

Time-space characteristics of EMS attendance and layperson naloxone administration during non-fatal opioid overdoses in Rhode Island: a retrospective, event-level analysis

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All frontline responders (peers, family members, emergency medical personnel) in Rhode Island working tirelessly to end the overdose crisis

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Rationale for Study

Opioid-involved deaths in the U.S. are skyrocketing, driven primarily by an opaque illicit drug supply

Despite public awareness and access to naloxone, fatal opioid overdose deaths continue to increase

Time-space variations in overdose occurrences complicate community-based overdose response

Micro-temporalities (e.g., hour-by-hour variations) in overdose burdens may exist but remain understudied

Study Objectives

AIM 1

Quantify high-dimensional **time-and-space correlates** of EMS response to non-fatal opioid overdoses over a three-year period.

AIM 2

Characterize spatio-temporal attributes of **layperson naloxone administration** at EMS-attended non-fatal opioid overdoses in Rhode Island.

Data Sources and Measures

Rhode Island Emergency Medical Services Information System (RI-EMSIS) ImageTrend

- Electronic reports compiled by the Rhode Island Department of Health (RIDOH)
- EMS runs meeting case definition from Jan 1, 2020, to Dec 31, 2022

Data attributes

- Individual (age, natal sex)
- Event (municipality, physical location, date, time)
- Naloxone administration (EMS, police, layperson)

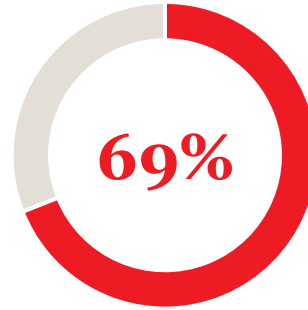
Overdose case dimensions:

- (1) EMS primary/secondary impression
- (2) “Unresponsive” in EMS narrative
- (3) Naloxone administration
- (4) Overdose-related symptomology

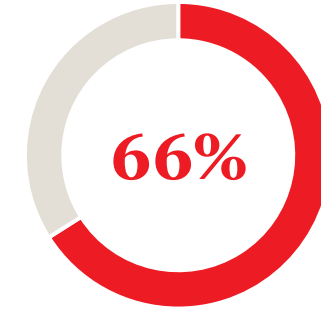
EMS responded to **5,377 non-fatal opioid overdoses** in Rhode Island from 2020 to 2022



