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Development and Process Evaluation of an Educational Intervention for Overdose Prevention and Naloxone Distribution by General Practice Trainees

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\textit{Keywords:} overdose, feasibility study, naloxone, heroin, education, general practice

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Running head: Intranasal Naloxone for General Practitioners
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Development and Process Evaluation of an Educational Intervention for Overdose Prevention and Naloxone Distribution by General Practice Trainees

Abstract

Background: Overdose is the most common cause of fatalities among opioid users. Naloxone is a life-saving medication for reverting opioid overdose. In Ireland, it is currently available to ambulance and emergency care services but General Practitioners (GP) are in regular contact with opioid users and their families. This positions them to provide naloxone themselves or to instruct patients how to use it. The new Clinical Practice Guidelines of the Pre-hospital Emergency Council of Ireland allows trained bystanders to administer intranasal naloxone.

We describe the development and process evaluation of an educational intervention, designed to help GP trainees identify and manage opioid overdose with intranasal naloxone.

Results: Knowledge of the risks of overdose, characteristics of overdose and appropriate actions to be taken increased significantly post-training \[\text{OOKS mean difference, 4.65 (standard deviation 4.13); } P < 0.001\]; attitudes improved too \[\text{OOAS mean difference, 11.13 (SD 6.38); } P < 0.001\]. The most and least useful delivery methods were simulation and video, respectively.

Methods: Participants (N=23) from one postgraduate training scheme in Ireland participated in a one-hour training session. The repeated-measures design, using the validated Opioid Overdose Knowledge (OOKS) and Attitudes (OOAS) Scales, examined changes immediately after training. Acceptability and satisfaction with training were measured with a self-administered questionnaire.

Conclusion. Appropriate training is a key requirement for distribution of naloxone through general practice. In future studies, the knowledge from this pilot will be used to inform a train-
the-trainer model, whereby healthcare professionals and other front-line service providers will be
trained to instruct opioid users and their families in overdose prevention and naloxone use.

*Keywords: overdose, feasibility study, naloxone, heroin, education,
general practice*
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Background

Overdose is the most common cause of death among opioid users and its prevention and management are thus priorities for healthcare agencies [1]. Europe has on average 17 drug-related deaths per million people (15–64 years) per year, varying from country to country [2]. With 70 drug-related deaths per million, Ireland has the third highest rate in Europe [2, 3]. Ambulance services in Dublin attend to an opioid overdose every day [4]. The use of the opioid antagonist, naloxone, is well recognised as an effective treatment for opioid overdose, and constitutes standard medical treatment in such situations. However, to prevent death, naloxone must be given very soon after the opioid has caused respiratory depression or arrest [5]. To date, naloxone has generally been used in injectable form, given via intramuscular, intravenous or intraosseous routes. A number of systems to introduce naloxone to families, buddies and drug workers have been established in countries other than Ireland and report positive effects [1, 6, 7]. Ireland currently has no such systems. Bystanders, specifically frontline service providers, peers or family members of opioid users, are best positioned to intervene immediately, when symptoms of overdose first appear [8]. General Practitioners (GP) in Ireland are also in regular contact with opioid users (and their families) either via methadone maintenance treatment or other medical services in general practice. This access should allow GPs to provide naloxone themselves or to instruct patients or family members on how to use it. However, no structured provision of naloxone exists in Irish general practice and previous research elsewhere has shown that GPs lack skills and knowledge
regarding naloxone administration and require more training [9]. Our preliminary work suggested this training should include elements of the ‘Clinical Practice Guidelines (CPG) approved by the Pre-Hospital Emergency Care Council of Ireland in October 2013 (Emergency First Response)’, specifically initiating contact with emergency services, cardio-pulmonary resuscitation (CPR), and the administration of intranasal naloxone (INN) [10, 11]. However, the feasibility and acceptability of such training for GPs has not been previously reported. Therefore, the current study aimed:

- To develop an educational intervention that enables doctors in specialist training for GP to support bystander response to overdose (i.e., initiating contact with emergency services, CPR, etc.), and the administration of intranasal naloxone (INN),

- To determine the potential feasibility, acceptability and usefulness of this training to trainee GPs.

