Research Article

Implementation of Clinical Algorithms for Take-Home Naloxone and Buprenorphine/Naloxone in Emergency Rooms: SuboxED Project Evaluation

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Abstract

Introduction: *Emergency departments (EDs) are often the first point of care for people at risk of opioid-related overdose, an issue on the rise in Canada. Dispensing take-home naloxone (THN) and/or initiating opioid agonist treatment (OAT) in the ED can help prevent overdose.*

Methods: *The SuboxED (CC-BY-NC-SA) project evaluated the implementation of a clinical algorithm for dispensing THN and prescribing buprenorphine/naloxone (B/n) in three EDs in the province of Québec. We performed a retrospective review of ED electronic medical records flagged as "at risk of opioid overdose (ROO)." This study included an implementation process from April 1, 2018 to April 30, 2019, and an evaluation of the project implementation for eligible patients from May 1 to December 31, 2019. We also administered satisfaction surveys to medical teams and patients.*

Results: *A total of 877 (36.2%) patient records were included in the analysis. Of these, 62% had a confirmed diagnostic of opioid use disorder (OUD) and 70.8% met eligibility criteria for naloxone prescription. However, only 7.7 % were given a prescription or take-home naloxone in the ED, and 12.4 % were initiated on B/n in the ED or in the community after the ED visit. Seven patients and 125 health care providers from EDs, clinics, and retail pharmacies completed the survey.*

Conclusion: *The SuboxED project demonstrated the feasibility of implementing a clinical algorithm for dispensing THN and initiating B/n in the ED, and of evaluating its efficacy in the 6 months following implantation. In addition to advocating for free access to THN in EDs, scaling up the uptake of the algorithm in EDs is the next challenge.*

Abbreviations
CHUM: Centre Hospitalier de l'Université de Montréal
CIUSSS: Centre Intégré Universitaire de Santé et des Services Sociaux
CRCHUM: Centre de Recherche du Centre Hospitalier de l'Université de Montréal
ED: Emergency Department
THN: Take Home Naloxone

B/n: Buprenorphine/naloxone
ROO: Risk of Opioid Overdose
OUD: Opioid use disorder
COWS: Clinical Opioid Withdrawal Scale
DSM-V: Diagnostic and Statistical Manual of Mental Disorders fifth edition
OAT: Opioid Agonist Treatment
REDCap: Research Electronic Data Capture
CRISM: Canadian Research Initiative in Substance Misuse
MSSS: Ministère de la Santé et des Services sociaux
IRB: Institutional Review Board
SUAP: Substance Use and Addictions Program
IUD: Institut Universitaire sur les Dépendances
CITADEL: Centre d'Intégration et d'analyse des Données Médicales
CCFP: Certification in the College of Family Physicians (Canada)
FRCPC: Fellow of the Royal College of Physicians of Canada
CCFP (EM): Certification in the College of Family Physicians with added competence in Emergency Medicine.

Introduction

People at risk of opioid-related overdoses are among the most disenfranchised patients in Canada, as evidenced by the high mortality rate among this population [1, 2]. Emergency departments (EDs) are often the first point of care for marginalized patients; thus, an ED visit for a nonfatal overdose is an opportunity to prevent an eventual lethal overdose. There are a number of strategies available to ED staff in attempt to prevent overdose mortality. Buprenorphine/naloxone (B/n) has been identified as the first line of treatment for patients with opioid use disorders (OUD) due to its efficacy and cost-effectiveness [3, 4]. Indeed, emergency physicians across the United States and Canada have begun to initiate B/n treatment in the ED [5-8]. Additionally, a take-home naloxone (THN) program has been established in Québec, Canada, in an effort to prevent opioid overdoses. Naloxone is now available from community-based harm-reduction groups, retail pharmacies, and hospitals [9].

In 2018, a multidisciplinary group of clinical leaders created an initiative to enhance access to care and better serve ED patients with opioid use disorder. The SuboxED (CC-BY-NC-SA) project was developed using evidence-based data with the goal of implementing a clinical algorithm for dispensing THN and prescribing B/n for eligible patients. The aims of the present study were to implement this new practice in three EDs in Québec, to evaluate the uptake and utilization of the algorithm, and to assess the experience of health professionals and patients post-implementation.

Methods
Overview of the SuboxED project

The SuboxED project had two phases, illustrated in Figure 1: (i) the implementation process and (ii) the evaluation process. Implementation required identifying three EDs, creating expert groups, confirming OAT and pharmacy partnerships, and developing both the ED clinical algorithm and training tools for ED staff.
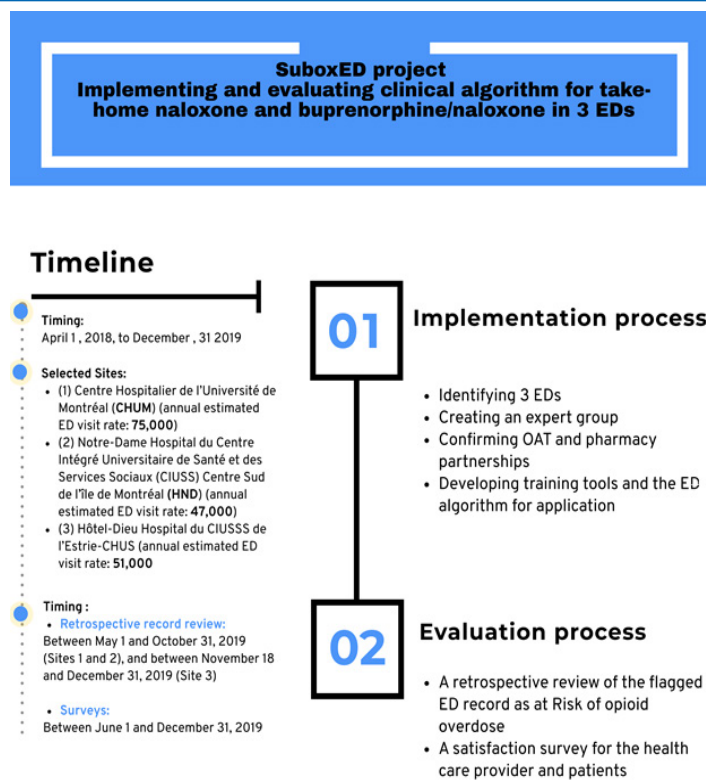

Figure 1: SuboxED Project phases

Phase 1: Implementation Process
EDs Staff Training

Two 20-minute online training modules (https://fcp.rtss.qc.ca/ena-login/index.html) and two in-person training workshops for ED staff were created, covering topics illustrated in (Figure 2). The support of head nurses and other key ED personnel were essential to facilitate staff trainings and ensure SuboxED algorithm uptake.

