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## “You can see those concentric rings going out”: Emergency personnel’s experiences treating overdose and perspectives on policy-level responses to the opioid crisis in New Hampshire



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## ABSTRACT

**Background:** In parallel to a substantial increase in opioid overdose deaths in New Hampshire (NH), emergency personnel experienced an increase in opioid-related encounters. To inform public health responses to this crisis, insights into the experiences and perspectives of those emergency personnel who treat opioid-related overdoses are warranted.

**Aims:** Systematically examine emergency personnel’s experiences treating opioid overdoses and obtain their perspectives on policy-level responses to the opioid crisis in NH.

**Methods:** Semi-structured qualitative interviews were conducted with 18 first responders [firefighters (n = 6), police officers (n = 6), emergency medical service providers (n = 6)] and 18 emergency department personnel employed in six NH counties. Interviews focused on emergency personnel’s perspectives on fentanyl/heroin formulations, experiences treating overdoses, harm reduction strategies, and experiences with treatment referral. Interviews were audio recorded, transcribed verbatim, and analyzed using content analysis.

**Results:** Emergency personnel cited the potency and inconsistency of fentanyl-laced heroin as primary drivers of opioid overdose. Increases in overdose-related encounters took a substantial emotional toll on emergency personnel, who described a range of responses including feelings of burnout, exhaustion, and helplessness. While some emergency personnel felt conflicted about the implementation of harm reduction strategies like syringe services programs, others emphasized the necessity of these services. Emergency personnel expressed frustration with barriers to treatment referral in the state and recommended immediate treatment access after overdose events.

**Conclusions:** Findings suggest that interventions addressing trauma and burnout are necessary to support emergency personnel, while expanded harm reduction and treatment access are critical to support those who experience opioid overdose in NH.

## 1. Introduction

In 2016, drug overdose deaths in the United States (US) surpassed the number of deaths from motor vehicle accidents (Dowell et al., 2017; Hedegaard et al., 2017), and 66% of those deaths involved opioids (Hedegaard et al., 2017; Seth et al., 2018b). While overdose deaths in

the US from natural and semi-synthetic opioids rose by an estimated 26% since 2009, deaths involving synthetic, non-methadone opioids, including illicitly manufactured fentanyl (IMF), increased by over 600% (Seth et al., 2018a). In the US, the state of New Hampshire (NH) was classified as one of eight high-burden states by the Centers for Disease Control and Prevention based on significant increases in synthetic

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opioid deaths (Gladden et al., 2016).

From 1999 to 2016, rates of opioid overdose deaths in NH surged from 3.1 to 35.8 per 100,000 persons (National Institute on Drug Abuse (NIDA, 2018)), more than three times the national rate (Centers for Disease Control and Prevention (Centers for Disease Control and Prevention (CDC, 2016)). In consequence, NH emergency medical services (EMS) experienced a three-fold increase in rates of naloxone administrations since 2012 (New Hampshire Information and Analysis Center, 2018). NH emergency departments (EDs) correspondingly experienced a 70% increase in opioid-related encounters since 2011 (Daly et al., 2017), driven by climbing rates of heroin and fentanyl-laced heroin (FLH)-related overdose hospitalizations (Daly et al., 2017; Unick and Ciccarone, 2017).

In 2016, the Comprehensive Addiction and Recovery Act supported the expansion of naloxone access among laypersons, EMS, and law enforcement agencies nationally (114th United States Congress, 2016). The NH House Bill 271 was passed in June 2015, expanding naloxone access within the state (New Hampshire State Legislature, 2015) and revising scope-of-practice protocols to allow basic emergency medical technicians (EMTs) and licensed police officers to administer intranasal naloxone (New Hampshire Department of Safety, 2018; New Hampshire EMS Medical Control Board and New Hampshire Bureau of EMS, 2016). NH emergency personnel were also faced with rapidly shifting patterns of opioid use and overdose due to the influx of IMF into the northeast region of the US (Springer et al., 2019). Between 2012 and 2015, rates of multiple naloxone administrations increased nationally by 25.8% (Faul et al., 2017). While data suggest that heroin overdoses typically occur 20–30 minutes after an individual's last use (Darke and Dufflou, 2016), IMF's potency can cause life-threatening respiratory depression within several minutes (Green and Gilbert, 2016), as well as chest wall rigidity (Burns et al., 2016), which may demand more advanced resuscitation skills (Fairbairn et al., 2017). Given these unique properties of IMF and challenges to studying the administration of naloxone in pre-hospital settings (Chou et al., 2017), an FDA advisory panel and some first responders have expressed uncertainty regarding the optimal minimum naloxone dose and route of administration to manage synthetic opioid overdose in pre-hospital settings (Chou et al., 2017; Fiore, 2016; Weaver et al., 2018). Concerns among emergency personnel about occupational exposure to IMF can also complicate overdose response and treatment (Howard and Hornsby-Myers, 2018; Moss et al., 2017). Despite these challenges, emergency personnel remain the first professionals to interact with individuals after an opioid overdose (Faul et al., 2017; Garza and Dyer, 2016) and may have the opportunity to provide support and treatment linkage to patients in addition to overdose reversal.

Epidemiologic approaches to minimize drug-related harms, including overdose, can either focus on environmental and contextual approaches targeting 'risk environments' or use individualistic approaches targeting individual behavior (Rhodes, 2002, 2009). According to Rhodes' risk environment framework, drug-related harms occur within social or physical spaces where different types of environments (physical, social, economic, and policy) interact within the macro- or micro-environment (Rhodes, 2002, 2009). An understanding of what makes an environment susceptible is paramount to implementing effective interventions (Rhodes, 2002). Consequently, a combined exploration of the lived experiences of emergency personnel with a consideration of the risk environment may provide insight on strategies to mitigate overdose-related harms by increasing understanding of how physical, social, and policy-related factors interact after overdose events to produce drug-related harm. This study therefore examined NH emergency personnel's experiences responding to overdose, including the process of treating overdoses, personnel's knowledge about IMF, and the personal and professional impact of responding. In addition, this study aimed to systematically explore emergency personnel's perspectives on policy-level responses to the opioid crisis in NH.