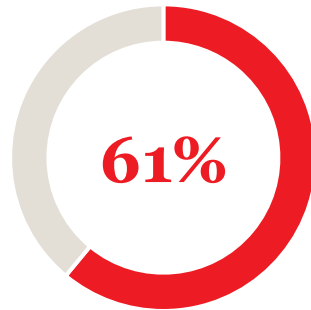
**Persons
<55 years**



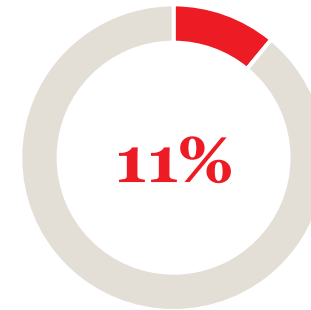
Males



**Afternoon &
evening hours**

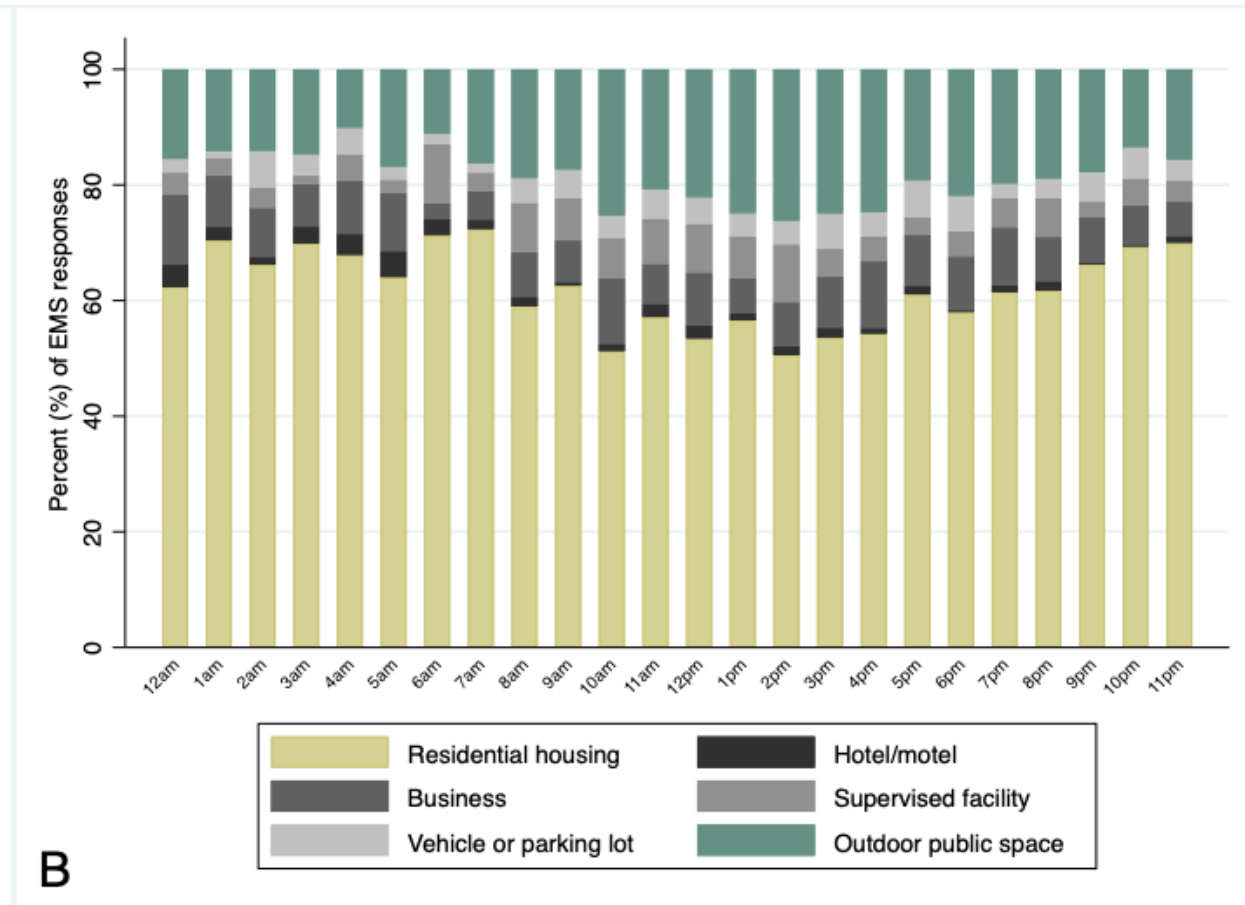
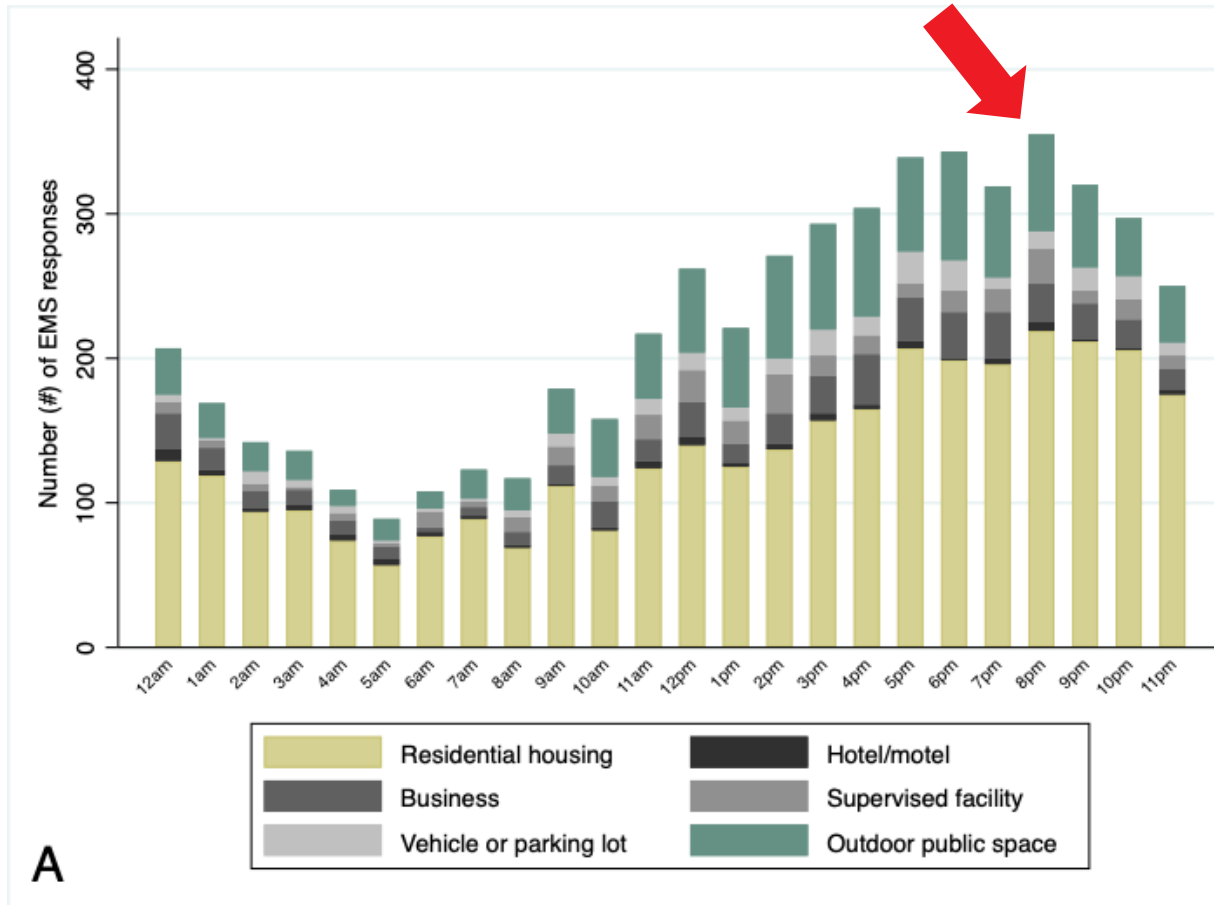