Methods

Design, sample and intervention. Ireland’s population of 4.6m is served by approximately 2,600 GPs; around 160 doctors enter one of 14 specialist-training programmes in GP each year. Each programme is accredited nationally and follows a standard four-year programme, the final two years of which are spent in supervised training practices. Participants (N=23) from the Dublin Mid Leinster Specialist Training Programme in GP, affiliated with University College Dublin in Ireland, were invited to participate in a one-hour training session. All accepted and took part in the study voluntarily. They were currently based in a designated training general practice, under the supervision of an accredited GP trainer.
Most practices were in Dublin (43%), with 1000 or more patients on their General Medical Services list (The GMS is a government subsidised health plan providing free point of care primary care and medicines for those on low incomes); only six practices (26%) prescribed methadone.

Most practices had one to three full-time GPs (16, 70%) and one to four part-time GPs (15, 83%). More than half of the practices had a practice nurse. Trainees were on average 25-34 years old (91%), and mostly female (78%). Eight (35%) were trained methadone prescribers and 11 (48%) have witnessed an opioid overdose (Table 1).

Ethical considerations / Adherence to the International guidelines

The Irish College of General Practitioners Research Ethics Committee approved this study (August 27th, 2014). Research carried out on humans in this study is in compliance with the Helsinki Declaration (http://www.wma.net/en/30publications/10policies/b3/index.html). This study adheres to the RATS guidelines on qualitative research (http://www.biomedcentral.com/ifora/rats). We informed the trainees about the study and consented them to participate one week before the educational session. Our convenience sample is likely to be representative of the national profile of doctors in specialist training for GP.

Development of the educational session

The educational session was developed as part of an evolving system of lay delivered INN. The key components of the system include:
1. One-year prospective audit of characteristics of opioid overdoses reported to ambulance services in Dublin [4, 12], and

2. Development and implementation of CPG-led lay administration of naloxone [13].

3. Exploration of mechanisms for roll-out of naloxone by registered Medical Practitioners, since it remains a prescription-only drug in Ireland.

As a first step, a national Naloxone Advisory Group was established. Secondly, a literature review on care options determined intervention of choice –– while the intranasal formulation appears to address safety, efficacy and utility criteria, it has not yet been approved by the Irish Department of Health for general use; intramuscular naloxone is currently available for prescription by doctors. However, an INN formulation is likely to become available in coming months and training oriented to INN was identified as the longer-term goal of the initiative. Our subsequent steps followed the Medical Research Council’s (MRC) framework, which advocates core phases in the development of health services interventions: preclinical, theoretical, modelling, exploratory trial, definitive trial and long-term implementation [14].

In the preclinical stage of the intervention development, we identified a need and targets for naloxone distribution by geo-locating the urban overdose hotspots – areas with high rates of overdoses [4]. They helped us to concentrate our efforts on general/ addiction care services in inner city, Dublin. The subsequent modelling phase formulated clinical practice guidelines (CPG). The Pre-hospital Emergency Care Council of Ireland approved it in October 2013 (PHECC, i.e., the Statutory Regulator for Pre-Hospital Emergency Care in Ireland). UCD emergency medical science centre concurrently collaborated with PHECC and the Naloxone
Advisory Group to develop and pilot an educational session led by the guidelines. The guidelines allow for training of lay people and health professionals in overdose prevention and naloxone use, subject to previous CPR training.

Naloxone training in isolation is not considered best practice [15], and as such, should be provided as an overall emergency care package which includes Basic Life Support (BLS) skills training. There are two BLS levels prescribed by PHECC:

- Cardiac First Response - Community (CFR)
- Cardiac First Response - Advanced (CFR-A)

All trainees were required to achieve the CFR standard as a prerequisite of the session (already held by all participants). After completion of this pilot study, the session will be evaluated with a group of community health professionals. Data from this feasibility evaluation will inform design of the final stage of development of the national implementation of the INN distribution.

Content and delivery of the educational session

We based the intervention on our previous work, pre-implementation assessments from Scotland and training of family members to manage heroin overdose and administer naloxone in England [6]. More specifically, factors enabling naloxone distribution and use were incorporated: evidence of effectiveness, appropriate training, and developing a policy regulation – the CPG – that would allow intranasal administration [9, 16]. The intervention was facilitated by:

- a small group session,
- a practical exercise,
- a video clip using content from: a) the family work from England, and
b) the introduction of take-home IN naloxone within National Health Service (NHS) Highland [16], and
- an anonymous evaluation/ feedback.

The video clip ensured fidelity and consistency of the information distribution. This was an evidence-based methodology in emergency care training, used with emergency services globally [17]. Multi-media theory was reinforced at each stage with practical application and exercises. The video was three minutes long and its headings included:
- Recognition of overdose,
- Assembly of the drug administration system,
- INN administration.