## 2. Materials and methods

Semi-structured, 60-minute interviews with emergency personnel were conducted between November 2016 and January 2017. These included a twelve-item demographic and professional history survey developed for this study. Interview questions were open-ended. The interview guide focused on experiences with overdoses, fentanyl formulation, perspectives on harm reduction and prevention strategies, and experiences with the treatment system. The interview guide was developed to address knowledge gaps recognized during formative research with NH stakeholders, including treatment providers, emergency personnel, state authorities, and policymakers (National Drug Early Warning System (National Drug Early Warning System (NDEWS, 2016)).

### 2.1. Participants and setting

Using Craigslist advertisements, flyers, and word-of-mouth, this study purposively recruited 36 emergency personnel to obtain a sample with equal representation from each professional category and each county. The final sample included 18 first responders [firefighters (n = 6), police officers (n = 6), EMS (n = 6)] and 18 clinical ED personnel [physicians (n = 9), nurses (n = 5), ED medical directors/physicians (n = 2), paramedics (n = 1), physician assistants (n = 1)]. ED personnel were employed at nine hospitals, comprised of short-term acute care facilities (n = 6), critical access hospitals (n = 2), and an academic medical center (n = 1). Seven of the nine were not-for-profit organizations. The number of staffed beds across the hospitals ranged from 25 to 395. Several participants were cross-certified (e.g., all firefighters were also EMS certified), and some were employed by both the ED and EMS. Participants were at least 18 years of age and currently employed in one of the following NH counties: Hillsborough, Cheshire, Grafton, Rockingham, Strafford, or Sullivan. Hillsborough County was targeted because it had the highest rate of overdose death in 2016, while Cheshire, Grafton, Rockingham, Strafford and Sullivan counties were included to provide representation across the state. In 2016, rates of EMS naloxone administration across these counties ranged from 7.45 (Grafton) to 35.61 per 10,000 residents (Strafford), while rates of opioid-related ED visits ranged from 17.48 (Cheshire) to 76.39 per 10,000 residents (Strafford) (New Hampshire Information and Analysis Center, 2017). To recruit a geographically diverse sample with equal representation across counties, we recruited one firefighter, EMS member and police officer, along with three ED personnel, from each county.

### 2.2. Procedures

Emergency personnel contacted the study research team by telephone or email. Research staff screened prospective participants and, depending on the participant's preference, conducted interviews in-person or by telephone. Each participant was assigned a study identification number, and no identifying information was collected. Interviews were audio recorded and identified only by participant number. Participants were given a study information sheet and provided verbal consent before the interview and received a \$50 gift card upon interview completion. The study was approved by the Trustees of Dartmouth College Committee for the Protection of Human Subjects.

### 2.3. Analysis

Interviews were transcribed verbatim and analyzed by the research team using a content analytic approach. An initial code list was derived inductively based on the domains of interest identified in the interview guide. Five research team members collectively coded two transcripts using the initial code list, assigning codes to sections of text using ATLAS.ti (Scientific Software Development GmbH, 2013), a qualitative

**Table 1**  
Participant demographics.

Demographics	Police (n = 6)	Fire (n = 6)	EMS (n = 6)	Emergency Department (n = 18)
Age years <i>m(sd)</i>	41.8 (7.0)	42.2 (11.2)	44.8 (10.8)	42.0 (10.1)
<b>Gender</b>				
Male	5 (83.3%)	6 (100%)	6 (100%)	12 (66.7%)
Female	1 (16.7%)	0 (0%)	0 (0%)	6 (33.3%)
<b>Race n(%)</b>				
Black/African American	0 (0%)	0 (0%)	0 (0%)	1 (5.6%)
White	6 (100%)	6 (100%)	6 (100%)	16 (88.9%)
Multiracial	0 (0%)	0 (0%)	0 (0%)	1 (5.6%)
<b>Ethnicity n(%)</b>				
Hispanic or Latino	0 (0%)	0 (0%)	0 (0%)	2 (11.1%)
Not Hispanic or Latino	5 (100%)	6 (100%)	6 (100%)	16 (88.9%)
Years employed <i>m(sd)</i>	17.2 (7.3)	18.4 (10.9)	18.3 (9.1)	7.9 (5.6)
How many overdoses have you responded to (estimated)? <i>Median (range)</i>	62 (24-1000)	58 (40-100)	88 (36-1000)	100 (4-450)
How many times have you administered naloxone? <i>m(sd)</i>	0 (0)	33 (17)	157 (235)	30 (37)
Average naloxone dose per patient <i>m(sd)</i>	N/A	1.9 (1.2)	1.6 (0.5)	1.7 (0.6)

EMS = emergency medical services; m = mean; n = sample size; sd = standard deviation.

analytic program. Team members then independently coded the remaining transcripts. During this process, the initial code list was iteratively revised, and new codes were derived deductively. The team met weekly to resolve discrepancies and refine the code list as needed. After all interviews were coded, pairs of research team members conducted subtheme analyses for each code, and the full team met weekly to review findings and establish consensus. Descriptive statistics from the demographic and professional experience survey were calculated using Stata, Version 14 (StataCorp, 2015).

### 3. Results

Participants ranged in age from 22 to 57 years and were predominately non-Hispanic, white males (Table 1). While first responders [firefighters, EMS, police officers] had been employed for an average of 18.0 (SD = 8.7) years, the ED personnel had been employed for an average of 7.9 (SD = 5.6) years. Fifteen ED personnel were employed at not-for-profit hospitals. Three worked at an academic medical center, three at critical access hospitals, and the remaining twelve at acute care facilities. Across all stakeholder groups, the majority of participants had extensive experience responding to opioid overdoses and estimated treating an average of 156 (SD = 228) overdoses throughout their career. All participants but the police officers also had administered naloxone.

The results are organized under two domains, with themes described below (Table 2): (1) experiences treating opioid overdose, including overdoses from fentanyl, and personal and professional impact; and (2) perspectives on policy-level responses, including naloxone, harm reduction, prevention, and treatment.