Training sessions

- The Clinical Opioid Withdrawl Scale (COWS)
- Defining of "at risk of opioid overdose "
- DSM-V criteria for diagnosing opioid use disorder
- Indications for OAT, THN, and ED- initiated B/n
- Adverse effects of B/n
- Proposed treatment algorithm and clinical tools

Figure 2: Training sessions

Application of the ED Algorithm

The ED algorithm would be triggered by triage nurses and ED pharmacists flagging patients at risk of opioid overdose (ROO) based on regional and international guidelines [10-12] (Figure 3). This ROO flag would alert ED physicians to assess the patient for THN or B/n eligibility using a clinical decision algorithm (Figure 4).

SuboxED
URGENCES | SUBOXONE^{MD} | NALOXONE

Triage Question: Identification of at Risk of Overdose Patient

This questionnaire will be used by the ED nurse on a computer-based triage system at the CHUM, or on a paper sheet at the CHUS and HND. It will be used as a reference document to help the nurse with the triage process:

Is the patient at risk of opioid overdose?

Yes ☐

No ☐

In order to confirm the previous eligibility criteria, the triage nurse will have the following questions for reference:

1. *To the patient:* Do you use prescribed opioids (hydromorphone or Dilaudid, morphine or Statex, oxycodone or Supeudol, OxyNeo, codeine or Empracet, fentanyl, methadone, suboxone)?

Yes ☐

No ☐

2. *To the patient:* Do you use illicit opioids? (Purchase other than from a pharmacy, share a prescription from another person, from the street)

Yes ☐

No ☐

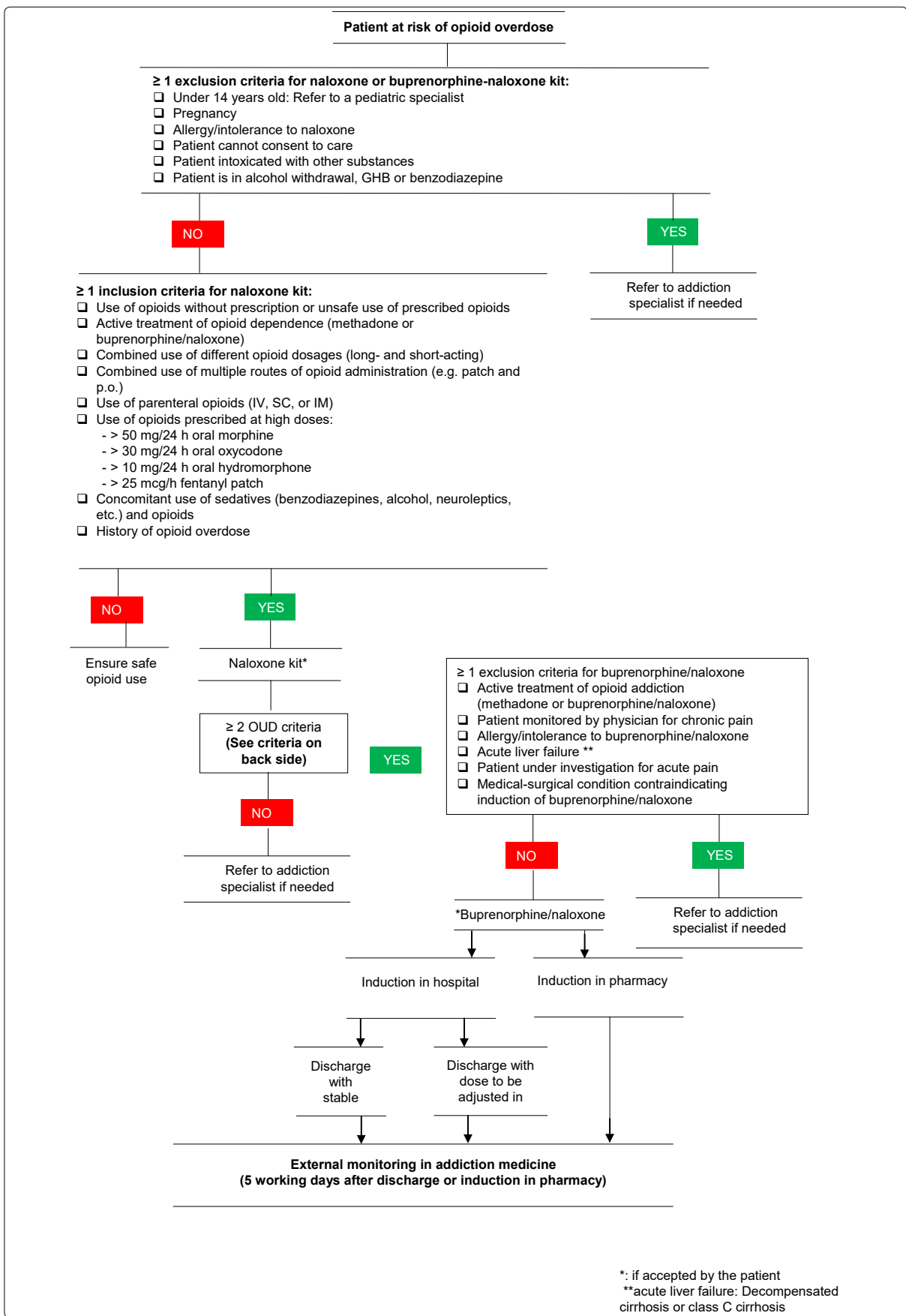3. Did the patient come to the ER for an opioid overdose?

