Factors Associated With Participation in an Emergency Department–Based Take-Home Naloxone Program for At-Risk Opioid Users

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Study objective: Although the World Health Organization recommends take-home naloxone to address the increasing global burden of opioid-related deaths, few emergency departments (EDs) offer a take-home naloxone program. We seek to determine the take-home naloxone acceptance rate among ED patients at high risk of opioid overdose and to examine factors associated with acceptance.

Methods: At a single urban ED, consecutive eligible patients at risk of opioid overdose were invited to complete a survey about opioid use, overdose experience, and take-home naloxone awareness, and then offered take-home naloxone. The primary outcome was acceptance of take-home naloxone, including the kit and standardized patient training. Univariate and multivariable logistic analyses were used to evaluate factors associated with acceptance.

Results: Of 241 eligible patients approached, 201 (83.4%) completed the questionnaire. Three-quarters of respondents used injection drugs, 37% were women, and 26% identified as "Indigenous." Of 201 respondents, 137 (68.2%; 95% confidence interval [CI] 61.7% to 74.7%) accepted take-home naloxone. Multivariable analysis revealed that factors associated with take-home naloxone acceptance included witnessing overdose in others (odds ratio [OR] 4.77; 95% CI 2.25 to 10.09), concern about own overdose death (OR 3.71; 95% CI 1.34 to 10.23), female sex (OR 2.50; 95% CI 1.21 to 5.17), and injection drug use (OR 2.22; 95% CI 1.06 to 4.67).

Conclusion: A two-thirds ED take-home naloxone acceptance rate in patients using opioids should encourage all EDs to dispense take-home naloxone. ED-based take-home naloxone programs have the potential to improve access to take-home naloxone and awareness in individuals most vulnerable to overdoses. [Ann Emerg Med. 2017;69:340-346.]

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INTRODUCTION

Background

Opioid overdoses are a preventable yet leading and increasing cause of death in North America[1] and around the world.[2] Naloxone, the antidote counteracting potentially lethal respiratory depression, has typically been available only to health care professionals. The World Health Organization now strongly recommends use of naloxone by lay responders for community treatment of overdoses.[2]

Importance

"Take-home naloxone" refers to prescribing naloxone to patients who use opioids or who may witness overdoses. It includes 2 components: a kit containing naloxone and its means of administration (injectable or intranasal) and standardized training for patients on recognizing and responding to overdoses. In 2014, 644 take-home naloxone program sites in the United States prescribed naloxone to nearly 38,000 laypeople annually, with 26,463 overdose reversals documented since 1996.[1] Take-home naloxone has typically been introduced in settings such as voluntary addiction and harm reduction program sites.

Few take-home naloxone programs are emergency department (ED) based and fewer still are described or studied. Nevertheless, people who use opioids regularly attend EDs and those using EDs have a higher risk of overdose death.[3] One survey of emergency physicians found lack of time, physician knowledge, training, and institutional support to be significant barriers to take-home naloxone prescribing in the ED.[4] Although most physicians

Editor's Capsule Summary

What is already known on this topic

Naloxone can save lives more frequently when delivered immediately rather than after the summoning and arrival of emergency medical services personnel or other providers. The willingness of laypersons to accept this role is uncertain.

What question this study addressed

What are the attitudes of emergency department (ED) patients at high risk for opioid overdose in regard to take-home naloxone kits?

What this study adds to our knowledge

In a convenience sample of 201 patients at one ED, two-thirds told interviewers they would accept a take-home kit, especially those who had witnessed an overdose or personally feared it.

How this is relevant to clinical practice

Patient acceptance is not likely a barrier to home naloxone dispensing, although the overall influence is less well defined.

surveyed were willing to prescribe take-home naloxone, only 1.7% had done so and only 10.3% had referred to community take-home naloxone programs.[4] Another survey asked patients who had previously received ED-based opioid overdose education or take-home naloxone about their behaviors in subsequent overdose situations, but not about their opinion of ED-based interventions.[5] To our knowledge, the patient-centered perspective on ED-based take-home naloxone acceptability and feasibility remains largely unexplored.

