Statewide Trends in Out-of-Hospital Cardiac Arrest Related to Drug Overdose

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SAMUEL BEGER DISCLOSURES

• None
CO-AUTHORS & RELEVANT DISCLOSURES

• Gabriella Smith, MD Candidate - No Disclosures
• Vatsal Chikani, MPH - No Disclosures
• Daniel W. Spaite, MD - No Disclosures
• Samuel M. Keim, MD - No Disclosures
• Robyn McDannold - No Disclosures
• Margaret Mullins - No Disclosures
• Bentley J. Bobrow, MD - No Disclosures
INSTITUTIONAL REVIEW BOARD APPROVAL

• OHCA has been designated a major public health problem in Arizona.

• Permission to publish the de-identified patient data was obtained from the ADHS HSRB and The University of Arizona IRB.
Drug overdose deaths in America

*The numbers for 2016 are preliminary estimates

**Some deaths on this chart may overlap if they involve multiple drugs

<table>
<thead>
<tr>
<th>2016</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All drugs</td>
<td>64,026</td>
</tr>
<tr>
<td>Fentanyl and other synthetic opioids (minus methadone)</td>
<td>19,547</td>
</tr>
<tr>
<td>Heroin</td>
<td>15,564</td>
</tr>
<tr>
<td>Opioid painkillers (natural and semisynthetic)</td>
<td>14,550</td>
</tr>
</tbody>
</table>

1. CDC 2017

![Graph showing the increase in drug overdose deaths from 1989 to 2015]
BACKGROUND: OVERDOSE AND OHCA

- High geographic variation in OD-OHCA proportion and incidence, varying up to 5-fold\textsuperscript{1,2,3}.

- May be related to differing methodologies (Naloxone administration, hospital determination vs EMS determination, etc.)

- Demographic studies see younger median age, increased survival rates of OD-OHCA victims and lower bystander CPR rates.\textsuperscript{1,2,3}

- There is a paucity of literature after 2013, (As opioid problem has increased).

STUDY AIM

• Assess the latest trends in incidence, process of care, and outcomes of OD-OHCAs compared to presumed cardiac etiology arrests (C-OHCAs) in the state of Arizona.
METHODS

Data Source:
Statewide observational study utilizing a mature Utstein-style database Save Hearts in Arizona Registry & Education (AZ SHARE).

Study Population:
Adults (18 +) - Five Years: January 1\textsuperscript{st} 2010 - December 31\textsuperscript{st} 2015.
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OD-OHCA vs C-OHCA Cohorts:
Detailed review of EMS first care reports linked with hospital records/outcomes, and vital statistics data.
OD-OHCA Cohort: Mentioning of OD or likely drug involvement in arrest in EMS or Hospital chart.
C-OHCA Cohort: Aggregate of non-traumatic/respiratory presumed cardiac etiologies
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Outcome: OD-OHCA incidence and survival to hospital discharge.
Demographics included age, gender, location of arrest and bystander CPR.
Outcomes included survival, initial shockable rhythm.
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Analysis:
Incidence, outcomes and demographic differences between OD-OHCA and C-OHCA cohorts
STATISTICAL METHODS

• Multivariate logistic regression was carried out to compare survival between the two groups.
• Difference in bystander CPR and survival between the OD-OHCA and C-OHCA were compared using the Chi-square test.
• All of the tests were two-tailed and a p-value of <0.05 was considered statistically significant.
• All statistical analyses were performed using the SAS software package, version 9.4 (SAS Institute, Inc., Cary, USA).
RESULTS: ENROLLMENT

SHARE Registry 2010-2015

21,658 Cardiac arrests

18,988 Cardiac arrests with overdose or cardiac etiology

987 Overdose cases (5.19%)

18,001 Cardiac etiology (94.81%)

2,670 (12.3%) Cardiac arrests with no-overdose and non-cardiac etiology
(Included trauma, respiratory etiology, hanging, lightning etc.)
## RESULTS