Yes ☐

No ☐

4. Does the patient have opioid withdrawal symptoms?

Yes ☐

No ☐

Figure 3: Triage question: identification at risk of opioid overdose patient

Patient at risk of opioid overdose

≥ 1 exclusion criteria for naloxone or buprenorphine-naloxone kit:
- ❑ Under 14 years old: Refer to a pediatric specialist
- ❑ Pregnancy
- ❑ Allergy/intolerance to naloxone
- ❑ Patient cannot consent to care
- ❑ Patient intoxicated with other substances
- ❑ Patient is in alcohol withdrawal, GHB or benzodiazepine

NO **YES**

Refer to addiction specialist if needed

≥ 1 inclusion criteria for naloxone kit:
- ❑ Use of opioids without prescription or unsafe use of prescribed opioids
- ❑ Active treatment of opioid dependence (methadone or buprenorphine/naloxone)
- ❑ Combined use of different opioid dosages (long- and short-acting)
- ❑ Combined use of multiple routes of opioid administration (e.g. patch and p.o.)
- ❑ Use of parenteral opioids (IV, SC, or IM)
- ❑ Use of opioids prescribed at high doses:
    - > 50 mg/24 h oral morphine
    - > 30 mg/24 h oral oxycodone
    - > 10 mg/24 h oral hydromorphone
    - > 25 mcg/h fentanyl patch
- ❑ Concomitant use of sedatives (benzodiazepines, alcohol, neuroleptics, etc.) and opioids
- ❑ History of opioid overdose

NO **YES**

Ensure safe opioid use

Naloxone kit*

≥ 1 exclusion criteria for buprenorphine/naloxone
- ❑ Active treatment of opioid addiction (methadone or buprenorphine/naloxone)
- ❑ Patient monitored by physician for chronic pain
- ❑ Allergy/intolerance to buprenorphine/naloxone
- ❑ Acute liver failure **
- ❑ Patient under investigation for acute pain
- ❑ Medical-surgical condition contraindicating induction of buprenorphine/naloxone

≥ 2 OUD criteria
(See criteria on back side)

YES

NO

Refer to addiction specialist if needed

NO **YES**

*Buprenorphine/naloxone

Refer to addiction specialist if needed

Induction in hospital   Induction in pharmacy

Discharge with stable   Discharge with dose to be adjusted in

External monitoring in addiction medicine
(5 working days after discharge or induction in pharmacy)

*: if accepted by the patient
**acute liver failure: Decompensated cirrhosis or class C cirrhosis

Figure 4: Algorithm for dispensing THN and prescribing B/n

THN and B/n Templates

After a patient was flagged for ROO, the ED physician checked for eligibility for THN and B/n. For patients with OUD who consented to treatment, an ED physician could initiate 4 mg of sublingual B/n with a maximum of dose of 12 mg of buprenorphine in 24 hours. Additional doses could be prescribed and retrieved at the patient's preferred retail pharmacy out of eight participating locations, or directly initiated at the retail pharmacy after ED physician evaluation. Patients discharged from the ED received information regarding THN and B/n, the address of their selected pharmacy, and an appointment at an OAT outpatient clinic during the seven days following discharge.

Phase 2: Evaluation Process

Once all the algorithm and triage tools were approved and available in each ED, the evaluation process began, including a retrospective review of the ED electronic medical records flagged for ROO. Additionally, medical teams and patients were asked to complete satisfaction surveys in order to enhance collaboration between ED staff and the research team, improve the execution of the algorithm, and integrate patient preference.

Retrospective Record Review

Between May 1 and October 31, 2019 (Sites 1 and 2), and between November 18 and December 31, 2019 (Site 3) we identified and analyzed patient records flagged for ROO by a triage nurse and ED pharmacists. The only eligibility criteria for patient records to be included in the SuboxED analysis was to be flagged for ROO. There were no exclusion criteria.

Satisfaction Survey

Healthcare professionals from the three EDs, three OAT clinics, and eight retail pharmacies, as well as 17 patients who initiated B/n, completed a 10-minute anonymous survey on paper or online using Research Electronic Data capture software (REDCap®) between June 1 and December 31, 2019. Completion of the survey was voluntary. Providers received a $20 online gift card and patients received $40 in cash for their time and effort. The research team ensured confidentiality per the ethics protocol.

Data Analysis

Data from the retrospective review and surveys were mainly descriptive. Continuous variables are reported in terms of means and standard deviations (SDs). Categorical variables are described as proportions and percentages. The 95% confidence intervals, when presented, are based on Wald's method. In the case of missing data, the reported denominator indicates valid enrolment excluding patients with missing data.