#### 3.1. Experiences treating opioid overdose

After a medical call is placed to the NH 9-1-1 system, participants explained that EMS and the fire department are immediately dispatched, followed by the police department. “We use a medical priority dispatch system. [Overdoses] tend to come in as very high, Echo-level calls, which deploy both fire and EMS resources” [Fire]. One police officer mentioned that the police department may arrive before EMS and the fire department at night, in which case the police department would commence cardiopulmonary resuscitation (CPR) until EMS/fire arrives. Upon arriving at a potential overdose, emergency personnel used cues within the physical scene to determine whether an opioid overdose occurred by examining the patient’s presentation and looking for drug paraphernalia. Emergency personnel specifically examined the patient’s presentation, looking for respiratory depression, skin color changes, and pupillary constriction. “Good assessment is going to not

100% tell you what you’re dealing with, but if you’ve got the pinpoint pupils, you’ve got the respiratory issue, you’re running down that road. Then if there is drugs, needles, paraphernalia, track marks, stuff like that, then you’re putting the whole picture together and most likely that’s what it is” [Fire]. Identifying paraphernalia was also critical to the safety of emergency personnel. “You’ve got to be careful so you don’t end up sticking yourself with a needle, getting in contact with... whatever that drug is that they had taken” [Fire]. If physical cues did not signal to emergency personnel that an overdose occurred, they sometimes used naloxone as a diagnostic tool:

“Sometimes we’ll get patients in... they don’t present initially as a narcotics overdose. And so you kind of work through your algorithms and say, ‘Okay, so if they’re not this and they’re not this, then maybe they’re this’. We had a patient come in recently who we couldn’t quite figure out what was going on with her because she didn’t really have a history of opiate overdose or anything like that. We pushed [naloxone] and she kind of just woke right up.” [EMS]

Determining whether a patient overdosed on an opioid was viewed as essential, but the type of opioid was perceived as less important since participants explained that naloxone administration is the protocol for all opioid overdoses. After stabilizing and reviving the patient, emergency personnel offered transport to the ED, though many reported patients being agitated, confused, and refusing to accept transport:

“Under the current law, as long as [the patient] is awake and talking, regardless of the event, they have the legal right to refuse... That’s a challenge because that misses the opportunity to get these people where they need to be.” [Fire]

Overdose patients typically arrive at the ED after either being transported by ambulance or being dropped off by a bystander, according to emergency personnel. Regardless of the mode of access, most ED staff explained that patients generally refuse to remain in the ED for observation, often due to precipitated withdrawal caused by naloxone. “Their greatest fear is withdrawal, and that’s what scares them about coming into an ER or being observed for prolonged periods... Although we see it as non-life-threatening, for them it’s the worst thing” [ED]. All participating ED providers reported that the ED in their hospital did not prescribe buprenorphine to patients. Instead, ED staff explained that discharge protocols often included the distribution of naloxone kits to patients and family members, as well as a list of possible resources. Many responders thought that a growing number of NH EDs also offered patients access to a recovery coach. Aside from handing patients a resource list, responders explained that a referral system “doesn’t exist. There’s a packet of ‘here is the location, here’s the phone number, make the phone call yourself, and good luck’” [ED], leaving no process to systematically link patients with treatment services following an overdose.

**Table 2**  
Themes and subthemes.

Themes and Subthemes	Illustrative Quote	Theme present (X = yes):			
		EMS (n = 6)	Fire (n = 6)	Police (n = 6)	ED (n = 18)
<b>EXPERIENCES TREATING OVERDOSE: WORKFLOW</b>					
Arrive at scene	"The biggest thing is that our fire and ambulance get the call first on the medical emergency if you go through 911, then we [police] get to call last. Unless it's 3AM, usually they're there first or we get there simultaneously." [Police]	X	X	X	
Determine whether overdose occurred	"If we have someone unconscious, you look at the scene. Again, you are somewhat of a detective... While you're trying to protect yourself, you're looking for signs of what caused this person to go unresponsive." [Fire]	X	X	X	
Assess patient presentation	"Almost every patient presents the same. Unresponsive, some cyanosis, they're blue in the face, they're not breathing at all." [Fire]	X	X		
Check for paraphernalia	"They'll [responders] see if there is any paraphernalia on scene, sometimes they've been found with needles still stuck in their arms. That's kind of a dead giveaway." [EMS]	X	X	X	
Use naloxone as diagnostic tool	"[Naloxone] can be a drug of exclusion. You have somebody down, they're unconscious, you're not really sure... You say, 'Is there any trauma? No. What's their blood sugar level? Oh, their blood sugar's fine.' Now you start thinking overdose. Naloxone." [EMS]	X	X		
Ensure patient and responder safety at scene	"We search Susie and it's more for their [the patient's] safety because if they come to, we don't want them grabbing anything. It's a safety issue not only for Susie, but for the paramedics working on her." [Police]	X	X	X	
Stabilize patient and administer naloxone	"In New Hampshire, we have statewide EMS protocols that dictate how we treat all patients... The priority is to first off, oxygenate, ventilate that person. Then the next thing is to make them start breathing on their own again and give them the [naloxone]." [EMS]	X	X	X	
Offer patient transport to ED	"Anytime we wake someone up after an overdose, our preference is to transport them to the hospital for further evaluation." [ED]	X	X	X	X
Patient resists transport	"Then when we wake them up, they're going to want to get out of there. They're not going to want to go to the hospital."	X	X	X	X
Arrival in ED	"Most of the time they're either brought in by ambulance or we get a lot of, sometimes we call them drive-bys, when a car will come up to the front and one of the passengers will be basically close to death in the car and we pull them out." [ED]				X
Patients wants to leave ED	"A lot of times they just leave against medical advice. They're in there. They get something to eat. They start feeling a little better, get some comfort meds, and they're out the door. Sometimes they don't even wait for that because they don't want to get sick." [Fire]	X	X	X	X
ED discharge protocol					
Distribute naloxone kits	"Everyone who comes in with an overdose gets a prescription for naloxone when they leave." [ED]	X	X		X
Offer recovery coach	"We have recovery coaches on-call now that are volunteers and they're available 24 hours a day." [ED]	X			X
List of resources/ information sheet	"I don't know if I get people into treatment as much as I give them phone numbers and the places they can call to try and get in on their own." [ED]	X	X		X
No referral protocol post-overdose	"No [there's no referral protocol], but we really need one... This is one of the things I think that we as EMS do really badly and the state, in fact, does really badly, is ensure some kind of follow-up care." [Fire]	X	X	X	X
<b>ILLEGITIMATELY MANUFACTURED FENTANYL (IMF) AND OVERDOSE</b>					
IMF major driver of increased rate of overdose	"It's changed, because you talk about it generically as heroin but it's all fentanyl. That's what's killing people. Heroin isn't killing people. If it was only heroin, we wouldn't have probably an eighth of the problem we have now." [Fire]	X	X	X	X
IMF potency	"I don't think people that have just been using heroin understand the true effects of what the fentanyl can do. They're trying to get that high off the amount that they normally take and if they try to take that same amount and it's mixed with fentanyl it's just too much." [EMS]	X	X	X	X
IMF batch inconsistency	"They get a lot more fentanyl and they try to mix that heroin in to try to give a good product or what they considered good. They're [people who use opioids] no chemist. They don't know what they're doing." [Police]	X	X	X	X
Lack of knowledge about IMF trafficking or formulation	"Other than what I hear about on the news, that it's being cut with heroin, I don't really know much about it." [ED]	X	X		X
Overdose on medical fentanyl "rare"	"Some people do get fentanyl patches and buy fentanyl patches illegally... That's very rare." [PD]	X	X	X	X
<b>PERSONAL AND PROFESSIONAL IMPACT</b>					
High confidence in treating overdose	"We're very well-trained. I think it's very smooth for us." [PD]	X	X	X	X
Emotional toll of responding to overdoses		X	X	X	X
Burnout	"I think we all get a little burned out from it." [ED]	X	X	X	X
Fatigue and exhaustion	"You get four, five overdoses on a shift and you're kind of a little more tired. They do take quite a bit of effort out of you." [EMS]	X	X	X	X
Helplessness and powerlessness	"You feel very helpless... That's definitely more challenging, not knowing what the right thing to say is, not being able to do anything, to give them [patients] any source of comfort." [ED]	X	X	X	X
Heightened worry and fear about own family or self	"My kids aren't safe anymore. It sounds a little corny I guess, but I fear that they are going to meet someone their age that's using, or willing to try to use, and that they'll use for the first time." [EMS]	X	X	X	X