**Residential
housing**



**Layperson naloxone
administration**

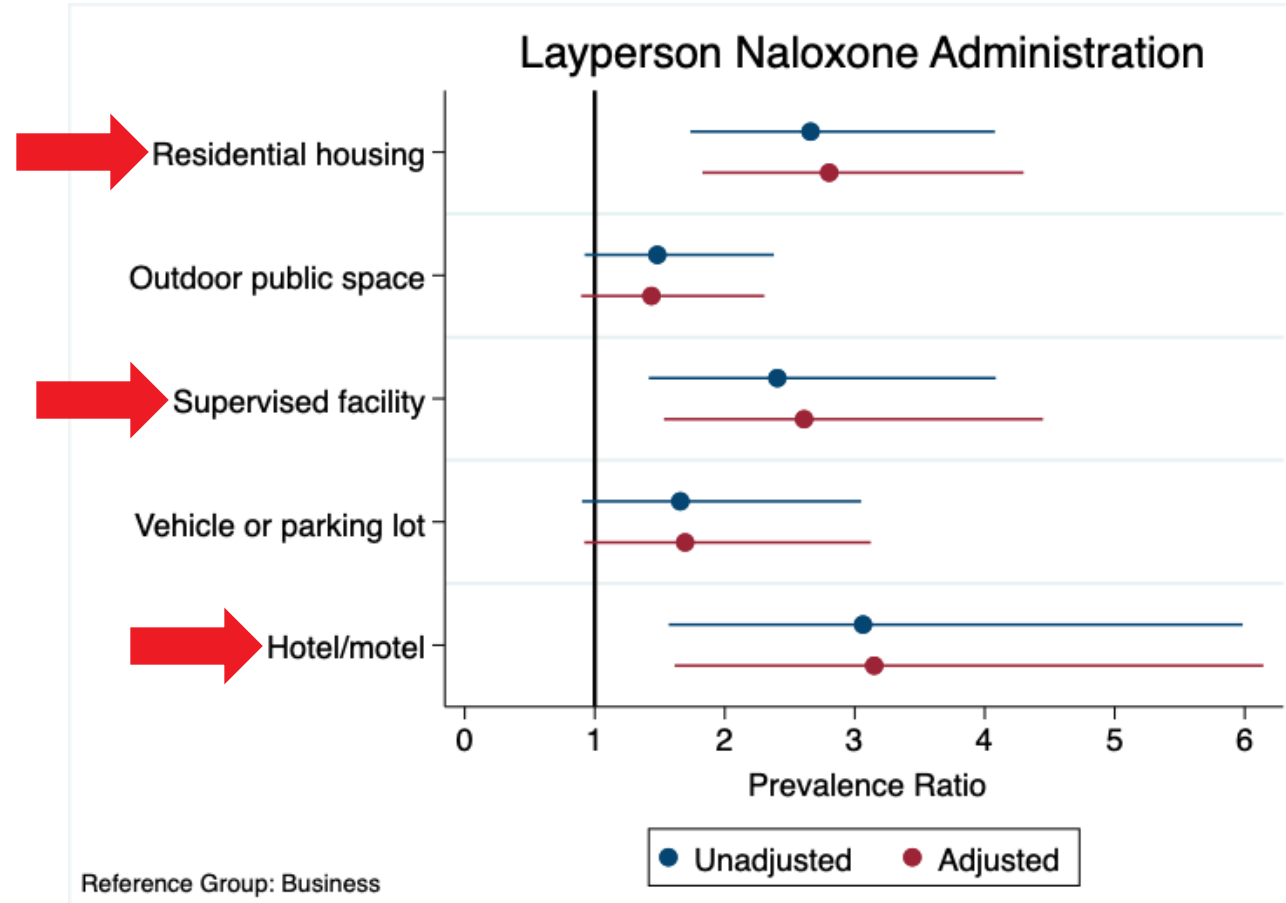
Hour-by-hour variations in physical locations of EMS callouts to non-fatal opioid overdoses