The educational session was delivered by two facilitators in a group setting, and took approximately 45 minutes. It was held in the medical school. A manual for the trainers was developed before delivery of the session in collaboration with the Naloxone Advisory Group, formed in the pre-clinical stages (http://drugs.ie/features/feature/naloxone_the_welsh_experience).

The aims of the educational session, described in the current study, were to ensure that GP trainees had the skills to manage an overdose (i.e., initiating contact with emergency services,
CPR, using INN and acquired sufficient knowledge, understanding and motivation to be willing to undertake INN distribution and training. The key learning outcomes of the educational session were to teach GPs how to i) recognise opioid overdose, ii) assemble INN, and iii) administer INN (Figure 1).

Data collection

A repeated-measures design, using the validated Opioid Overdose Knowledge (OOKS) and Attitudes (OOAS) Scales, examined changes immediately before and after the training. Acceptability and satisfaction with training were measured with a self-administered questionnaire (acceptability of the session, learning needs and suggested improvements).

OOKS has 45 items organised in four sub-scales (risks, signs, actions and naloxone use, range 0-45). The OOAS has 28 items grouped in three sub-scales (competence, concerns and readiness, range 28-140). Both scales were developed and psychometrically evaluated with a convenient sample of friends and family members of heroin users and healthcare professionals in England. Both OOKS and OOAS were shown internally reliable (Cronbach's alpha = 0.83 and 0.90, respectively). Retest after 14 days also showed fair-to-excellent values (OOKS, ICC = 0.90 and OOAS, ICC = 0.82). Professionals scored significantly higher on both scales than family members [18]. We changed two questions about needles and deleted two items about injecting naloxone in the attitudes scale (new range 26-130).
Acceptability of the session to trainees was assessed with open-ended questions that asked trainees to write what was good or bad about each of the five training delivery methods. The trainees rated each session based on its usefulness (5-point Likert scales); the rating scales were taken from our previous study [19].

Data analysis
The means and standard deviations (SD) for perceived changes in knowledge and attitudes pre-/post-training were calculated and compared using non-parametric Wilcoxon Paired Signed-Rank Tests (IBM SPSS, version 20). For usefulness, the scores from the Likert scales were added together; the means and standard deviations (SD) calculated. Answers to open-ended questions were content analysed; similar responses were grouped and number of responses counted.

Results
Pre-training and post-training knowledge
The educational session elicited significant changes in all four knowledge categories (i.e., risks, signs, actions and use of naloxone, see Table 2). Furthermore, the median composite knowledge score increased from 28 pre-training to 32 post-training (p<0.001).

Skills
All participants were directly observed to have acquired the skills needed to assemble and effectively deliver the correct dose of naloxone, in a safe manner. All delivered INN using the standard patient assessment method taught, rather than as an isolated intervention.

**Pre-training and post-training attitudes**

There was a significant increase in all three categories (competencies, concerns and readiness) of positive attitudes towards overdose management (Table 2). The median composite score for attitudes increased from 96 pre-training to 108 post-training ($p<0.001$).

**Evaluation of the educational session**

The group mean for the session’s usefulness score was 21.9 (out of 25); the most and the least useful delivery methods were simulation and video, respectively (see Table 3).

<insert Table 3 here>

Most of the participants (74%) felt their questions were answered and saw a potential for the INN or overdose prevention in their training practice. The part of the presentation that trainees liked the most was that it “Provided answers to the questions I had just asked”. It could have been “less rushed, more interactive.”

In the video, the trainees were able to “actually see the device [Mucosal Atomiser Device]”. The sound could be improved. During the practical simulation it was “helpful to see how easy it is [administration]”. More time could be spent on this. The trainees perceived the small-group discussion as an “opportunity to ask questions”. One commented, “Would be nice to discuss pros/cons of lay people having naloxone and where GP would avail of it.”
Finally, trainees were given an opportunity to comment on their educational needs or provide suggestions for improvement of the session (Table 3). Several wanted more examples or real life situations to play with and two other trainees wished for more time or booster sessions: “Very quick session so difficult to fully answer all Q’s [questions], however, very useful and would definitely allow us/help us to know what to do in OD setting.”
This educational session, informed by a Clinical Practice Guideline (CPG), has significantly improved knowledge of and positive attitudes towards overdose management among GP trainees. Most useful components of the training were simulation, presentation and group discussion, with trainees appreciating the opportunity to ask questions.