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Table 2 (continued)

Themes and Subthemes	Illustrative Quote	Theme present (X = yes):			
		EMS (n = 6)	Fire (n = 6)	Police (n = 6)	ED (n = 18)
<i>Intrusive recollections</i>	“Sometimes you can’t forget. You can’t unsee what you see every day.” [Fire]	X	X	X	X
<i>Recognition of compassion fatigue or posttraumatic stress symptoms</i>	“There has been some compassion fatigue because of that. Only so many times that the providers can handle or people can take. They do the best they can with what they have. When it’s their fifth or sixth patient that’s coming for the same problem, you get tired after it.” [Fire]	X	X		X
<i>Cumulative nature of emotional impact</i>	“It just gets tough. It’s getting tougher and tougher because it grinds you down.” [EMS]	X	X	X	X
<i>Witnessing trauma of family members impactful</i>	“And then having to watch a family come in of this 21 year-old boy... Just watching his family have to come in and identify the body... That was probably the worst night that I’d ever had having to deal with overdoses.” [ED]	X	X	X	X
<i>Challenges coping when children present at overdose</i>	“I went to an overdose in a hotel room... A young mother was there. The kid was in the crib, in one of those playpen things, and he’s in the bathroom and he had shot up. Needle’s still in his arm. We’re doing CPR on the guy, and we look up, and there’s the kid. Yeah, that was tough, That’s still there...” [Fire]	X	X	X	X
<i>Necessity of coping mechanisms</i>	“It’s just everyone has their limits. I teach EMT classes and stuff like that. I basically will come up with two cups of water, and I’ll say every call you go on, you’re adding water to the cup. You don’t want that cup to overflow.” [EMS]	X	X		
<i>Humor</i>	“You’ll see a lot of humor involved in this, our calls and that. It’s just a mechanism of dealing with what you see. If you took everything to heart, you wouldn’t last very long.” [EMS]	X	X		
<i>Counseling</i>	“I’ve gone through my employee assistance program a couple times, just to seek counseling... just to speak to somebody, vent to somebody.” [EMS]	X	X		
<i>Informal conversations with colleagues, friends or family</i>	“There are absolutely times where a month or two down the road you’re like, ‘Man, that really affected me,’ but you also have to be able to speak about that and talk about that ‘cause otherwise, it will eat you up inside.” [EMS]	X	X		
<i>Minimizing time in the field</i>	“I am now in administration. I have left the street because of more or less constant calls and that kind of stuff... I know of other paramedics who have left the streets because of the epidemic.” [Fire]		X		
<b>PERSPECTIVES ON NALOXONE</b>					
<i>Naloxone increasingly available</i>	“[Naloxone] is available now, where it wasn’t before.” [EMS]	X	X	X	X
<i>Agreement naloxone should be available to all responders</i>	“In the medical setting, [naloxone] is an essential drug. I like it in the hands of all first responders, including police and fire and EMS.” [ED]	X	X	X	X
<i>Attitudes toward naloxone distribution to laypersons</i>					
<i>Support</i>	“I think having it available to as many people as possible is great.” [EMS]	X	X	X	X
<i>Opposition or conflicted feelings</i>	“I think giving it to family members or individuals, I think that is wrong. I think it gives them false hope. As long as they have it in their pocket, they can try to use more than they normally would use.” [Fire]	X	X	X	X
<b>HARM REDUCTION AND PREVENTION STRATEGIES</b>					
<i>Harm reduction programs necessary</i>	“I think something that’s not really talked about is really more like, have prevention type things for people that are actively using, that we don’t give up on that subset of people that’s still using, and that we take steps to make it safer for them to use the drug. Things like, and again, I’m a big city girl, things like syringe exchanges, things like clean needle programs.” [ED]	X	X	X	X
<i>Opportunity to save lives Pragmatism</i>	“I think if we’re going to have the opportunity to save lives, why not?” [Fire] “I’d like to see it [opioid use] not be around, but it’s not a reality, so it is going to be around, so things like that [syringe services programs (SSPs)] are a good idea.” [ED]	X	X	X	X
<i>Reduce drug-related harm</i>	“I think needle exchange programs are just fine. Obviously, the potential complications, or consequences of infection disease transmission through the sharing of dirty needles is a big problem. I think ignoring that is short sighted.” [ED]	X	X	X	X
<i>Conflicted attitude towards harm reduction strategies</i>	“Personally, I struggle with those types of programs.” [ED]	X	X	X	X
<i>Perpetuating the problem</i>	“I just feel like it’s a double-edged sword, like we’re giving people a real safety net. You don’t want people using dirty needles and contracting anything, but you also are making it easier for people to use.” [ED]	X		X	X
<i>Moral obligation to follow laws</i>	“There’s parts of what we’re doing that we’re enabling the use of illegal substances or substances that are being misused illegally. That’s not following the rules and I guess I’m a rule follower. I have a hard time with that.” [ED]		X	X	X
<b>Recommendations for strengthening prevention</b>					
<i>Expand pre-high school education</i>	“I’d start at grade school. I’d start as soon as they can understand the spoken word and they can read, and I think they should be learning about drugs. Whether it’s your six, seven-year-old, your first, second graders.” [EMS]	X	X	X	X
<i>Prudent opioid prescribing</i>	“We need to be aggressive in controlling pain and we also need to carefully screen who gets these medicines, with the assumption being that we’re going to withhold them from some people.” [ED]	X			X
<i>Implement patient education on pain and risks of opioids</i>	“I think we need prevention programs that are all about education and getting the word out there and getting people to understand that pain is a normal part of life and a normal part of healing.” [ED]	X			X