Statistically significant ($p < 0.05$) correlates of opioid overdoses in residential housing and public outdoor spaces

Covariates	Residential Housing		Public Outdoor Spaces	
	adjPR (95% CI)	p-value	adjPR (95% CI)	p-value
Age group				
18-34 years	1.00	Ref.	1.78 (1.49-2.12)	<0.001
35-54 years	1.06 (1.01-1.11)	0.028	1.65 (1.38-1.96)	<0.001
55+ years	1.21 (1.14-1.28)	<0.001	1.00	Ref.
Sex				
Male	1.00	Ref.	1.41 (1.24-1.60)	<0.001
Female	1.14 (1.09-1.19)	<0.001	1.00	Ref.
Season				
Spring (Mar-May)	1.10 (1.03-1.17)	0.003	1.22 (1.03-1.46)	0.025
Summer (Jun-Aug)	1.03 (0.97-1.10)	0.331	1.53 (1.29-1.80)	<0.001
Autumn (Sep-Nov)	1.00	Ref.	1.48 (1.25-1.76)	<0.001
Winter (Dec-Feb)	1.15 (1.08-1.22)	<0.001	1.00	Ref.
Time of day				
Early morning (5:00AM-8:59AM)	1.25 (1.14-1.36)	<0.001	1.19 (0.88-1.60)	0.256
Late morning (9:00AM-12:59PM)	1.03 (0.95-1.12)	0.431	1.65 (1.30-2.11)	<0.001
Early afternoon (1:00PM-4:59PM)	1.00	Ref.	1.91 (1.51-2.40)	<0.001
Early evening (5:00PM-8:59PM)	1.14 (1.06-1.22)	<0.001	1.47 (1.17-1.86)	<0.001
Late evening (9:00PM-12:59AM)	1.27 (1.19-1.36)	<0.001	1.14 (0.89-1.47)	0.294
Overnight (1:00AM-4:59AM)	1.29 (1.19-1.40)	<0.001	1.00	Ref.

Geographic correlates (crude and adjusted) of layperson naloxone administration among EMS-attended non-fatal opioid overdoses



Limitations



Case definitions for overdose were abstracted from unstructured EMS narratives (subject to underreporting)



Limited transportability of data and findings to overdose that are unwitnessed or unobserved by EMS



Inability to discern granularities in specific geographies (e.g., private homes and supportive housing programs)

Conclusions and Implications

Most non-fatal opioid overdoses occurred in private residences and during afternoon/evening hours

Layperson naloxone administration was rare but more likely to occur in indoor, housing settings

Increased naloxone possession and self-efficacy in places outside homes (e.g., businesses) is warranted