Goals of This Investigation

EDs have an opportunity to expand take-home naloxone coverage to vulnerable individuals who might not typically obtain take-home naloxone elsewhere. Our site began offering ED-based take-home naloxone in 2015 as an approved site of an established, province-wide, take-home naloxone program. We surveyed at-risk patients to ascertain patient acceptance of ED-based take-home naloxone and examined factors related to acceptance.

MATERIALS AND METHODS

Setting

The study took place at an urban inner-city teaching and referral center. Its ED has 82,000 visits annually, including patients with a high prevalence of chronic mental illness, illicit drug use, and unstable housing. The ethics boards of Providence Health Care, the University of British Columbia, and the London School of Hygiene & Tropical Medicine approved the study.

Initial criteria for approaching any registered ED patient aged 16 years or older; both criteria had to be satisfied:

1. Opioid use as follows: Any self-reported illicit opioid use in past 6 months; or prescribed daily methadone, buprenorphine-naltrexone combination, or daily opioids greater than or equal to 100 morphine equivalents, within the last 6 months, as recorded on the provincial pharmacy database.
2. Clinical presentation suggestive of opioid use, including opioid overdose, opioid withdrawal, opioid prescription request, or soft tissue infection thought to be related to opioid use; or referral from nurse or attending physician based on clinical judgment.

Exclusion criteria:

1. Acute medical or psychiatric illness, including altered mental status, which would preclude informed consent or reasonable survey completion.
2. Currently in possession of THN kit or sole reason for ED visit was request for THN kit.
3. Currently incarcerated or institutionalized.
4. Unable to use THN kit because of physical, cognitive, or psychiatric issues.
5. Previous participation in study.

Figure 1. Eligibility criteria. *THN*, Take-home naloxone.

Selection of Participants

Patients aged 16 years or older meeting criteria for high opioid overdose risk and capable of providing informed consent and administering take-home naloxone were approached to participate. (See Figure 1 for inclusion and exclusion criteria.)

Because we found no existing surveys meeting the needs of an ED-based take-home naloxone program, we designed a questionnaire adapted from published surveys on drug and alcohol use[6] and overdose experience.[7] Domains included demographic details (such as self-identification with Canadian Indigenous groups), medical history, prescription opioid and illicit drug use history, previous overdose experiences, and preexisting take-home naloxone

awareness and opinions. To maximize comprehensibility and validity, the instrument was piloted on emergency physician and nursing staff, as well as on volunteer at-risk patients and amended accordingly (Appendix E1, available online at http://www.annemergmed.com).

Research assistants covered shifts between 9 AM and 9 PM, including weekends, for 12 weeks, from May to August 2015. While on shift, research assistants reviewed chief complaints on electronic patient tracking boards, paper triage notes, paper out-of-hospital notes, and paper pharmacy database records for all patients present in the ED. ED staff could also recommend candidates. Research assistants consecutively approached all take-home naloxone candidates identified. We chose administered over self-administered surveys because experience in our patient population demonstrated increased completion without reluctance to discuss drug use openly.[6] Eligible, consenting patients had standardized 15- to 20-minute interviews once their acute medical issue had been managed. Research assistants used portable electronic devices to administer the anonymous online survey (Surveymonkey.com, Palo Alto, CA) and immediately thereafter to record the patient's decision on accepting take-home naloxone. Participants were compensated Can $10 for their time. Take-home naloxone was offered to all patients, including those who declined to participate in the survey.

The provincial harm reduction program (http://towardtheheart.com) provided standardized kits and training materials. Research assistants, nurses, or physicians reviewed training materials and kit contents individually with recipients. The nurse dispensing the kit answered any additional questions. The training lasted approximately 5 minutes. The kit contained 2 vials of 0.4 mg naloxone, syringes with self-retracting needles, gloves, a rescue breathing barrier mask, and an instructional diagram. (As a response to the occasional need for additional naloxone doses in fentanyl overdose, the kit was modified after the study and now contains 3 vials of 0.4 mg naloxone.)

Outcome Measures

The primary outcome was take-home naloxone acceptance, defined as the patient agreeing to receive the take-home naloxone kit and associated training during his or her ED visit. As a secondary outcome, we analyzed patient characteristics for associations with take-home naloxone acceptance.

