Impact of Unit Dose Packaging on Unintentional Pediatric Buprenorphine Exposures

GS Wang[1,2], G Bau[1], SG Severtson[1], JL Green[1], RC Dart[1]

[1]Rocky Mountain Poison & Drug Center - Denver Health, Denver, CO

[2]Department of Pediatrics, Medical Toxicology, University of Colorado Anschutz Medical Campus, Children's Hospital Colorado, Aurora, CO

Introduction

- The prescription opioid epidemic has impacted millions in the United States.
- In pediatrics, accidental, small dose exposures in young children have the potential to result in death.
- Unit dose packaging (UDP) is a method intended to prevent unintentional pediatric exposures where each unit dose is individually packaged.
- We evaluated the impact of UDP on unintentional general buprenorphine pediatric exposures.

Methods

- Data involving children under 6 years from the Researched Abuse, Diversion, and Addiction Related Surveillance (RADARS®) System Poison Center Program between July 2014 and September 2015 were analyzed.
- Buprenorphine products with UDP included Suboxone® Sublingual Film, Zubsolv® Sublingual Tablet , and Bunavail® Buccal Film (launched in 2010Q3, 2013Q3, and 2014Q4, respectively).
- Using Poisson regression, average unintentional general pediatric buprenorphine exposures rates of the following drug groups were compared:
  - −Buprenorphine products with UDP
  - −Combination buprenorphine tablets without UDP
  - −Single entity buprenorphine tablets without UDP
- Two denominators were considered:
  - −Number of prescriptions dispensed
  - −Number of dosing units dispensed

Results

- The average rate of buprenorphine products with UDP was 0.26 (95% CI: 0.24 - 0.29) per 10,000 prescriptions dispensed. (Table 1)
- This was significantly less (p<0.0001) than the average rate of combination buprenorphine tablets without UDP (1.11, 95% CI: 0.96 - 1.29) and the average rate of single entity buprenorphine tablets without UDP (0.84, 95% CI: 0.69 – 1.03). (Table 1)
- Similar results were found for rates per dosing units dispensed. (Table 2)

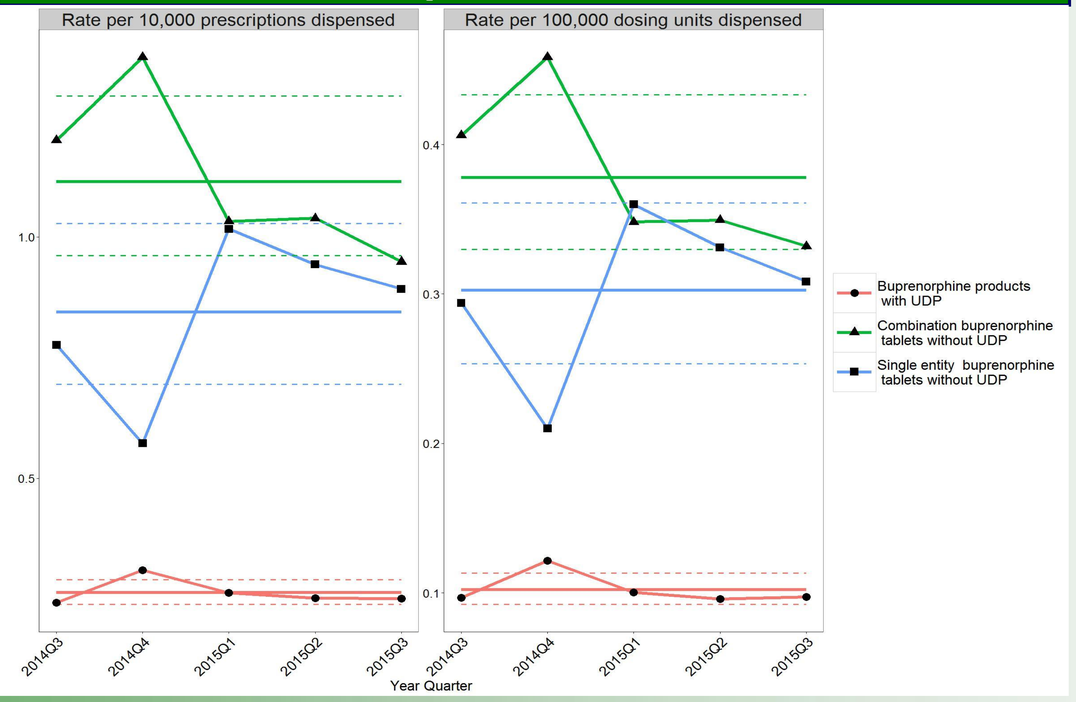
Table 1. Rate per 10,000 Prescriptions Dispensed