Results
Retrospective Record Review

From May 1 to October 31, 2019 (Sites 1 and 2), and November 18 to December 31, 2019 (Site 3), there were 77,403 recorded visits to the EDs. Triage nurses flagged 2,422 patient records as ROO. Of these 2,422 patient records reviewed by the research team, 1,545 were excluded from analysis either for not meeting the inclusion criteria for ROO (833, 34.3%) or lacking sufficient data to assess the ROO (712, 29.4%). In total, 877 (36.2%) records were eligible for analysis (Figure 5).
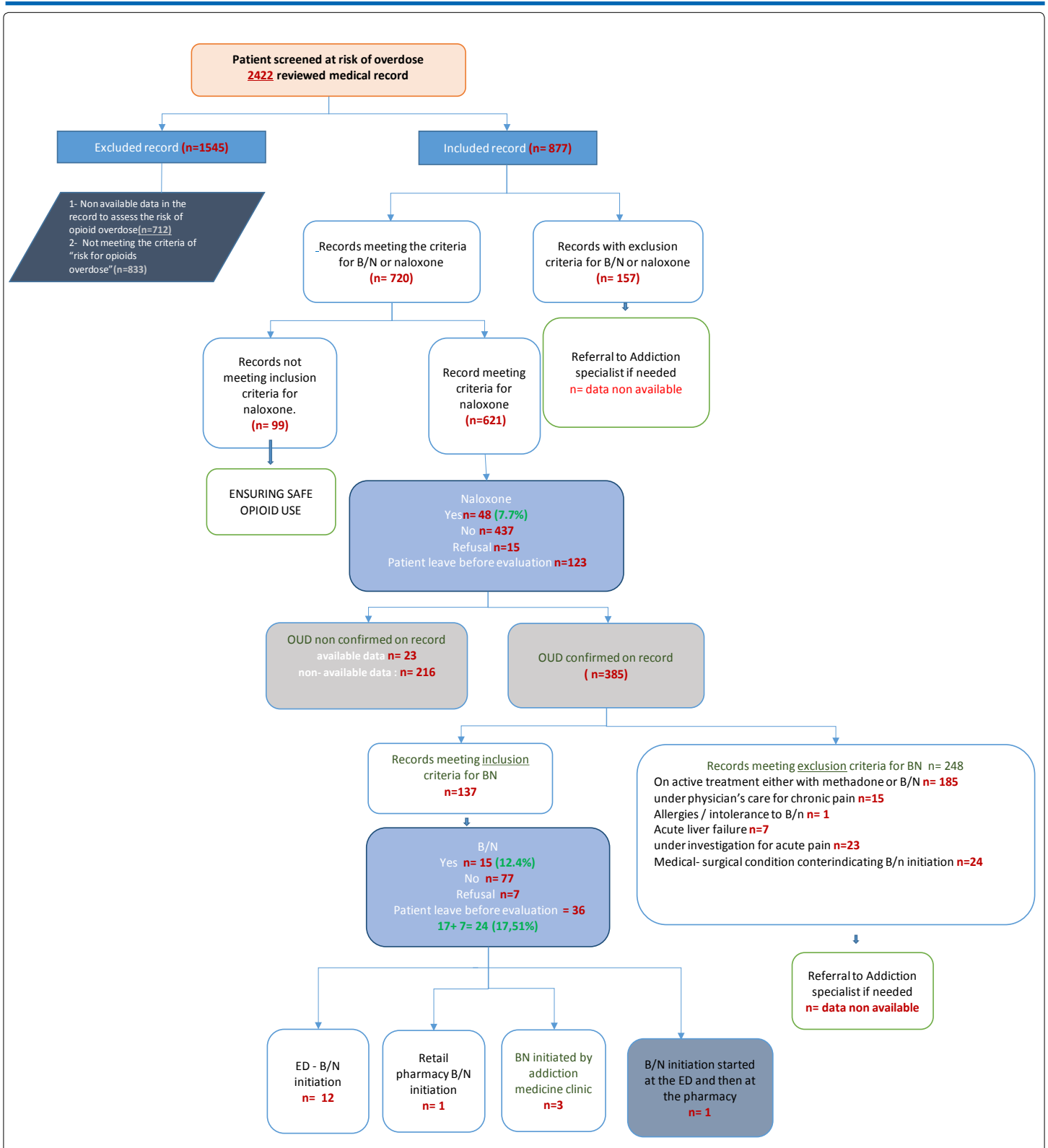
Patient screened at risk of overdose
2422 reviewed medical record

Excluded record **(n=1545)**

Included record **(n= 877)**

1- Non available data in the record to assess the risk of opioid overdose**(n=712)**
2- Not meeting the criteria of "risk for opioids overdose"**(n=833)**

Records meeting the criteria for B/N or naloxone **(n= 720)**

Records with exclusion criteria for B/N or naloxone **(n= 157)**

Records not meeting inclusion criteria for naloxone. **(n= 99)**

Record meeting criteria for naloxone **(n=621)**

Referral to Addiction specialist if needed **n= data non available**

ENSURING SAFE OPIOID USE

Naloxone
Yes **n= 48 (7.7%)**
No **n= 437**
Refusal **n=15**
Patient leave before evaluation **n=123**

OUD non confirmed on record
available data n= 23
non- available data : n= 216

OUD confirmed on record **(n=385)**

Records meeting inclusion criteria for BN **n=137**

Records meeting exclusion criteria for BN **n= 248**
On active treatment either with methadone or B/N **n= 185**
under physician's care for chronic pain **n=15**
Allergies / intolerance to B/n **n= 1**
Acute liver failure **n=7**
under investigation for acute pain **n=23**
Medical- surgical condition conterindicating B/n initiation **n=24**

B/N
Yes **n= 15 (12.4%)**
No **n= 77**
Refusal **n=7**
Patient leave before evaluation = 36
17+ 7= 24 (17,51%)

Referral to Addiction specialist if needed **n= data non available**

ED - B/N initiation **n= 12**

Retail pharmacy B/N initiation **n= 1**

BN initiated by addiction medicine clinic **n=3**

B/N initiation started at the ED and then at the pharmacy **n= 1**

Figure 5: Retrospective record review flowchart

Reviewed Patient Records: Patient Characteristics

Table 1 & 2 shows the demographic data of patients whose records were included in the study. Most of the included patients were male and Francophone. Half were homeless. No ethnicity data was available. Records indicated that 19.6% of patients at risk of opioid-related overdose left the hospital before a physician's evaluation.