Primary Data Analysis

Stata (version 11.0; StataCorp, College Station, TX) was used to analyze data. Categorical variables were summarized as counts and proportions. Patient characteristics collected in the survey were considered as potential factors related to take-home naloxone acceptance. For each variable, a logistic regression adjusting for age and sex was used to test for association (as odds ratios [ORs]) between the variable and take-home naloxone acceptance. Variables with $P \leq .10$ (2-sided) in the age-sex–adjusted analysis were candidates for the multivariable logistic regression model. Forward stepwise logistic regression using likelihood ratio tests was applied to determine factors associated with take-home naloxone acceptance in the multivariable model. Preexisting take-home naloxone opinions were not included in multivariable analyses because these were considered intermediate steps on the pathway to take-home naloxone acceptance. To examine possible selection bias from daytime-only enrollment, we collected basic demographic characteristics on all patients with 5 opioid-related discharge diagnoses during the study period. We then compared day versus nighttime (9 PM to 9 AM) patients across characteristics, using χ^2 tests.

Because the study was not designed to test specific hypotheses or find differences between groups, we did not formally calculate sample size. For a rough estimate, we used the "rule of 10" for logistic regression[8] and our desire to identify up to 10 associated factors without the risk of overfitting. (Our literature review had revealed 8 factors previously associated with take-home naloxone acceptance.[9-12]) Considering a worst-case 50% ED take-home naloxone acceptance rate (given rates up to 89% in community-based studies,)[7,11] a 200-response sample would generate the needed 100 positive outcomes.

RESULTS

A total of 417 consecutive opioid users were identified during 601 daytime recruitment hours. All 241 eligible patients were offered take-home naloxone and survey participation, of whom 201 completed the survey (83.4% response) (Figure 2). In a subset of patients with 5 opioid-related discharge diagnoses, 99 daytime patients did not differ systematically from the 84 (unstudied) nighttime patients from the study period in terms of sex, age, homelessness, take-home naloxone prescription rate, or relative frequency of discharge diagnoses.

The Table outlines demographic details, comorbidities, substance use, overdose history, and take-home naloxone beliefs and attitudes. Respondents were 37.0% women; 25.8% self-identified as Indigenous, 30.4% reported no fixed address, and 65.7% endorsed having a chronic mental health condition. Overall, 74.6% of the patients used