Drug group	Average Rate (95% CI)	Rate Ratio (95% CI)	P-value
Buprenorphine products with UDP	0.26 (0.24, 0.29)	Reference	Reference
Combination buprenorphine tablets without UDP	1.11 (0.96, 1.29)	4.23 (3.54, 5.05)	<0.0001
Single entity buprenorphine tablets without UDP	0.84 (0.69, 1.03)	3.20 (2.57, 3.99)	<0.0001

Table 2. Rate per 100,000 Dosing Units Dispensed

Drug group	Average Rate (95% CI)	Rate Ratio (95% CI)	P-value
Buprenorphine products with UDP	0.10 (0.09, 0.11)	Reference	Reference
Combination buprenorphine tablets without UDP	0.38 (0.33, 0.43)	3.70 (3.12, 4.39)	<0.0001
Single entity buprenorphine tablets without UDP	0.30 (0.25, 0.36)	2.96 (2.41, 3.63)	<0.0001

Figure 1. Prescription and Dosing Units Dispensed Rates



Conclusions

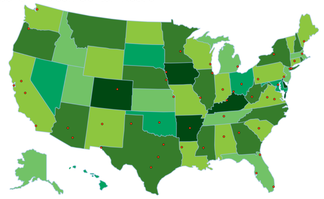
- The average unintentional general pediatric exposure drug utilization rates were significantly lower for buprenorphine products with UDP than for combination buprenorphine tablets without UDP rates and single entity buprenorphine tablets without UDP rates per prescription dispensed and dosing units dispensed.
- Unit dose packaging may decrease morbidity and mortality from pediatric buprenorphine exposures.

Limitations

- These data rely on spontaneous calls made to participating poison centers, which may not be representative of the US population.

RADARS System Poison Centers

Arizona Poison and Drug Information Center: Boesen KJ, Shirazi FM.
Arkansas Poison and Drug Information Center: Foster H.
Banner Poison and Drug Information Center: Stevens D. Klemens J.
Blue Ridge Poison Center: Holstege CP, Vakkalanka PV.
California Poison Control System: Lewis J, Strong D, Huntington S.
Central Ohio Poison Center: Spiller HA, Huffman RM, Casavant MJ.
Central Texas Poison Center: Baker SD.
Children's Hospital of Michigan: Price P.
Cincinnati Drug and Poison Information Center: Yin S, Pierce B.
Connecticut Poison Control Center: McKay C, Sangalli B.
Florida Poison Information Center – Jacksonville: Schauben JL, Sollee D.
Florida Poison Information Center – Miami: Bernstein J, Weisman RS.
Florida Poison Information Center – Tampa: Aleguas A, Cullen T.
Georgia Poison Center: Jones A, Geller RJ, Lopez G, Hon S.
Illinois Poison Center: Kubic A, DesLauries C.
Indiana Poison Center: Mowry JB.
Iowa Poison Control Center: Bottei E, Kalin L, Ringling S, Zellmer K.
Kentucky Regional Poison Center: Runge H.
Louisiana Poison Center: Ryan M.
Maryland Poison Center: Goodrich L.
Massachusetts/Rhode Island Poison Center: Burns M, Sheroff A.
Minnesota Poison Control System: Anderson D, Lintner C.
Mississippi Poison Control Center: Cox R, Parker C.
Missouri Regional Poison Center: Weber J, Enders S, Odom C.
Nebraska Regional Poison Center: Jacobitz K, Rasmussen M.
New Jersey Poison Information and Education System: Ruck B, Marcus S, Rego R.
New Mexico Poison and Drug Information Center: Smolinske S.
New York City Poison Control Center: Hoffman, R, Mercurio-Zappala, M.
North Texas Poison Center: Abron D, Uzoegwu L, Gardner M, Tae B.
Northern New England Poison Center: Simone KE, Bubar J.
Oklahoma Poison Control Center: McGoodwin L, Schaeffer S
Oregon Poison Center: McKeown N., Giffin S
Palmetto Poison Center: Michels J.
Pittsburgh Poison Center: Mrvos, R, Kurta D.
Regional Poison Control Center of Alabama: Kirkland S, Whitworth B, Slattery A, Liebelt E.
Rocky Mountain Poison & Drug Center: Dart RC.
South Texas Poison Center: Cobb DB, Villarreal CL, Varney SM.
Tennessee Poison Center: Kumar S, Seger D.
Texas Panhandle Poison Center: Jaramillo J, Rivers R.
The Poison Control Center at The Children's Hospital of Philadelphia: Trella J, Gunter P.
The University of Kansas Hospital Poison Control Center: Thornton S, Oller L.
Upstate New York Poison Center: Cantor R, Stork C, Caliva M.
Virginia Poison Center: Rose SR.
Washington Poison Center: Hastings N, Sullivan S, Von Derau K.
West Texas Regional Poison Center: Baeza S, Anzures J, Torres O.
West Virginia Poison Center: Scharman EJ, Cook JR.
Wisconsin Poison Center: Kostic M.



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