Our findings are consistent with the literature which highlights the effectiveness of education in improving knowledge of and attitudes towards overdose management [20]. Other studies successfully trained opioid users [5], their families or friends [6], needle exchange workers [21], staff in addiction clinics [22], police and fire-fighters [23]. The various lengths and formats of training reported in this literature suggests that less training may be needed than we thought [24]; for instance, participants in a recent UK trial saved a comparable number of people with naloxone regardless of whether they received the full training or information only (five vs three controls), over a three months follow up [6]. Our training produced slightly higher changes in positive attitudes, compared to the UK trial, it was linked with greater competence and confidence, but we could not demonstrate impact on the provider behaviour in an overdose situation. The changes in the attitudes towards and willingness to intervene in an opioid overdose suggest that our trainees would have used naloxone should they be provided with a take-home dose.
The feasibility and acceptability of our session for medical trainees were comparable with previous research in other groups [22, 23, 25, 26]. In this study, some aspects of the educational session were more helpful than has been reported in previous literature, i.e. hands-on experience with materials and access of GPs to INN kit [27].

Similar to previous initiatives developing and evaluating complex health interventions, the framework of Medical Research Council was efficiently applied to pilot-test a model for lay delivered IN naloxone for opioid overdose among drug users [28-30]. Intervention developed in this modelling phase built upon the hotspots mapping and qualitative exercises conducted in the pre-clinical stages [4, 12, 31].

The focus of the training developed in this pilot project was on intranasal naloxone and general practice (GP). This hasn’t been done before. While the target population of the training was unusual, GP trainees clearly demonstrated improved skill, knowledge and willingness to intervene in a possible opioid overdose. Recognising this implication should shift our thinking about the role of GPs in the management and prevention of overdoses. In the literature, GPs tend to be overlooked as a possible training/distribution avenue. This route may be a unique component of a national roll out of the naloxone strategy [32], and, as evident in our findings, one acceptable to primary health care professionals themselves. The decision to focus the educational session on the GP trainees was influenced mainly by a recent Scottish pre-implementation study [9], and the frequent contact that GPs have with patients in methadone maintenance treatment in Ireland [33], or elsewhere [34]. The Scottish pre-implementation study indicated that general practice may be a viable route for distributing naloxone in the community;
while half of the GPs were unsure about GP-based naloxone, the other half were willing to provide this drug to family or buddies of opioid users.

Intranasal naloxone (INN) is a needleless, safe and effective alternative to intramuscular formulations [10, 11, 35-37]. The next studies should use the INN for training and distribution, especially because of its safety for both bystanders (e.g. reduced fear of injury), and for opioid users (e.g. less suspicion from police if naloxone found). The challenge for future research and education is also to incorporate the INN training into medical education and engage other groups of service providers and clients to use INN and to prevent overdoses.

The current study is limited in several ways. Our findings are not generalizable to the larger population of GPs involved in addiction treatment. The GP trainees participated voluntarily, and were not obliged to take part in the training or to apply their learning in practice. Our core focus on application of a validated framework for development of health services interventions (MRC), together with the repeated-measures design, suggests a convincing potential value of the intervention for evaluation in future studies.

**Conclusion**

General practice trainees can be trained to support bystander response to overdose with intranasal naloxone. Appropriate training is a key requirement for distribution of naloxone through general practice. In future studies, our educational session should be used to inform a train-the-trainer model, whereby healthcare professionals and other frontline service providers
will be trained to instruct opioid users and their families in overdose prevention and naloxone
use. If feasible, such research can expand the role of general practice in the management of
opioid overdose and distribution of naloxone to opioid users, buddies, families, frontline service
providers and other professions.

Abbreviations

INN = Intranasal naloxone
GP = General Practice
MRC = Medical Research Council
OOKS = Opioid Overdose Knowledge Scale
OOAS = Opioid Overdose Attitudes Scale
SD = Standard Deviation
CPG = Clinical Practice Guidelines
CPR = cardio-pulmonary resuscitation
PHECC = The Pre-hospital Emergency Care Council of Ireland
UCD = University College Dublin
BLS = Basic Life Support
CFR = Cardiac First Response - Community (CFR)
CFR-A = Cardiac First Response - Advanced (CFR-A)
NHS = National Health Service
ICC = Intracluster correlation coefficient
Availability of Supporting Data

None.