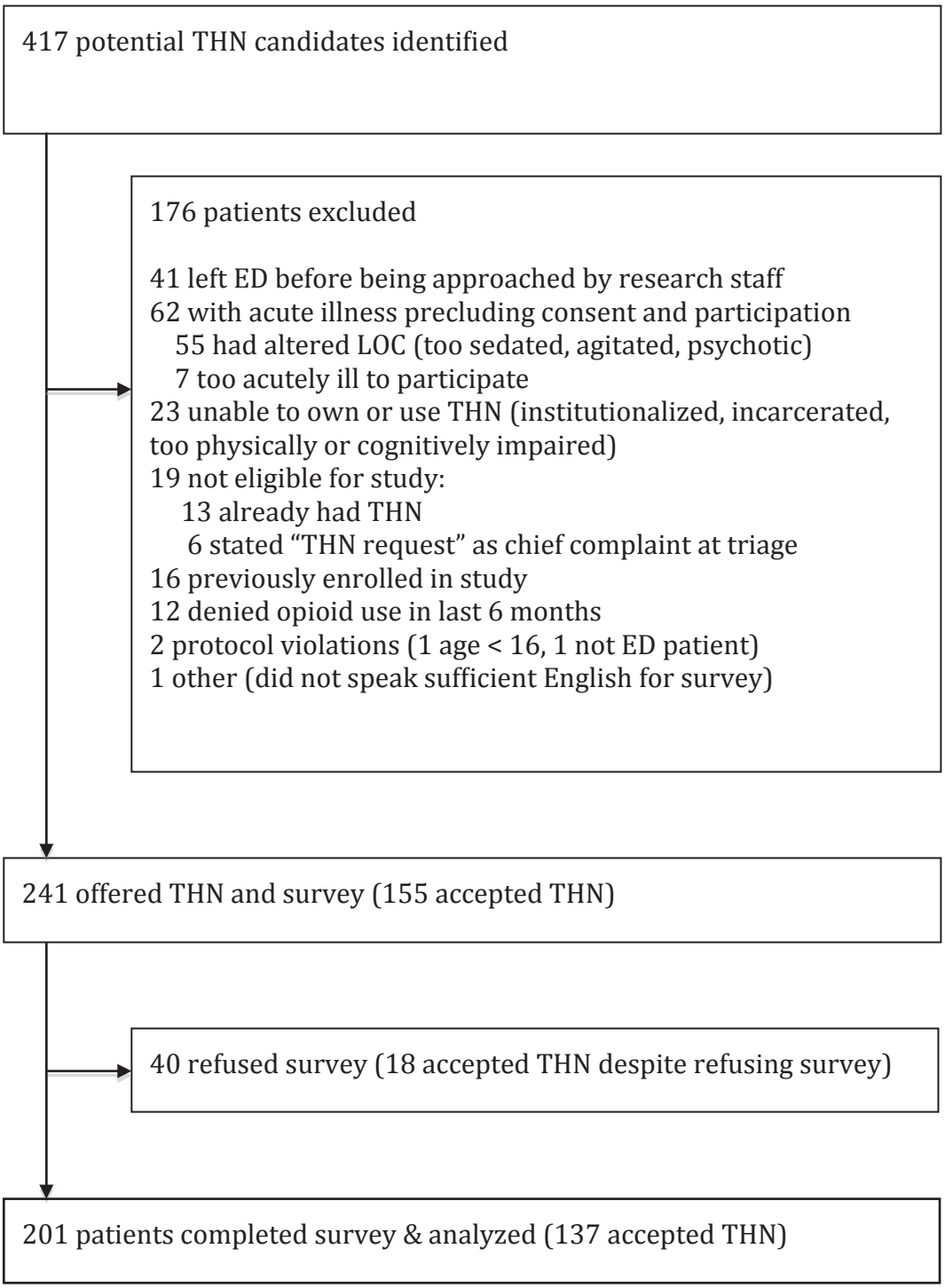

Figure 2. Study flow diagram. *LOC*, Level of consciousness.

injection drugs, 60.7% reported previously overdosing on opioids, and 15.4% had ever received a take-home naloxone kit. In regard to opinions, 91.5% believed that take-home naloxone was "a good idea" and 84.0% thought that the ED was a suitable location for take-home naloxone dispensing and training. Of the 201 participating patients, 137 (68.2%; 95% confidence interval [CI] 61.7% to 74.7%) accepted the take-home naloxone kit and training.

In multivariable analysis (N=199, accounting for participants with missing variables), factors associated with take-home naloxone acceptance included witnessing others overdose (OR 4.77; 95% CI 2.25 to 10.09), concern about

