

Who Is Using Take-home Naloxone a Lot? An Examination of Super-savers

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Abstract

Background

As the opioid overdose crisis persists and take-home naloxone (THN) programmes expand, it is important that the intervention is targeted towards those most likely to use it. We examined THN program participants to 1) describe those that return for refills, specifically those that reported multiple use (super-savers) and 2) to determine what rescuer characteristics were associated with higher rates of THN use.

Methods

This study included a cohort of consenting THN recipients from June 2014- June 2021 who completed initial and refill questionnaires from a widespread program in Norway. Adjusted logistic regression was used to explore associations with higher rates of THN use. 'Super-savers' reported three or more THN uses.

Results

A total of 1054 participants returned for a THN refill during the study period. Of these, 558 reported their last THN to have been used on an overdose. In the adjusted model, the only significant predictor for being a super-saver was previously witnessing 11-20 overdoses at baseline [AOR, 3.27 (1.18-9.07)]. Overall, those who returned for a refill were comparable, regardless of if their last THN had been used on an overdose.

Conclusions

Witnessing a high number of overdoses was subsequently associated with higher reports of THN use. THN programs should continue to emphasize and prioritize THN for people actively using drugs, particularly those who have witnessed overdoses previously.

Background

Overdoses are a significant public health issue and are responsible for an estimated 200,000 deaths globally each year [1]. Opioids are suspected to be the cause for the majority of these deaths [1] and many of these deaths can be prevented with the timely use of naloxone. Take-home naloxone (THN) programmes emerged in the 1990s in attempt to reduce opioid overdose deaths by equipping bystanders with naloxone, an opioid antagonist [2]. Since THN programmes prepare bystanders to reverse an overdose, they must reach not only those that are likely to overdose themselves, but also and primarily those likely to witness an overdose.

Peer administration of THN (often alongside overdose prevention training) has been acknowledged as a key intervention in preventing overdose deaths [3, 4]. On a macro-level, THN programmes have been found to reduce overdose mortality [5] while also being cost-effective. Economic modelling studies have

shown THN to be cost-effective [6, 7], but only when distribution is targeted towards people who have a high enough risk [8].

When examining those who are at high-risk of overdosing, previous studies have shown that rescues are often performed by people who use drugs [9-11]. A study in New York found that training individuals at high-risk of witnessing an overdose resulted in frequent use of THN, with naloxone being used in 77% of the witnessed overdoses [9]. Within the opioid use disorder (OUD) treatment setting, a yearlong cohort study found that nearly 20% of the OUD patients enrolled in the study had reversed an overdose within the year [12].

As the opioid overdose crisis persists, and THN programmes expand, it is important that this intervention is targeted towards those most likely to use it. Budget constraints and resource scarcity that THN programmes commonly face mean it is important to optimise programmes [13, 14]. Also, given that this group is often hard-to-reach, specific and targeted outreach is essential. A more detailed description and understanding of who uses THN (a lot), i.e., 'super-savers' can help to guide the implementation of THN programmes to better reach those with the greatest potential of rescuing someone.

In this study we investigated a cohort of THN programme participants and aimed to 1) describe those that return for refills, specifically those that reported multiple use of naloxone (super-savers) and 2) to determine what rescuer characteristics were associated with higher reports of THN use.

Methods

Design and setting

This study is a prospective cohort study based on data from consenting participants in the Norwegian THN program from the period of June 2014 to June 2021. All individuals receiving THN were asked to complete questionnaires and provide consent to use their data for the study. Participation in the study was voluntary and did not preclude receiving THN. Because participants could receive THN without enrolling in the study, unique identification data was not captured on all participants at the first distribution of kits. This reflected a decided priority in distributing naloxone over requiring complete registration and thus data collection from all participants.

The Norwegian THN programme is a widespread, government-supported public health initiative. The programme began as a pilot project in June 2014 as part of the National Overdose Prevention Strategy [15]. Details for the THN programme are described elsewhere [16]. Presently, the Norwegian THN programme is a national scheme, currently offering naloxone at 125 distribution sites across the country. Naloxone is distributed within the national overdose prevention scheme without individual prescription or cost to recipients. Data collection consists of (ideally) an initial baseline questionnaire at the first training, followed by a refill questionnaire for all subsequent visits. Data is collected by staff working at the distribution sites at the point of THN training [17]. Participation in data collection is voluntary and individuals can receive naloxone without filling in the questionnaires (at any time point).