Table 1: Reviewed patient records: Patient characteristics

		Site 1	Site 2	Site 3	Total
Age	Mean age in years	47	44	52	47
	SD	15	16	13	15
Gender	Female	223	31	13	267
	Male	526	62	9	597
	Transgender	1	0	0	1
	Total	750	93	22	865 (12 missing)
Housing status	Home Housed	353	62	16	431
	Homeless	396	31	6	433
	Total	749	93	22	864 (13 missing)
Reason of visit	Pain	325	28	12	365
	Intoxication	74	29	1	104
	Opioid-related overdose	15	5	0	20
	Other	334	30	9	373
	Total	748	92	22	862 (15 missing)
Length of stay in ED	For patients who left before evaluation (n=123) Mean (HH:MM) SD (HH:MM)	7:58 7 :43	5:33 4:25	0:14 0:12	- -

*Site 1: CHUM; Site 2: HND; Site 3: CHUS ; SD: Standard deviation

Table 2 demographic characteristic of the ED survey respondents:

		1 month post implementation n (%)	6 months post implementation n (%)
Gender	Male	12 (19.7)	7(23.3)
	Female	49 (80.3)	23(76,7)
Years of practice	0-4	19 (31.1)	16 (33.3)
	5-10	18 (29.5)	6 (20)
	11-20	16 (26.2)	6 (20)
	More than 20	8 (13.10)	8 (26.7)
Hospital type	Site 1: CHUM	11 (18)	5 (16.7)
	Site 2: HND	23 (37.7)	24 (80)
	Site 3: CHUS	27 (44.3)	1 (3.3)
Training	CCFP	5 (8.2)	7 (23.3)
	FRCPC	1 (1.6)	-
	CCFP (EM)	-	1 (3.3)
	Fellow	1 (1.6)	-
	Nurse	21 (34.4)	11 (36.7)
	Clinical nurse	25 (41)	9 (30)
	Pharmacist	4 (6.6)	2 (6.7)
	Others	4 (6.6)	-

CCFP= Certification in the College of Family Physicians (Canada); FRCPC=Fellow of the Royal College of Physicians of Canada; CCFP (EM)=Certification in the College of Family Physicians with added competence in Emergency Medicine

Reason for ED Consultation

According to patient records, the primary reason for ED visit was pain (582, 36.5%). Secondary reasons were intoxication (136, 8.5%) and opioid-related overdose (24, 1.5%).

THN Distribution

Of the 877 records reviewed, 621 (70.8%) met the eligibility criteria for naloxone prescription. Out of these patients, only 48 (7.7%) were given a prescription for naloxone or THN during their ED visit. Fifteen patients (2.4%) were offered naloxone but refused it, and 19.8% patients left the ED before evaluation by an ED physician.

B/n Initiation

Of the records meeting eligibility criteria for B/n initiation, 385 (62%) had a confirmed OUD diagnosis. Among people with OUD, 185 (48%) were already on active OAT with either methadone or B/n, and 15 (3.8%) were under a physician's care for chronic pain before their visit to the ED. Of the 137 patients records with OUD, 12 (8.7%) were initiated on B/n in the ED, 1 (0.7%) was initiated in a retail pharmacy after receiving a prescription in an ED, and 3 (2%) were initiated in one of the three outpatients OAT clinics after receiving a referral from the ED.

ED Health Care Provider Survey

Of an estimated 300 ED health care providers at the three study sites, 91 completed one- and six month post-implementation surveys. Most respondents were female. One-third of respondents were clinical nurses; 37.7 % worked at Site 2 and 44% worked at Site 3. The majority of provider respondents (70.3%) had strong concerns about opioid-related overdose for patients during the first month post-ED visit. At six months, 43.3% reported needing more training on the algorithm, in person and online (36.7%). After six months, 30% of health care provider respondents thought that B/n initiation increased the ED workload, though only 14.8% thought so at one month post-implementation (Figure 6).
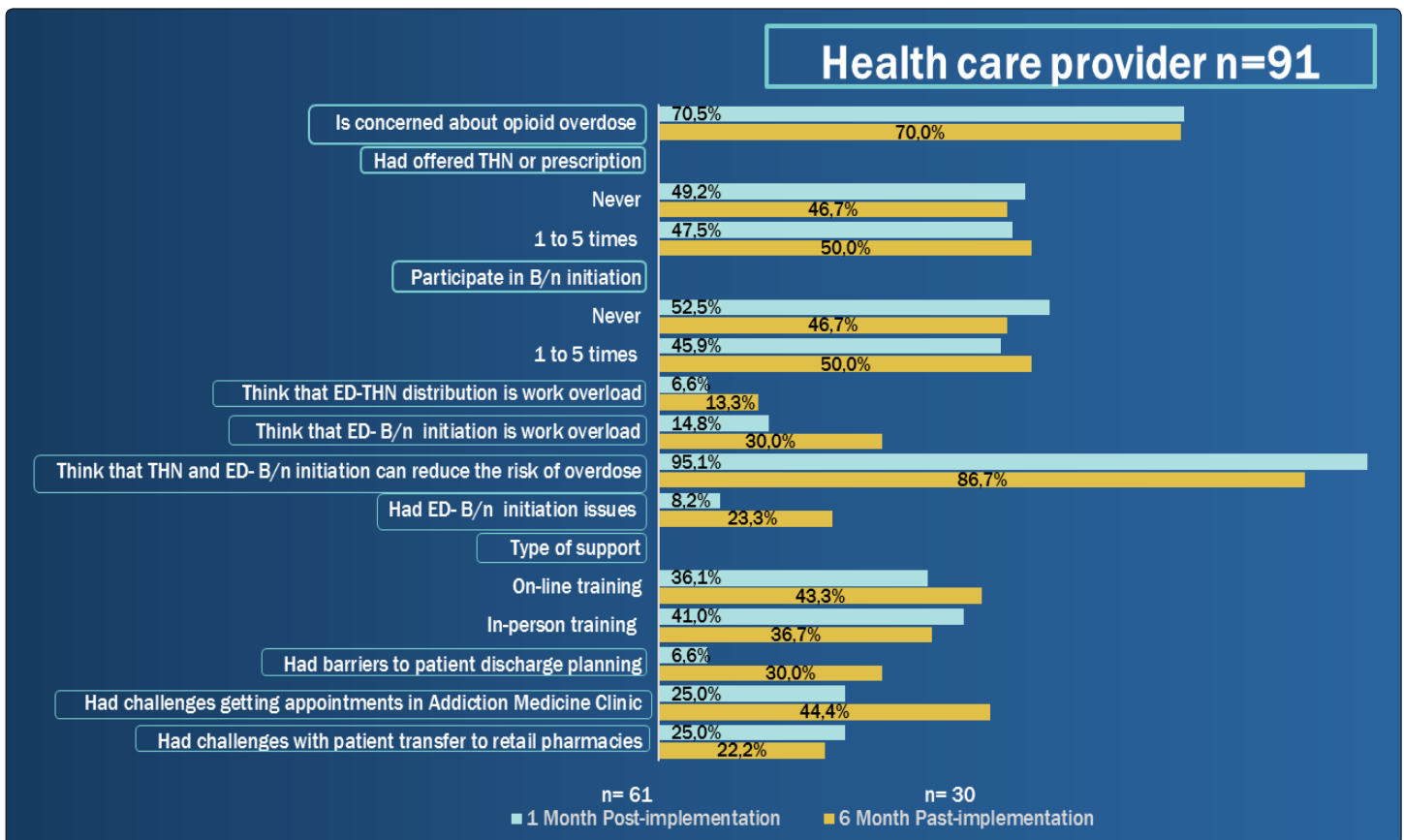
Figure 6: Health care provider survey