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Table 2 (continued)

Themes and Subthemes	Illustrative Quote	Theme present (X = yes):			
		EMS (n = 6)	Fire (n = 6)	Police (n = 6)	ED (n = 18)
<b>TREATMENT</b>					
<b>Frustration with barriers to treatment referral</b>	“I’m very disappointed and frustrated. The lack of quick intervention when a person has their ‘Come to Jesus moment’ about ‘Time for me to quit, this is no fun anymore’. I put them in a limbo until they can actually meet the appropriate professionals. It’s a high-risk limbo, people die on these waiting lists, waiting to get help.” [ED]		X		X
<b>Patient-level barriers</b>					
<b>Patient motivation for treatment post-overdose</b>	“I find people are not necessarily receptive to treatment when they present to the ED.” [ED]	X		X	X
<b>System-level barriers</b>					
<b>Lack of available services and resources</b>	“I think it’s just a limited resource, is the biggest issue. There are only so many beds, and when they’re full, they’re full.” [ED]	X			X
<b>Limited staff capacity in ED</b>	“Who has the capacity [for referral]? We sit with people who are sick, broken bones, having trouble breathing... Now somebody who’s not urgently needing care, are we going to sit there for an hour?” [ED]				X
<b>Lack of knowledge about available and appropriate services</b>	“Information, honestly, until about a month ago, was nonexistent... There was no information readily available and handed to us that said, ‘Hey, when you come across people, point them in this direction. Give them this phone number. Give them this whatever it may be.’” [EMS]	X	X		X
<b>Funding</b>					
<b>Suggestions to improve treatment linkage</b>	“Unfortunately, the state doesn’t have the money. That’s a big part of it.” [Police]		X		X
<b>Expand treatment capacity</b>	“You’re not going to arrest your way out of this. You have to start offering services as well.” [Police]	X	X	X	X
<b>Improve accessibility and immediacy</b>	“I think there’s the treatment piece of it, which is really all about access, but not just Monday-through-Friday, 9-to-5 access. It doesn’t work that way.” [ED]	X		X	X
<b>Address co-occurring psychiatric disorders</b>	“I think that filling in the gaps in the mental health side of things can be somewhat helpful for dealing with substance abuse as well. Increasing the support for those services is probably a large role of it.” [ED]	X	X	X	X
<b>Increase treatment funding</b>	“State funding is going to have to be part of the treatment option... Even if they’re not directly supporting, then they need to give tax breaks or some kind of support...” [EMS]	X	X	X	X
<b>Improve coordination of services</b>	“It has to be easy and it has to be coordinated. It can’t be difficult to obtain. The person essentially has got to be put in a position where they have to do very little other than say, ‘Yep, I’m ready.’” [Fire]		X	X	X

### 3.1.1. Illicitly manufactured fentanyl (IMF) and overdose

Based on their experiences responding to overdose calls, most emergency personnel believed IMF was primarily responsible for increased rates of opioid overdoses in NH. “The majority of us... pretty much believe that there is very little actual heroin in the streets and the bulk is likely mostly fentanyl, if not completely fentanyl at this point” [ED]. Emergency personnel thought that the physical characteristics of IMF, including IMF’s potency and inconsistency, were primary drivers of opioid overdose. Additionally, they suggested that inconsistency in batches of FLH could make creating a “safe dose” exceedingly difficult for people who use opioids:

“The police department used to test the fingers, literally the finger of a glove that’s jam-packed with powder. They will test in five different spots in the finger and get five different concentrations... You and I may use and be fine, but our friend may use from that same batch and overdose and die because it’s a higher concentration.” [EMS]

Despite their experiences responding, the vast majority of fire, EMS, and ED personnel lacked first-hand knowledge about fentanyl trafficking and the formulation or specifics of IMF and FLH as drug products. Though they believed that fentanyl was the driver of the increased overdose rate in NH, they had predominately learned about IMF through the media. “Other than what I hear about on the news, that it’s being cut with heroin, I don’t really know much about it” [ED]. When they were able to verify the presence of an illicit opioid at an overdose event, they predominately reported that “it’s generally sold as... a brownish, whitish powder” [Police]. Although a few emergency personnel acknowledged having cases where patients overdosed on fentanyl patches or opioid pills, these were considered “rare.”