Measures

The measures examined come from two separate questionnaires. The measures obtained from the baseline questionnaire include gender, age, current opioid use (current, previous, never), number of witnessed overdoses (never, once, 2-10 times, 11-20 times, more than 20 times), the number of experienced overdoses (never, once, 2-10 times, 11-20 times, more than 20 times), and if their primary use of opioids was through injection. From the refill questionnaires we obtained: the rescuer's relationship to the person who overdosed (friend, acquaintance, partner, stranger, self, child, other), the overdose location (private home, shelter, on the street/public place, car/carpark, other), number of reported THN saves, and number of returns for refills. This information did not overlap, and therefore questions asked from the initial questionnaire were not repeated at subsequent refills.

Inclusion

Participants were included in this study if they returned one or more times for a refill and had provided data at baseline.

Super-saver

Super-savers are defined as individuals who returned for a refill after reporting using their previous spray on an overdose three or more times during the study period.

Statistical analysis

Baseline demographic characteristics (gender, age, current opioid use status, number of witnessed overdoses, and number of experienced overdoses) are described for all participants. For witnessed overdoses, we describe the overdose location and the witnesses' relationship to the person who overdosed.

Logistic regression was used to explore the relationship between demographic variables (age, gender, current opioid use, number of witnessed overdoses, and injection as their main mode of opioid use) and higher rates of reported THN use (more than three reports) for participants who provided baseline data and refill data. Univariable analysis was first done for each predictor variable independently. Variables with $p < 0.25$ were included in the multivariable model [18]. The resulting multivariable logistic regression contained six independent variables (age, gender, current opioid use, witnessed overdoses, experienced overdoses, and injecting). All analyses were completed in IBM SPSS version 27.

Ethical approval

This study was approved by the Norwegian Data Protection Official for Research.

Results

Demographics

The Norwegian THN programme distributed 15708 kits from June 2014 until June 2021. Consent was received for 10682 (68.0%) of the kits distributed. Of these, 5226 individuals completed initial baseline questionnaires and 1054 returned at least once to pick up a new spray. These 1054 make up the subset of participants in this study.

At baseline, the majority of the returning participants were male (66.7%) with a mean age of 38.2 years (Table 1). Nearly all participants used opioids (either currently or previously) (91.8%, n=968). Over 90% (n=953) of returning participants had witnessed an overdose at some point prior to their first naloxone training, and 61% (n=640) had experienced at least one overdose themselves. For all returning participants (both those that reported to have used THN and not), 21% (n=110) and 19% (n=200) respectively had witnessed more than 20 overdoses.

Take-home naloxone refills and use

There were 1054 individuals who returned for a refill during the study period. Among those who returned for a refill, the median number of refills was 2 (IQR=3). There were 558 participants (52.9%) that reported that their THN was used at least once on an overdose, and 496 reported it had not. The 558 participants that reported using THN did so at 2216 overdose incidences (Table 2). The rescuer's relationship to the person who overdosed was nearly always known, as 'stranger' made up less than a quarter of cases (11.5%, n=255). Over half of the THN uses occurred in private homes (58.5%, n=1296), followed by on the street/public locations (27.6 %, n=611).

Super-savers

Participant characteristics for those who used THN on an overdose is summarized in Table 3. Of those who had used their last THN on an overdose, 70.8% (n=395) returned 1-2 times, 22.4% (n=125) returned 3-5 times, and 6.8% (n=38) returned for refills 6 or more times. From the total reports of THN being used for an overdose, there were 163 participants (29.2%) that reported 3 or more uses. This group was categorized as "Supersavers" in the regression analysis (Table 4).

Findings from the unadjusted and adjusted relations between characteristics of individuals associated with higher rates of THN use (supersavers) are found in Table 4. In the adjusted model, the only significant predictors for being a supersaver were those that reported previously witnessing 11-20 overdoses at baseline [AOR, 3.27 (1.18-9.07)].