Table. Patient demographics and ORs for take-home naloxone acceptance.*

Characteristic, No. (%)	No. (%)	Accepted, No. (%), N Accepted=137	Adjusted OR (95% CI)†
Demographics			
Age ≥40 y	109 (54.2)	75 (54.7)	1.08 (0.59–1.98)
Female (n=200)	74 (37.0)	57 (41.6)	1.94 (1.01–3.73)‡
White (n=198)	131 (66.2)	83 (60.6)	0.53 (0.26–1.09)
Indigenous (n=198)§	51 (25.8)	39 (28.5)	1.54 (0.70–3.38)
Other ethnocultural group (n=198)	16 (8.1)	13 (9.5)	2.26 (0.61–8.36)
No fixed address	61 (30.4)	42 (30.7)	1.12 (0.57–2.19)
Incarcerated in past 6 mo (n=200)	36 (18.0)	28 (20.4)	2.05 (0.83–5.05)
Triage complaint			
Presumed opioid overdose	32 (15.9)	26 (19.0)	2.49 (0.95–6.50)‡
Presumed opioid withdrawal	8 (4.0)	6 (4.4)	1.31 (0.25–6.79)
Skin/soft tissue infection	35 (17.4)	27 (19.7)	1.62 (0.68–3.87)
Other opioid-related reason‖	16 (8.0)	10 (7.3)	0.86 (0.29–2.56)
Nonopioid-related triage complaint¶	110 (54.7)	68 (49.6)	0.49 (0.26–0.93)‡
Comorbidities			
HIV	25 (12.4)	19 (13.9)	1.70 (0.62–4.65)
Hepatitis C	85 (42.3)	57 (41.6)	0.96 (0.51–1.79)
Chronic mental health condition	132 (65.7)	92 (67.2)	1.22 (0.65–2.31)
Chronic pain	80 (39.8)	57 (41.6)	1.16 (0.60–2.25)
History of drug use			
Opioid use ≥10 y	107 (53.2)	73 (53.3)	0.94 (0.49–1.82)
Any use of prescription opioids	165 (82.1)	112 (81.8)	0.98 (0.44–2.16)
Prescribed high-dose opioids#	32 (15.9)	21 (15.3)	0.82 (0.36–1.89)
Opioids only as prescribed for chronic pain only	20 (10.0)	12 (8.8)	0.59 (0.22–1.62)
Prescribed methadone or Suboxone**	94 (46.8)	61 (44.5)	0.79 (0.43-1.45)
Injection drug use in last 6 mo	150 (74.6)	110 (80.3)	2.94 (1.43–6.04)‡
Heroin use in last 6 mo	150 (74.6)	108 (78.8)	2.28 (1.09–4.77)‡
Cocaine/crack use	94 (46.8)	60 (43.8)	0.64 (0.35–1.19)
Amphetamine use	118 (58.7)	88 (64.2)	2.39 (1.24–4.63)‡
Daily alcohol use	20 (10.0)	10 (7.3)	0.45 (0.17–1.18)‡
Benzodiazepine use	83 (41.3)	53 (38.7)	0.71 (0.38–1.30)
OD experience			
Previous opioid OD	122 (60.7)	87 (63.5)	1.55 (0.84–2.86)
Previously received naloxone for OD	85 (42.3)	63 (46.0)	1.74 (0.93–3.27)‡
Feels at risk of OD death	69 (34.3)	50 (36.5)	1.34 (0.70–2.57)
Concern for OD death increased by ED visit	40 (19.9)	34 (24.8)	3.36 (1.30–8.67)‡
Witnessed opioid OD of others (n=200)	151 (75.5)	115 (83.9)	4.37 (2.17–8.78)‡
Use of harm reduction services††			
Any use of services	168 (83.6)	120 (87.6)	2.49 (1.14–5.45)‡
Attended detoxification in past 6 mo (n=200)	45 (22.5)	31 (22.6)	1.29 (0.61–2.77)
Aware of provincial THN program	100 (49.8)	71 (51.8)	1.36 (0.73–2.54)
Previously had THN	31 (15.4)	21 (15.3)	1.10 (0.47–2.58)
Knows others with THN (n=200)	51 (25.5)	39 (28.5)	1.80 (0.85–3.83)
Opinions about THN‡‡			
Thinks THN a good idea (n=200)	183 (91.5)	133 (97.1)	N/A
Thinks ED-based THN a good idea (n=200)	168 (84.0)	120 (87.6)	N/A
Feels comfortable receiving ED-based THN training (n=171)	153 (89.5)	129 (94.1)	N/A
Believes ED convenient for THN and training	160 (79.6)	111 (81.0)	N/A
Believes ED private enough for THN and training	177 (88.1)	124 (90.5)	N/A

OD, Overdose; *N/A*, not applicable.

*n=201 unless specified otherwise.

†OR for acceptance after adjustment for age and sex.

‡Indicates $P<.10$ and selection for consideration in the multivariable logistic regression model.

§Indigenous: Self-identification as First Nations, Métis Inuit, or wholly or partly Indigenous.

‖For example, requesting detoxification or opioid prescription.

¶Nonopioid substance abuse complaints, mental health complaints, and medical complaints (chest pain, abdominal pain, fever, dyspnea, etc).

#High-dose opioid: daily dose 100 morphine equivalents or greater from pharmacy database.

**From pharmacy database. Suboxone: buprenorphine-naltrexone combination.

††Use of supervised injection site, needle exchange programs, etc.

‡‡These were for information only and not used as explanatory variables.

one's own overdose death (OR 3.71; 95% CI 1.34 to 10.23), female sex (OR 2.50; 95% CI 1.21 to 5.17), and injection drug use (OR 2.22; 95% CI 1.06 to 4.67). Some variables associated with take-home naloxone acceptance in univariate analysis, notably, use of heroin, methamphetamine, and harm reduction services, were collinear with injection drug use and were not associated with the outcome in multivariable analysis.