Competing interests

None reported.

Authors’ contributions

GB and JK designed the study. ME, HT, GB and JK composed the training manual and study instruments. HT and ME organized the session. GB and NC delivered the educational session. HT and JK entered data for analyses. JK conducted the statistical analyses. JK drafted the first draft of manuscript and incorporated suggestions from all coauthors. All authors have read and approved the final version of the article.

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Table 1 Sample characteristics

| PROFILES OF TRAINING PRACTICES | N  | %  |
|--------------------------------|----|----|
| County of practice             |    |    |
| Dublin                         | 10 | 43%|
| Wicklow                        | 8  | 35%|
| Other                          | 3  | 12%|
| Missing data                   | 2  | 10%|
| GMS list size                  |    |    |
| <500                           | 1  | 4% |
| 500-1000                       | 4  | 17%|
| 1000-1500                      | 7  | 30%|
| 1500-2000                      | 2  | 9% |
| >2000                          | 8  | 35%|
| Missing data                   | 1  | 5% |
| Practice setting               |    |    |
| Urban                          | 9  | 39%|
| Rural                          | 5  | 22%|
| Mixed                          | 8  | 35%|
| Missing data                   | 1  | 5% |
| Mean number of GPs (excluding GP registrars) |    |    |
| F/t                            | 2.6| (SD 2.04)|
| P/t                            | 1.6| (SD 1.21)|
| Practice nurse                 | 12 | 52%|
| Active member of a Primary Care Team | 11 | 48%|
| Ever attended a primary care team meeting | 6  | 26%|
| Methadone prescribing          | 6  | 26%|
| Level of methadone prescribing |    |    |
| Level 1                        | 4  | 17%|
| Level 2                        | 2  | 9% |
| N of patients receiving methadone in the practice |    |    |
| 0-5                            | 1  | 4% |
| 5-10                           | 1  | 4% |
| 10-15                          | 2  | 9% |
| 15-20                          | 1  | 4% |
| Years prescribing methadone    |    |    |
| 3 years                        | 1  | 4% |
| TRAINEE PROFILE |       |     |
|----------------|-------|-----|
|                | 15+ years | 2  | 8% |
| Age            |       |     |
|                | 25-34 years | 21 | 91% |
|                | 35+ years  | 2  | 9% |
| Year of Graduation |       |     |
|                | 2008 | 5  | 22% |
|                | 2009 | 5  | 22% |
|                | 2010 | 4  | 17% |
|                | 2011 | 5  | 22% |
|                | other | 3  | 12% |
| Training in addiction |       |     |
|                | 0 hours | 1  | 4% |
|                | <4 hours | 3  | 13% |
|                | 4-10 hours | 7  | 30% |
|                | 11-40 hours | 2  | 9% |
|                | >40 hours | 1  | 4% |
| Trained in methadone prescribing |       |     |
|                | Level 1 | 8  | 35% |
|                | None/ Planned during training | 15 | 65% |
| (i) Ever witnessed an opioid overdose |       |     |
|                | Hospital | 9  | 39% |
|                | Community | 2  | 9% |
| (ii) No of Witnessed Hospital overdoses | 39+* |
| (iii) No of Witnessed Community overdoses |       |
| (iv) Ever administered Naloxone outside of Emergency Department | 5  | 22% |
| Knowledge on Drugs in Ireland |       |     |
| No of trainees who know how many people die due to overdose every year in Ireland | 10  | 43% |
| No of trainees who know how many people are currently in methadone treatment in Ireland | 8  | 35% |

*One trainee witnessed more than 10 hospital overdoses
Table 2 Self-reported change in knowledge and attitudes pre-/post-training, and usefulness of the session