Discussion

We found that being a supersaver was associated with higher reports of previously witnessed overdoses at the point of the initial THN training. When comparing those that returned for a refill, we found no demographic or behavioural characteristics to be associated with higher rates of THN use. Further, we found that the characteristics among those who returned for a THN refill were comparable, regardless of if their previous THN had been used on an overdose or not. Our findings suggest the those returning for a

THN refill, irrespective of how their previous THN was used, should be considered a highly relevant target group for THN distribution and outreach.

The majority of the participants in this study were people who currently or previously used opioids and had witnessed and/or experienced overdoses. Over 90% of our participants had witnessed at least one overdose at the time of their initial THN training, which is consistent (albeit on the high end) with global prevalence estimates [19]. Others have suggested targeting THN programs towards people who use drugs and that these groups are the most likely to witness and respond to an opioid overdose [9, 10]. The Norwegian THN program has targeted active drug users [16], which is supported by the characteristics of participants in this study. Individuals that returned for a THN refill (even in cases when previous THN was not used) were current opioid users, which is consistent with what others have found [10, 20].

Prior studies have found witnessing an overdose a predictor for naloxone use [10]. This is in line with our main finding, as those that reported 11-20 witnessed overdoses at the initial THN training were also those that reported the most THN use. The supersaver group made up 15% of the sample but contributed to 29% of reported THN use. This further illustrates the importance of targeting this group of active drug users, particularly as THN programs expand to other potentially relevant groups, such as police, ambulance staff, and relatives of people who use drugs.

While often deemed 'hard-to-treat,' the participants in this study returned for THN refills, even in cases when their previous THN had not been used on an overdose. In a study of 'hard-to-reach' people who use drugs in Norway, poly-substance injectors who were outside of treatment had a 10 times higher mortality risk when compared to the general public [21]. This group, although outside of treatment, may be more accessible via low-threshold facilities, often where THN distribution occurs. The participants in this study not only witnessed overdoses and returned to the THN distribution facilities for refills, but also had high rates of personally experiencing overdoses. Of those that returned for a refill, over 60% had previously had an opioid overdose. This illustrates the dual importance of overdose prevention training for the participant as a rescuer, but also for personal overdose prevention education.

This study has a number of limitations. First, the data provided is self-reported and therefore subject to recall bias. In addition, baseline data was not collected for all participants who returned for a refill, so reports of overdose reversals where baseline data was not available were not included in this study. Further, reports of refills were only collected for those that returned to a distribution site, since no active follow-up occurred. We therefore may be missing overdose events when a participant did not complete baseline data, did not return for a refill questionnaire, or did not complete a refill questionnaire. Despite the limitations, this study was able to observe over 1,000 participants who returned for a THN refill, and to assess if particular characteristics were an associated predictor for higher reports of subsequent THN use.

In summary, we found that witnessing a high number of overdoses at initial THN training was subsequently associated with higher reports of THN use. Our findings support that THN programs

continue to emphasize and prioritize THN to people actively using drugs, particularly those who have witnessed overdoses previously.

Declarations

Ethics approval and consent to participate

This study was approved by the Norwegian Data Protection Official for Research.

Consent for publication

Not applicable

Availability of data and materials

The datasets analysed during the current study are not publicly available due to privacy for the participants but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Author's contributions

All authors contributed equally to the development of this manuscript. All authors read and approved the final manuscript.

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Tables

Table 1 Characteristics of take-home naloxone participants at initial training

Characteristics	All n=1054 returning participants	
	N	%
Female	351	33.3
Missing	7	0.7
Age (mean/SD)	38.2	10.1
Missing	45	4.3
Current opioid use		
Yes	721	68.4
No, previously	247	23.4
No, never	86	8.2
Witnessed overdoses		
Never	80	7.6
Once	53	5.0
2-10 times	419	39.8
11-20 times	281	26.7
More than 20 times	200	19.0
Missing	21	2.0
Experienced overdoses		
Never	160	15.2
Once	49	4.6
2-10 times	411	39.0
11-20 times	99	9.4
More than 20 times	81	7.7
Missing	254	24.1

Table 2: Overview on all reported overdose incidences when take-home naloxone was used