### 3.1.2. Personal and professional impact for emergency personnel

Emergency personnel reported feeling extremely confident in their ability to treat opioid overdoses based on their extensive experience and training. “We do it so often, and we do it so well. We’re extremely good at doing CPR. We’re extremely good at managing overdoses... It’s almost sadly routine, but it is completely routine” [Fire]. Despite their confidence, the burgeoning increase in overdose-related encounters took a significant emotional toll on emergency personnel, who described feeling burned out, exhausted, and helpless at times. In addition to the general toll of handling an increase in call volume, witnessing the trauma experienced by family members at overdose scenes was reported to be especially emotional. “The impact wasn’t to the actual heroin abuser themselves, it was sort of like throwing a rock in a pond. You can see those concentric rings going out... It wasn’t just where the rock landed; it was everybody on the outside of that” [EMS]. Coping was particularly challenging when children were involved:

“I responded to a residence where a 13-year-old girl had found both her parents unresponsive in the living room... She’s making pancakes in the kitchen. She walks out into the living room to ask her mother a question, and they’re both unresponsive... To find two in the same house and the circumstances in how it was found, that’s probably going to stick with me for the rest of my life.” [EMS]

The emotional burden of responding was pervasively described. The majority highlighted the cumulative nature of the emotional impact, explaining that “it’s getting tougher and tougher because it grinds you down” [EMS]. These experiences weighed heavily on some. “You can’t unsee what you see every day. We see it. We get numb to it. But you’re like, how many more [Division for Children, Youth and Families (DCYF)] referrals can I do to the state [when children are present at overdoses]? How do we deal?” [Fire]. A few recognized symptoms of

compassion fatigue (Cocker and Joss, 2016) or posttraumatic stress among themselves or their colleagues, including symptoms like fatigue, powerlessness, fear, and intrusive recollections of events. Many described feeling “very helpless”, explaining that “the hard part is you’re the safety net. We’re not going to fix the problem, but you keep on being the same safety net... and we [administer naloxone to] the same people over and over again” [Fire]. Emergency personnel also experienced heightened worry and fear, especially about their own families. “My kids aren’t safe anymore. It sounds a little corny, I guess” [EMS]. Some also described intrusive recollections of overdose events, explaining that “they all stick with you, to some degree” [Police]. One explained, “you can talk to anyone in EMS. They have those certain calls they just never will forget. They’ll be sitting here talking just like this and they can see it. Like, I’m seeing it right now. That’s just how it is” [Fire].

Some described the necessity of developing coping mechanisms. Coping mechanisms utilized by participants included seeking professional counseling, having informal conversations with colleagues and friends, utilizing humor, or switching roles to minimize time in the field. Although emergency personnel extensively described the burden of responding, only a few offered concrete suggestions to cope with the emotional toll. Several recommended accessing counseling or informally talking about experiences with peers. Only one described accessing professional support through an employee assistance program. Despite the lack of identified coping mechanisms, the importance of addressing the emotional impact was evident, with several acknowledging that more resources and support are crucial.

“Everyone has their limits. I teach EMT classes... I will come up with two cups of water, and I’ll say ‘every call you go on, you’re adding water to the cup. You don’t want that cup to overflow.’ It’s always going to be with you, it’s going to affect you, so you have to deal with it, whether you talk to someone about it and again, that’s why you’ll see a lot of humor involved in our calls. It’s just a mechanism of dealing with what you see.” [EMS]

### 3.2. Perspectives on policy-level responses

#### 3.2.1. Naloxone

Emergency personnel generally believed that naloxone was becoming more available in the NH community, and several mentioned “we’ll get somebody in by ambulance that a family member has given it. That’s new” [ED]. Though some felt naloxone should be widely available to laypersons, others thought it should only be available to emergency personnel. Those who generally supported increased community availability of naloxone thought that “if it helps a couple kids make a good decision next time, if it gives them the opportunity to have that *mea culpa* moment or have that epiphany, then it’s worth it” [ED]. Others believed that distributing naloxone to laypersons may result in riskier opioid use and discourage individuals from seeking professional help. “There is a side of me that wonders if we’ve become permissive... so Joe knows, ‘Okay, I have [naloxone] right here, so I really don’t have to be as safe as I used to be because if I do [overdose], my wife will just give me the shot and I’ll be fine” [EMS]. Others thought that “I don’t think we’re called as much now. I think they’re just using the [naloxone] and saying ‘We don’t want the police or the EMS there.’” [EMS] Some worried that by not accessing professional treatment, patients could re-overdose on the substances already in their systems.

While attitudes were mixed regarding expanded access to naloxone for laypersons, more than a third of emergency personnel agreed that naloxone should be “in the hands of all first responders” [ED], including police officers. Emergency personnel expressed positive attitudes toward the expanded scope-of-practice regulations allowing police officers and basic life support providers to administer intranasal naloxone after licensure.

“It used to be that lifesaving drugs were kind of what EMTs did... It wasn’t a problem before, because we weren’t overburdening our EMS

system. Now that we are, we have to enable more of our provider base to actually treat that problem.” [EMS]

#### 3.2.2. Harm reduction and prevention strategies

While some emergency personnel felt conflicted about harm reduction strategies like syringe services programs (SSPs), others emphasized their necessity and pragmatism. They deemed evidence-based harm-reduction strategies, especially the implementation of SSPs, as crucial to minimize harm, “because if people are going to use, they’re going to use. And just because they don’t have a clean needle does not mean they’re not going to use” [ED]. For this group of emergency personnel, the opportunity to reduce the spread of infectious disease was “a step in the right direction” [ED].