| Knowledge / attitudes | Pre-training median/ mean (SD) | Post-training median/ mean (SD) | Mean diff (SD) | Wilcoxon Z/ P-value |
|-----------------------|-------------------------------|--------------------------------|----------------|---------------------|
| Knowledge:            | 28/ 27 (4.1)                  | 32/ 31.65 (1.11)               | 4.65 (4.13)    | -4.03, 0.000        |
| Risks                 | 8/ 7.48 (1.93)                | 9/ 8.65 (.65)                 | 1.17 (2.06)    | -2.69, 0.007        |
| Signs                 | 5/ 4.87 (1.25)                | 6/ 5.7 (.45)                  | 0.87 (1.39)    | -2.75, 0.006        |
| Actions               | 5/ 5.26 (1.1)                 | 6/ 6.4 (.58)                  | 1.13 (1.18)    | -3.62, 0.000        |
| INN use               | 10/ 9.39 (1.27)               | 11/ 10.8 (.34)                | 1.48 (1.2)     | -3.80, 0.000        |
| Attitudes:            | 96/ 97.4 (7.22)               | 108/ 108.57 (8.07)            | 11.13 (6.38)   | -4.11, 0.000        |
| Competencies          | 33/ 33.65 (4.68)              | 41/ 41 (3.96)                 | 7.39 (5.02)    | -4.11, 0.000        |
| Concerns              | 22/ 22.1 (2.64)               | 24/ 24 (2.92)                 | 2 (2.15)       | -3.46, 0.001        |
| Readiness             | 40/ 41.7 (3.33)               | 43/ 43.5 (3.85)               | 1.7 (2.77)     | -2.63, 0.008        |

The following were useful in education

| Completely agree / agree N (%) | Unsure | Completely disagree / disagree N (%) | Mean score post-training (SD) |
|--------------------------------|--------|-------------------------------------|-------------------------------|
| Presentation                   | 23 (100) | 0                     | 0                             | 4.48 (.51)               |
| Video                          | 19 (82.6) | 3 (13)               | 1 (4.3)                       | 4.22 (.85)               |
| Simulation                     | 23 (100) | 0                     | 0                             | 4.61 (.5)               |
| Q & A                          | 21 (91.3) | 2 (8.7)               | 0                             | 4.3 (.64)               |
| Guideline demonstration        | 20 (87)  | 3 (13)                | 0                             | 4.35 (.74)               |
Table 3 – Acceptability of the educational session

| How did you find each aspect of the session? | What was good about it? | How can it be improved? |
|---------------------------------------------|-------------------------|------------------------|
| Presentation                                | - Clear 4/15            | - Less rushed, more    |
|                                             | - Informative 7/15      | interactive 2/3        |
|                                             | - Concise 8/15          | - Stimulating questions|
|                                             |                         | 1/3                    |
| Video                                       | - Visual 3/11           | - Audio 6/7            |
|                                             | - Practical or          | - More time 1/7        |
|                                             | demonstrative 5/11      |                        |
|                                             | - Easy to follow 2/11   |                        |
| Simulation                                  | - Hands on experience of| - More time 2/6        |
|                                             | usage 13/18             | - Practice 1/6         |
|                                             | - Very/ good 2/18       | - Facilitators 1/6     |
|                                             | - Informative 2/18      | - Sound 1/6            |
|                                             | - Demonstrated ease of  |                        |
|                                             | use, increased          |                        |
|                                             | confidence 3/18         |                        |
| Q&A discussion                              | - Opportunity to ask    | - No major questions   |
|                                             | questions 4/6           | asked 2/5              |
|                                             | - Collaborative 1/6     | - More time 1/5        |
|                                             | - Good/ clear 2/6       | - Naloxone for lay     |
|                                             |                         | people and access for  |
|                                             |                         | GPs 1/5                |

Would any other educational interventions/activities help trainees?

- Booster sessions 1/9
- More simulations/real life situations 3/9
- More samples, syringes, differences between IN and exact-dose-dispenser 4/9
Suggestions for improvement:

- Booster sessions 3/8
- More time 2/8
- Scenarios 1/8
- Very/good 2/8

Numbers in brackets indicate how many trainees reported about the particular item.
Figure 1: Learning outcomes, delivery method / content and initial evaluation of the session
**Learning outcomes**
- To recognise opioid overdose
- To assemble naloxone
- To administer INN

**Delivery method**
- Formal presentation
- Video demonstrations of how to i) recognise opioid overdose, ii) assemble naloxone, and iii) administer INN
- Practical exercises on how to assemble and administer INN
- Q&A discussion
- Repeated measures assessment / feedback

**Evaluation of education session**
- Perceived changes in knowledge and attitudes
- Qualitative data on strengths / weaknesses
- Anonymous and confidential
Additional files provided with this submission:

Additional file 1: CL_BMC_09012015.docx, 117K
http://www.biomedcentral.com/imedia/6115358781564201/supp1.docx
Additional file 2: IN-Naloxone study_extension_27082014.pdf, 191K
http://www.biomedcentral.com/imedia/6605567891569576/supp2.pdf