LIMITATIONS

Our primarily white and Indigenous study population in a Canadian inner-city ED had a high representation of patients using injection drugs, making the results more difficult to generalize to other at-risk populations, including those predominantly receiving prescription opioids for either medical or nonmedical purposes. Other EDs should examine take-home naloxone acceptability in their patients, given the widespread nature of the opioid overdose epidemic across groups and locations.

Our questionnaire was not previously validated, but components had been tested in previous studies. The sample size may have been insufficient to detect all factors associated with take-home naloxone acceptance. Some patients screened as potentially eligible left the ED before being approached and may have had different responses. Patients identified as candidates but excluded, declining participation, or leaving before approached did not differ systematically in age, sex, type of opioid use, or type of ED presentations from those participating. Similarly, unscreened patients presenting overnight may have differed systematically, but the subset analysis did not reveal differences in demographics or take-home naloxone acceptance rates.

Because of the anonymous nature of the survey, take-home naloxone acceptance at survey completion had to be the primary outcome, rather than actual receipt of a kit, which would have required tracking patient identifiers. We are aware of at least 1 patient leaving the ED after accepting take-home naloxone but before receiving it. Owing to the small financial incentive and survey administration method, recall and social desirability biases may have influenced responses, although one would not expect directional bias. Outside of a research context with research assistants, it may be more difficult to identify and recruit take-home naloxone candidates during steady-state ED operations. Ongoing operational research of established programs is also needed.

DISCUSSION

A take-home naloxone acceptance rate greater than two-thirds supports the premise that EDs are feasible places to perform take-home naloxone distribution and training for high-risk patients. Factors associated with acceptance may assist clinicians and public health officials in designing interventions addressing the needs of ED patients. Depending on resources, one might focus efforts only on individuals most likely to accept ED take-home naloxone. Alternatively, one might develop strategies to engage more challenging subgroups that might not readily access take-home naloxone elsewhere.

Our high response rate is encouraging in a traditionally marginalized and difficult-to-access population. Surveying vulnerable patients in regard to their opinions of ED-based take-home naloxone provides a valuable counterpoint to important work examining health care provider attitudes. Our findings that ED patients are likely to accept take-home naloxone should encourage more emergency physicians to offer it despite some of the barriers previously identified among physicians.[4] Both patient- and provider-centered investigative approaches are needed to design optimal evidence-based programs to increase take-home naloxone coverage and eventually decrease overdose deaths.

Our findings that a majority of at-risk patients believe take-home naloxone to be "a good idea" is comparable to opioid users' hypothetical willingness to receive take-home naloxone training or administer take-home naloxone investigated in non-ED settings.[7,11] Not surprisingly, our strictly defined endpoint of accepting take-home naloxone and undergoing training "on the spot" generated a lower acceptance rate than previously reported, especially when taking into account the challenges of a busy ED environment. Immediate ED take-home naloxone acceptance aside, ED-based take-home naloxone can spread awareness: Half of our patients became aware of take-home naloxone during their ED stay and could thereafter seek take-home naloxone elsewhere or share information about it with peers.

We found injection drug use and witnessing others overdose to be associated with take-home naloxone acceptance, as did previous work in non-ED settings.[11] Although long-term opioid users and patients with chronic pain did not readily accept take-home naloxone in one study,[9] we did not find them less likely to do so. Of other factors previously reported,[10-12] we did not find recent incarceration, heroin use, previous overdose, or knowing someone with take-home naloxone to be positively linked with take-home naloxone acceptance.

To our knowledge, our study is the first to report higher take-home naloxone acceptance in women than men. Our findings suggest that public health planners may wish to incorporate sex-specific strategies in ED-based

take-home naloxone programs and further consider the influence of sex on take-home naloxone acceptance in non-ED settings.

A two-thirds ED take-home naloxone acceptance rate in patients using opioids should encourage all EDs to dispense take-home naloxone. ED-based take-home naloxone programs have the potential to improve take-home naloxone access and awareness in individuals most vulnerable to overdoses.

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