Some emergency personnel felt conflicted about the implementation of harm reduction programs, voicing concerns that harm reduction may perpetuate the problem. “I feel like it’s a double-edged sword, like we’re giving people a real safety net. You don’t want people using dirty needles and contracting anything, but you also are making it easier for people to use” [ED]. For others, the illegality of drug use placed harm reduction strategies in direct opposition to their moral obligation to follow laws. “We’re enabling the use of illegal substances... That’s not following the rules, and I guess I’m a rule follower. I have a hard time with that” [ED].

Emergency personnel specifically suggested strategies to strengthen prevention efforts like expanding pre-high school education and interventions in school settings. “I think there needs to be far more education for our youth, along with places, phone numbers for them to call and just be like, ‘Hey, listen. I’m thinking about using. I need help.’ You have to target the next generation” [EMS]. Prudent opioid prescribing was viewed as another critical prevention strategy by roughly half of participants. This group supported crackdowns on opioid prescriptions to prevent new individuals from using opioids and underscored the importance of improved patient education about pain and risks of prescription opioids. “I think there needs to be training with clinicians to do a better job educating patients. I’ve begun to do this on my own, teaching that the day you stop your Percocet is a bad day. Don’t go seeking stuff from a neighbor or a buddy to get over it, or you will develop this problem and it will be with you the rest of your life” [ED].

#### 3.2.3. Treatment

Overwhelmingly, emergency personnel expressed frustration with barriers to treatment referral after overdose events, explaining that “I think we’re failing them by not taking that small window and placing them somewhere” [ED]. Participants named barriers to referral at both the system and patient levels. At the patient level, the primary barrier cited by emergency personnel was patient interest and motivation for treatment. About a quarter of emergency personnel believed many patients lacked interest in referral to treatment immediately after an overdose. System-level barriers participants had experienced included a lack of available treatment services, resources, staff time, knowledge, and funding. About half of the interviewees were frustrated by significant shortages in the availability of treatment for substance use disorders in NH, particularly for patients without insurance.

“We just need resources. If I have someone who’s willing to seek help, I feel like I would move the earth and the moon... Then, oh well, there’s no beds available for three days, and they don’t have a primary care doctor who can get medical clearance done.” [ED]

ED providers highlighted limited staff capacity and the busy nature of the ED as barriers, while other participants expressed a lack of knowledge about available and appropriate services. “Information, honestly, until about a month ago, was nonexistent to me and my fire department... There was no information readily available” [Fire].

To improve treatment linkage, emergency personnel suggested improving treatment availability and accessibility for substance use and co-occurring psychiatric disorders, increasing funding for treatment, and improving the coordination of services. They almost unanimously

emphasized that improving treatment availability in NH was paramount and specifically desired increases in the number of residential and pharmacotherapy treatment programs. “Have enough beds and outpatient treatment for anybody that needs it and have it at a phone call away” [Police]. Immediate, ‘24/7’ access to these services was also deemed critical. “There’s the treatment piece of it, which is really all about access, but not just Monday-through-Friday, 9-to-5 access. It doesn’t work that way” [ED]. To facilitate this rapid access, emergency personnel explained that referral and entry processes should be simplified and coordinated to help both referring agencies and patients navigate the treatment system.

Several emergency personnel acknowledged that patients who use opioids also have high rates of co-occurring psychiatric disorders and other psychosocial needs. They viewed expanded access to treatment for these co-occurring disorders and psychosocial needs as critical.

“Without a massive overhaul of the psychiatric care system, which is so closely tied to these substance abuse issues and so ridiculously underfunded and under-supported, there’s no chance that we’re going to reach a lot of these patients because their problems are not—I sound like a broken record—but they are far from solely substance abuse. They are socioeconomic, psychiatric, and everything else.” [ED]

#### 4. Discussion

This research was designed to understand emergency personnel’s experiences responding to overdose and to explore their perspectives on policy-level responses to the opioid crisis in NH. Results suggest that after overdoses occur, an interaction between physical (e.g., patient experiences of precipitated withdrawal, emergency personnel exposure to overdose scene), economic (e.g., availability and funding of treatment, time), social (e.g., norms and attitudes toward harm reduction), and policy-related (e.g., laws toward harm reduction) factors create challenges for responders seeking to mitigate drug-related harms.

Responders described factors of the post-overdose environment within the overdose scene and emergency department that both hinder and facilitate the implementation of effective responses to the crisis. Emergency personnel are generally the first to arrive, respond, and interact with patients and bystanders following an overdose and therefore have a unique opportunity to engage individuals who are in crisis. NH emergency personnel recognize this opportunity as a potential facilitator and generally expressed willingness to be engaged in the treatment linkage process but were frustrated by the numerous physical, economic, and policy-level barriers. Suggestions for improving treatment referral after overdoses focused on policy-level responses within the macro-environment, including expanding treatment availability, increasing funding for treatment programs, and expediting access to treatment resources.

As highlighted by emergency personnel, policies increasing immediate and low-cost access to evidence-based treatments are critical (Barry, 2018). Participating emergency personnel often highlighted the need for more inpatient treatment programs. Though myths persist that increasing the availability of “beds” and abstinence-based inpatient treatment are important to attenuate opioid-related harms, these programs may instead increase a patient’s risk of overdose by reducing their tolerance to opioids (Wakeman and Barnett, 2018). Emergency personnel also recommended improving immediate access to MOUD, which has been demonstrated to reduce the risk of opioid overdose and associated mortality (Ma et al., 2018; Sordo et al., 2017). Because withdrawal symptoms were commonly cited as reasons for patients prematurely leaving the ED after overdosing, treating withdrawal symptoms with pharmacotherapies may encourage patients to remain in the ED and seek treatment (Cisewski et al., 2019; Klein et al., 2019). Though a growing body of literature suggests that treatment initiation and linkage through the ED may be effective in improving outcomes for patients after an overdose (Cisewski et al., 2019; Goodough, 2018; Hawk and D’Onofrio, 2018; Su et al., 2018), more research is needed to

determine the optimal approaches for treatment initiation and linkage in both pre-hospital and ED settings.