<table>
<thead>
<tr>
<th>Incident year</th>
<th>Overdose</th>
<th>Cardiac etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>% (95% CI)</td>
</tr>
<tr>
<td>Overall</td>
<td>987</td>
<td>5.1%</td>
</tr>
<tr>
<td>2010</td>
<td>121</td>
<td>4.6% (3.8-5.4)</td>
</tr>
<tr>
<td>2011</td>
<td>131</td>
<td>4.4% (3.7-5.2)</td>
</tr>
<tr>
<td>2012</td>
<td>126</td>
<td>4.1% (3.5-4.9)</td>
</tr>
<tr>
<td>2013</td>
<td>154</td>
<td>4.6% (3.9-5.3)</td>
</tr>
<tr>
<td>2014</td>
<td>212</td>
<td>6.3% (5.5-7.1)</td>
</tr>
<tr>
<td>2015</td>
<td>243</td>
<td>6.4% (5.7-7.3)</td>
</tr>
</tbody>
</table>
## RESULTS: DEMOGRAPHICS

<table>
<thead>
<tr>
<th></th>
<th>Overdose (n=987)</th>
<th>Cardiac etiology (n=18,001)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean, SD)</td>
<td>38.8 yrs (14.6)</td>
<td>64.2 (18.4)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Gender - Male</td>
<td>63.65 (628)</td>
<td>64.6% (11,630)</td>
<td>0.5157</td>
</tr>
<tr>
<td>Shockable rhythm</td>
<td>7.0% (69)</td>
<td>22.6% (4,065)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Location - residential</td>
<td>65.3% (644)</td>
<td>53.9% (9,707)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Bystander CPR Performed</td>
<td>49.4% (369)</td>
<td>48.32% (6,800)</td>
<td>0.5231</td>
</tr>
<tr>
<td>Missing data</td>
<td>24.3% (240)</td>
<td>21.6% (3,893)</td>
<td></td>
</tr>
<tr>
<td>Survived</td>
<td>18.6% (181)</td>
<td>11.9% (2,097)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Missing data</td>
<td>1.6% (16)</td>
<td>2.3% (410)</td>
<td></td>
</tr>
</tbody>
</table>
## RESULTS: BYSTANDER CPR

<table>
<thead>
<tr>
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<th>Overdose</th>
<th>Cardiac etiology</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simple OR</td>
<td>Adjusted OR</td>
</tr>
<tr>
<td>Survival</td>
<td>Simple OR</td>
<td>Adjusted OR</td>
</tr>
<tr>
<td>Bystander CPR performed</td>
<td>1.6 (1.1-2.3)</td>
<td>1.6 (1.0-2.4)</td>
</tr>
<tr>
<td></td>
<td>1.3 (1.2-1.4)</td>
<td>1.2 (1.0-1.3)</td>
</tr>
</tbody>
</table>

**Adjusted for witnessed arrest, shockable rhythm, gender, age, response time**
DISCUSSION

• First statewide study that we are aware of analyzing OD-OHCAs in U.S.

• We found that OD-OHCA victims were younger and more likely to survive than C-OHCA.

• In contrast to previous studies, we found that BCPR rates were nearly identical.

• BCPR appeared to have a significant impact on survival in both groups.
LIMITATIONS

• Missing data was present, MI to minimize risk of bias.

• Do not know for sure exact cause of death.

• The structure of the AZ-SHARE prevents identification of exact drug implicated in the OD.

• Because of local variability, these findings may be different in other regions.
CONCLUSIONS

• This statewide study found a significant increase in the proportion of OD-OHCAs over time as well as differences in population demographics and epidemiology.

• Bystander CPR was associated with survival for both OD-OHCA and C-OHCA.

• Tracking local OD-OHCAs may provide opportunities for prevention strategies and guide resuscitation efforts.
We are grateful for the Arizona EMS system for their dedication and excellence.