OAT Clinic Professional Survey

Out of an estimated 35 OAT clinic professionals involved at the study sites, 27 participated in the satisfaction survey at one and six months post-implementation. All respondents (100%) reported being aware of the importance of SuboxED for patients at risk of opioid-related overdose (Figure 7).
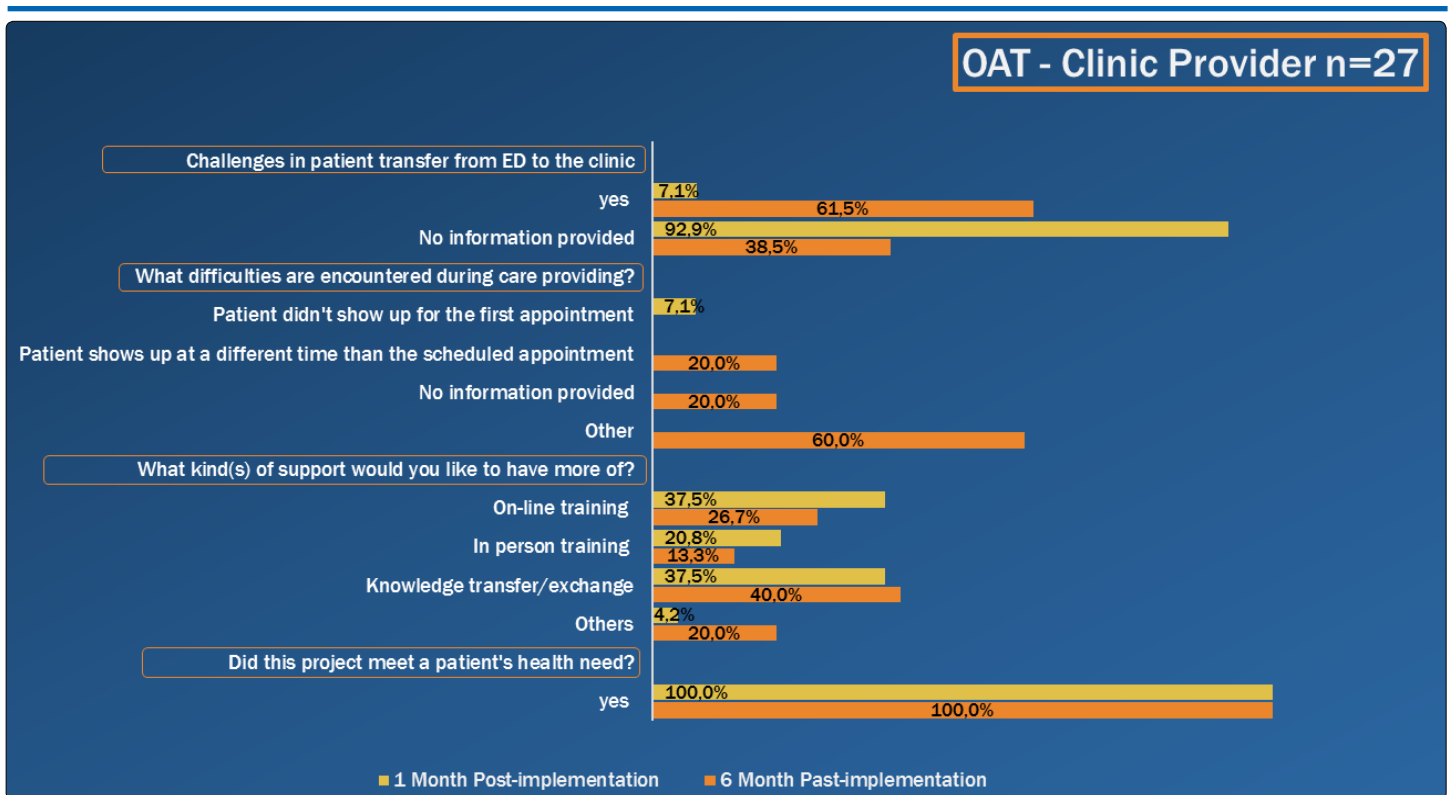
Figure 7: OAT clinic provider survey