Many emergency personnel emphasized the importance of prevention and suggested improving access to educational interventions targeting youth and individuals at high risk for opioid use. Given the limited evidence supporting the effectiveness of educational interventions in reducing substance use (Hawk et al., 2015; Lynam et al., 1999), the development and evaluation of universal, selective, and indicated prevention strategies is warranted (LeNoue and Riggs, 2016). While improving patient education about pain and opioid pain relievers may improve patient knowledge about risks (McCarthy et al., 2015), efforts to crack down on opioid prescribing may instead increase overdose risk if patients transition to illicit use of opioids (Glanz et al., 2018; Wakeman and Barnett, 2018).

Consistent with existing literature examining perspectives on harm reduction among law enforcement and other emergency personnel (Banta-Green et al., 2013; Green et al., 2013b; Kilwein et al., 2019), interviewees expressed conflicted attitudes that reflected norms surrounding harm reduction. While many supported implementing harm reduction strategies, particularly SSPs, others cited concerns about harm reduction strategies, believing these programs would enable more reckless opioid use. Worry about risk compensation has similarly been identified as a barrier to naloxone distribution in primary care settings (Behar et al., 2018; Binswanger et al., 2015; Green et al., 2013a) and mirrors concerns cited by EMS members in other rural regions (Kilwein et al., 2019). Supporters of harm reduction approaches frequently cited research on the effectiveness of these programs in reducing overdose and infectious disease transmission (Hagan et al., 2000; Perlman and Jordan, 2018). Education on the efficacy of these programs may be critical to shift attitudes and social norms, as the strong negative viewpoints expressed by some participants toward harm reduction approaches are in direct opposition to evidence emphasizing the effectiveness of strategies such as SSPs and bystander naloxone distribution (Mueller et al., 2015). In combination, these negative opinions about efficacious harm reduction approaches plus emergency personnel’s overall lack of knowledge about effective treatment highlights a critical opportunity to improve understanding and change attitudes. The necessity of improving physician training in addiction medicine is well documented (Wood et al., 2013). Though NH now requires all physicians with a NH Drug Enforcement Administration (DEA) license to complete a minimum of three hours of training on pain management and/or addiction annually (New Hampshire Medical Society, 2019), no such requirements exist for EMS and fire personnel. NH EMS students generally receive little training on substance use, though the NH Departments of Safety and Health and Human Services are developing a training program to educate responders on opioid use (The Eagle-Tribune, 2017). Research suggests a combination of factual didactic content, sympathetic personal narratives, and examples of successful programs may be effective in increasing support for harm reduction and overdose prevention (Bachhuber et al., 2015; McGinty et al., 2018), so these strategies should be implemented along with policies increasing the availability evidence-based treatment, SSPs and naloxone.

Results also suggest drug-related harms caused by overdose extend beyond their direct impact on people who use opioids. Emergency personnel emphasized the emotional burden caused by their exposure to opioid overdoses and deaths but offered few suggestions on how to effectively cope with or reduce the emotional burden of responding. Cumulative exposure to work-related traumatic events may be associated with increased risk of posttraumatic stress disorder (PTSD) and depression (Geronazzo-Alman et al., 2017; Jozaghi et al., 2018), which impacts both individual and family-level systems. Addressing this toll may help mitigate harms and allow emergency personnel to most effectively respond. In NH, efforts to address the emotional toll on first responders include the organization of a peer support group for emergency personnel (Sutherland, 2018), but to date, few evidence-based interventions to address PTSD and other psychiatric symptoms among

first responders have been rigorously evaluated (Haugen et al., 2012). Effective interventions should be tailored and implemented to address these mental health issues and provide support for emergency personnel (Haugen et al., 2012). In addition to developing more efficacious targeted interventions, organizations employing emergency personnel should more broadly disseminate information on available resources, including employee assistance programs or peer support groups.

This study had several limitations. All participants were recruited from a single state. Findings therefore only represent the experiences and perspectives of those working within NH. Enrollment was stratified based on NH county and professional category [police, fire, EMS, ED] but was not stratified based on age, gender, race, or ethnicity. The sample was comprised of volunteers. Those with significant experience or strong opinions about opioid overdose may have been more likely to participate and may have different perspectives than those who did not volunteer to participate. Due to the subgroup sample sizes of only six police officers, six firefighters, and six EMS staff, the analysis was also unable to examine differences in perspectives among subgroups.

## 5. Conclusions

Emergency personnel are on the front lines of the opioid crisis, playing a critical role in reversing overdoses and engaging with patients and families. Findings of this study suggest that a combination of physical (e.g., patient experiences of precipitated withdrawal, emergency personnel exposure to overdose scene), economic (e.g., availability and funding of treatment, time), social (e.g., norms and attitudes toward harm reduction), and policy-related (e.g., laws toward harm reduction) factors interact within the micro- and macro-environments in NH to form obstacles for responders attempting to reduce substance-related harms. Based on their experiences responding to overdoses, emergency personnel offered several policy-level suggestions to address the opioid crisis, including expanding harm reduction services and prevention efforts and improving treatment referral processes to provide more patients rapid access to effective treatment. Though emergency personnel were confident in their ability to medically address opioid overdoses, they frequently encountered traumatic overdose scenes and experienced a significant emotional burden. In addition to these findings supporting increased access to services for those who overdose, interventions addressing trauma, burnout, and compassion fatigue among the emergency personnel responding to overdoses are necessary. By increasing our understanding of key physical, social and policy-level factors within the post-overdose environment, we are better able to conceptualize and implement effective environmental interventions to enable harm reduction and reduce opioid-related harms (Rhodes, 2002).

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## Contributors

Saunders drafted the manuscript, and Metcalf, Walsh, Moore, Meier, McLeman, Auty, Bessen, and Marsch made substantial edits to the manuscript. Marsch and Meier designed the study and wrote the protocol. McLeman, Saunders, and Walsh managed the literature searches and summaries of previous related work. Auty, McLeman, Metcalf, Moore, and Saunders collected the data. Metcalf, Walsh, Bessen and Saunders coded the transcripts. Metcalf, Moore, Walsh, Bessen, and Saunders conducted the subtheme analyses. All authors contributed to and have approved the final manuscript.

## Declaration of Competing Interest

No conflict declared.

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