	N	%
Total	2216	100
Relationship to person who overdosed		
Friend	852	38.4
Acquaintance	586	26.4
Partner	137	6.2
Stranger	255	11.5
Self	169	7.6
Family	14	0.6
Client / patient	18	0.8
Other	15	0.7
Missing	170	7.7
Overdose location		
Private home	1296	58.5
Shelter	66	3.0
On the street / public place	611	27.6
Car or carpark	18	0.8
Treatment or service center	23	1.0
Other	22	1.0
Unknown	15	0.7
Missing	165	7.4

Table 3: Characteristics of participants who returned for a take-home naloxone refill grouped by number of reported uses

	Used THN for overdose		Refilled, but not used		Used 1-2 times		Used 3 to 5 times		Used 6 times or more	
	N	%	N	%	N	%	N	%	N	%
Totals	558	100	496	47.1	395	70.8	125	22.4	38	6.8
Characteristics										
Female	185	33.2	127	31.4	123	31.1	44	35.2	18	47.4
Missing	4	0.7	2	0.5	3	0.8	0	0	1	2.6
Age (mean/SD)	37.5	9.9	38.6	10.2	38.0	10.0	36.6	9.9	35.8	8.7
Missing	23		13		14		6		3	
Current opioid use										
Yes	406	72.8	263	65.1	279	70.6	96	76.8	31	81.6
No, previously	119	21.3	104	25.7	88	22.3	25	20.0	6	15.8
No, never	33	5.9	37	9.2	28	7.1	4	3.2	1	2.6
Witnessed overdoses										
Never	30	5.4	37	9.2	24	6.1	4	3.2	2	5.3
Once	28	5.0	22	5.4	23	5.8	2	1.6	3	7.9
2-10 times	205	36.7	181	44.8	148	37.5	49	39.2	8	21.1
11-20 times	167	29.9	95	23.5	102	25.8	46	36.8	19	50.0
More than 20 times	117	21.0	63	15.6	91	23.0	21	16.8	5	13.2
Missing	11	2.0	6	1.5	7	1.8	3	2.4	1	2.6
Experienced overdoses										
Never	75	13.4	73	18.1	53	13.4	18	14.4	4	10.5
Once	25	4.5	18	4.5	20	5.1	3	2.4	2	5.3
2-10 times	231	41.4	150	37.1	144	36.5	66	52.8	21	55.3
11-20 times	65	11.6	30	7.4	51	12.9	11	8.8	3	7.9
More than 20 times	51	9.1	23	5.7	35	8.9	12	9.6	4	10.5
Missing	111	19.9	110	27.2	92	23.3	15	12.0	4	10.5

THN: take-home naloxone

Table 4: Multiple logistic regression for predicting characteristics associated with higher rates of naloxone use (more than 3 uses) among THN participants who returned for a refill from 2014-2021

	Unadjusted			Adjusted		
	OR	95% CI	P-value	OR	95% CI	P-value
Age	0.98	0.98-1.00	0.03*	0.98	0.96-1.00	0.07
Gender						
Male	Ref	-	-	-	-	-
Female	1.35	0.95-1.35	0.09	1.56	1.05-2.32	0.03*
Current opioid use						
Yes	1.67	1.12-2.49	0.01*	0.87	0.45-1.67	0.67
No	Ref	-	-	-	-	-
Witnessed overdose						
Once	1.13	0.32-3.93	0.85	0.77	0.16-3.55	0.73
2-10 times	1.76	0.73-4.27	0.21	1.90	0.69-5.21	0.21
11-20 times	3.35	1.39-8.12	0.007*	3.27	1.18-9.07	0.02*
More than 20 times	1.72	0.67-4.38	0.26	2.17	0.74-6.37	0.16
Never	Ref	-	-	-	-	-
Experienced overdosed						
Once	1.35	0.68-2.69	0.59	1.26	0.48-3.33	0.64
2-10 times	1.50	1.02-2.20	0.04*	1.30	0.75-2.26	0.36
11-20 times	2.11	1.23-3.62	0.98	0.65	0.30-1.41	0.28
More than 20 times	2.16	1.20-3.89	0.21	1.18	0.53-2.61	0.67
Never	Ref	-	-	-	-	-
Inject						
Yes	1.48	0.96-2.28	0.08	1.50	0.94-2.41	0.09
No	Ref	-	-	-	-	-

*p<0.05, THN: take-home naloxone