Retail Pharmacy Survey

In total, seven out of eight retail pharmacists participating in the SuboxED project completed the satisfaction survey. All respondents (100%) considered SuboxED a key public health intervention to reduce opioid-related deaths and indicated that it should be implemented more broadly in all EDs (Figure 8).
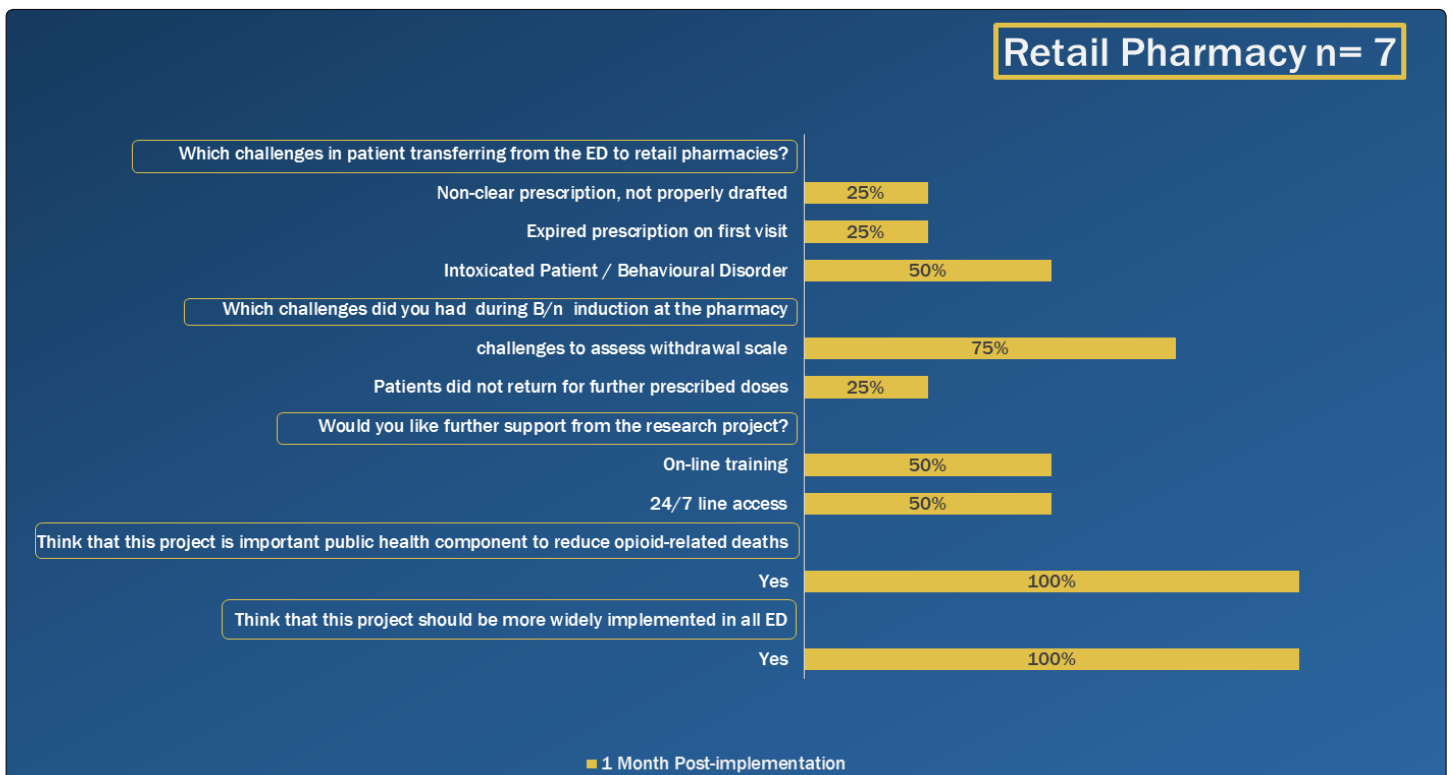
Figure 8: Retail pharmacy survey

Patient Satisfaction Survey

Of the patients who initiated B/n under SuboxED project, ten out of 17 completed the self-reported survey in the month following initiation. Respondents were mostly male (70%), ages 22 to 60 years old. A majority (80%) of the respondents reported satisfaction with their experience of B/n initiation in the ED (Figure 9).
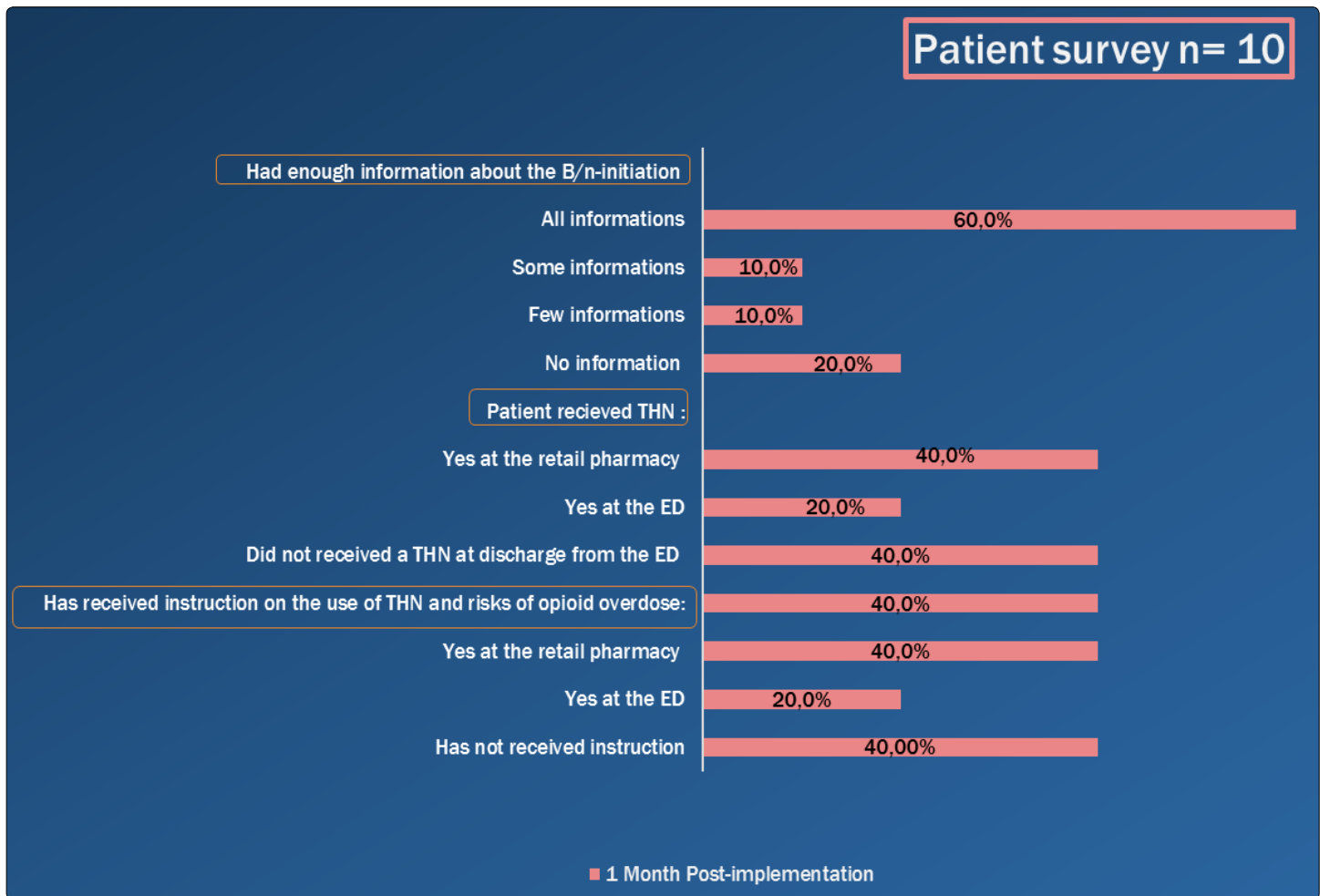
Figure 9: patient survey

