mantel Haenszel adjustment). However, we did find effect modification by year of visit. When stratified by year, the relative risks were 0.65 (95% CI 0.40, 1.05) in 2012, 0.80 (95% CI 0.56, 1.15) in 2013, and 1.50 (95% CI 1.18, 1.90) in 2014. This suggests lower risk in OS residents during the medical marijuana period, when availability to the drug was low amongst this group, followed by a sharp rise in the RR when availability of recreational marijuana increased. This is further demonstrated by the rate ratio of 1.98 between 2013 and 2014 at UCH.

Different slopes of ED visit rates between OS and CO residents (Figures 1A and 1B) suggest different use and behavior patterns between tourists and CO residents. It is unclear why the urban hospital data demonstrate a flattening rate while the statewide data demonstrate a continued modest rise, though not as sharp as OS rates. Urban areas have been at the forefront of use patterns across the state, likely due to wider availability of the marijuana products. We will continue to follow these rate changes and plan further stratification of these data as part of a larger effort to advise and implement public health educational efforts in the future.

Table 1: Clinical and demographic characteristics of ED visits with cannabis use related ICD-9 codes from 2012 to 2014 (University of Colorado Hospital)

	Total n=2,603	Colorado Residents n=2,469	Out-of-State Residents n=118
Age, Median (IQR)	34 (25-47)	34 (25-47)	35.5 (27-47)
% between 18-21 years	12%	13%	9%
Sex			
Female	35%	35%	27%
Male	65%	65%	73%
Race			
Black	38%	40%	13%
White	46%	44%	80%
Other	16%	16%	7%
Reason for Visit^a			
Cardiopulmonary	16%	16%	22%
Gastrointestinal	27%	27%	15%
Psychiatric	26%	25%	37%
Altered Mental Status ^b	6%	6%	6%
# of Total Drug Diagnoses, Mean (SD)^c	1.28 (0.54)	1.28 (0.55)	1.30 (0.56)
Disposition			
Admit	56%	56%	43%
Discharge	44%	44%	57%
Length of Stay in Minutes, Median (IQR)	349 (208-670)	349 (209-675)	304.5 (180-638)

^aEach ED visit may have up to 5 reasons for visit (mean = 1.33).

^bAltered Mental Status visits were a subset of psychiatric evaluation visits and this group includes the following reasons for visit: aggressive behavior, agitation, altered mental status, delusional, hallucinations, manic behavior, and paranoid. It does not include anxiety or panic attack.

^cAmong ICD-9 codes for use of: cocaine, cannabis, amphetamines, and opioids including heroin.

Table 2A: ED visits to the University of Colorado Hospital with drug use related ICD-9 codes among out-of-state residents from 2012 to 2014

	2012 n=44	2013 n=77	2014 n=132
Rate of ED Visits / 10,000 ED Visits (95% CI)			
Cannabis	54 (29-80)	85 (55-115)	168 (129-206)
Cocaine	35 (14-56)	43 (21-64)	57 (34-79)
Amphetamines	35 (14-56)	35 (14-56)	57 (34-79)
Opioid including heroin	58 (31-84)	60 (34-85)	76 (50-102)

Table 2B. Statewide ED visits with drug use related ICD-9 codes among out-of-state residents in Colorado from 2011 to 2014 (Colorado Hospital Association)

	2011 n=477	2012 n=523	2013 n=815	2014 n=1,360
# ED Visits / 10,000 ED Visits (95% CI)				
Cannabis	75 (68-81)	78 (71-85)	112 (104-12)	163 (154-171)
Cocaine	81 (74-88)	63 (57-69)	42 (37-47)	43 (39-48)
Amphetamines	52 (46-57)	62 (56-68)	80 (73-86)	94 (88-101)
Opioids including heroin	79 (72-86)	78 (71-85)	65 (59-71)	76 (70-81)

Figure 2A: ED visits to the University of Colorado Hospital with drug use related ICD-9 codes among out-of-state residents from 2012 to 2014

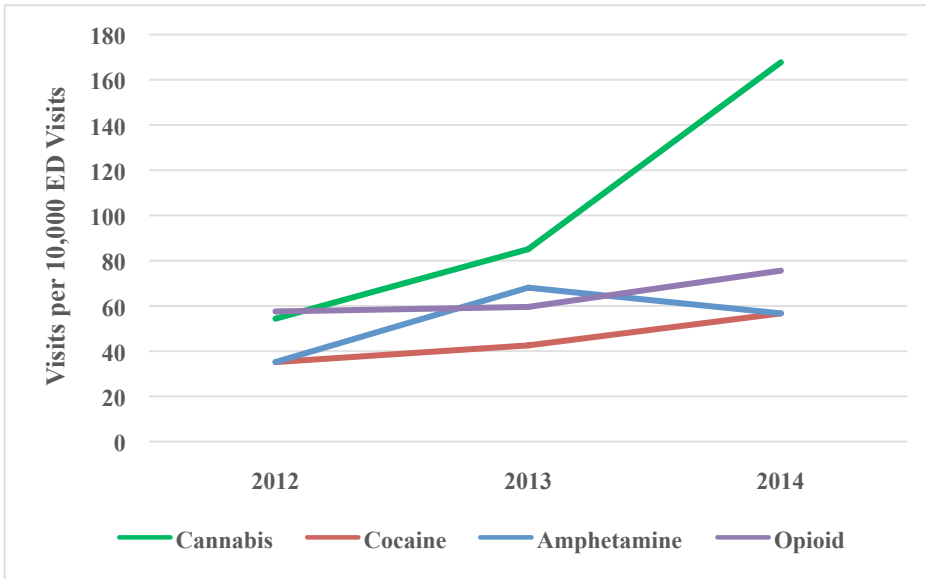


Figure 2B: Statewide ED visits with drug use related ICD-9 codes among out-of-state residents in Colorado from 2011 to 2014 (Colorado Hospital Association)