Discussion

This study demonstrated that the implementation of a clinical algorithm for THN and ED B/n initiation in a short period of time is feasible, despite rather slow uptake. Prior to May 2019, the three participating EDs had no record of THN distribution or B/n initiation for patients who were at ROO, despite some unconfirmed anecdotal reports to the contrary. From May 1 to December 31, 2019, 7.7% of patients at ROO were given THN and 12.4% of eligible patients were initiated on B/n. We identified several challenges and limitations throughout the implementation and evaluation process.

Challenges of implementing the SuboxED algorithm

- Access to THN in the EDs: government cost coverage for THN in hospital EDs was not available until October 25, 2019. We assume this impacted availability of naloxone at the study sites and prevented adherence to the clinical protocol.

- Provider training: high rates of ED staff turnover and gaps in the communication plan of the new clinical algorithm to all staff made training complex.

- Competing priorities: more urgent medical actions could have taken precedence over THN and B/n in the ED.

- Participation bias: the personal opinions of physicians and nurses regarding the role of the EDs in the opioid crisis may have had an impact on uptake.

- Patients' access to B/n: unclear or misspelled prescriptions faxed to retail pharmacies hindered access in some cases, as did gaps in the linkage between OAT outpatient clinics and the retail pharmacies intended to administer OAT after a patient's ED visit.

- Timing: data collection may have been done too early post-implementation, before the new algorithm was fully integrated into the ED care routine.

- Methodological design limitation: retrospective chart review.

Future work will be required to determine to what extent these factors played a role in the uptake of TNH and B/n initiation in EDs.

Expanding the SuboxED algorithm across all EDs in Québec will require the involvement and commitment of ED staff, clinical leadership, and hospital administration, as well as the partnership of retail pharmacies and OAT outpatient clinics in the community. Knowledge transfer and training will need to be tailored to the busy ED environment and performed regularly in order to ensure continued familiarity with the algorithm among all ED staff. Adjustments will be needed to ensure that the clinical tools developed through the SuboxED project facilitate, rather than impede, optimal care for patients at ROO who visit the ED. For example, a validated and more specific screening question for opioid-related overdose could be integrated into nurses' questionnaires to identify patients in need of THN and/or B/n treatment beyond the triage stage.

Currently, medical evaluation is required prior to dispensing THN. Our study showed that 19.6% of patients at risk of opioid-related overdose left the hospital before a physician's evaluation. This gap could be closed by giving triage nurses the capacity to dispense THN to these patients. The standard of care for patients at risk of opioid-related overdose must include measures to ensure timely access to THN.

Conclusion

The SuboxED project developed a clinical algorithm and training sessions for its implementation as an ED response to the opioid crisis in Québec, Canada. The project involved two phases: the implementation process and the evaluation process. Patients at ROO, whether or not they have OUD, often seek ED services, making EDs highly suitable for such an intervention. SuboxED assists these patients by increasing access to THN for patients at risk of opioid-related overdose, and to B/n for patients with OUD. In order to reach more patients, guiding algorithms must be implemented and adopted more widely as part of standard care for people at risk of opioid overdose.

Establishing that the risk for opioid-related overdose is flagged as a high priority for patients with OUD may prove challenging, as ED physicians and nurses encounter many competing medical priorities. This is especially relevant during the COVID-19 pandemic, which has exacerbated the opioid epidemic, as evidenced by a 11.4% increase in overdose deaths in Canada during the first four months of 2020 compared to those same months in 2019 [13]. Medical authorities in Canada and the US have issued clinical guidance supporting the availability of naloxone and OAT during the pandemic [14, 15]. Despite the current focus on COVID-19, it is crucial that EDs do not overlook patients with OUD and those at risk of overdose.

The SuboxED project demonstrated the feasibility of implementing a clinical algorithm for dispensing THN and initiating B/n in the ED, executing this algorithm and evaluating it in the first 6 months'

post implantation, as well as advocating for free access to THN in ED. In the context of the opioid crisis, scaling up the uptake of the algorithm in EDs is the next challenge.

Declarations

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