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

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

4 **Abstract**

5 **Background:** Overdose is the most common cause of fatalities among opioid users. Naloxone is
6 a life-saving medication for reverting opioid overdose. In Ireland, it is currently available to
7 ambulance and emergency care services but General Practitioners (GP) are in regular contact
8 with opioid users and their families. This positions them to provide naloxone themselves or to
9 instruct patients how to use it. The new Clinical Practice Guidelines of the Pre-hospital
10 Emergency Council of Ireland allows trained bystanders to administer intranasal naloxone.
11 We describe the development and process evaluation of an educational intervention, designed to
12 help GP trainees identify and manage opioid overdose with intranasal naloxone.

13 **Results:** Knowledge of the risks of overdose, characteristics of overdose and appropriate actions
14 to be taken increased significantly post-training [OOKS mean difference, 4.65 (standard
15 deviation 4.13); $P < 0.001$]; attitudes improved too [OOAS mean difference, 11.13 (SD 6.38);
16 $P < 0.001$]. The most and least useful delivery methods were simulation and video, respectively.

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

22 **Conclusion.** Appropriate training is a key requirement for distribution of naloxone through
23 general practice. In future studies, the knowledge from this pilot will be used to inform a train-

24 the-trainer model, whereby healthcare professionals and other front-line service providers will be
25 trained to instruct opioid users and their families in overdose prevention and naloxone use.

26

27 *Keywords:* overdose, feasibility study, naloxone, heroin, education,

28 general practice

29

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

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Background

34 Overdose is the most common cause of death among opioid users and its prevention and
35 management are thus priorities for healthcare agencies [1]. Europe has on average 17 drug-
36 related deaths per million people (15–64 years) per year, varying from country to country [2].
37 With 70 drug-related deaths per million, Ireland has the third highest rate in Europe [2, 3].
38 Ambulance services in Dublin attend to an opioid overdose every day [4]. The use of the opioid
39 antagonist, naloxone, is well recognised as an effective treatment for opioid overdose, and
40 constitutes standard medical treatment in such situations. However, to prevent death, naloxone
41 must be given very soon after the opioid has caused respiratory depression or arrest [5]. To date,
42 naloxone has generally been used in injectable form, given via intramuscular, intravenous or
43 intraosseous routes. A number of systems to introduce naloxone to families, buddies and drug
44 workers have been established in countries other than Ireland and report positive effects [1, 6, 7].
45 Ireland currently has no such systems.
46 Bystanders, specifically frontline service providers, peers or family members of opioid users, are
47 best positioned to intervene immediately, when symptoms of overdose first appear [8]. General
48 Practitioners (GP) in Ireland are also in regular contact with opioid users (and their families)
49 either via methadone maintenance treatment or other medical services in general practice. This
50 access should allow GPs to provide naloxone themselves or to instruct patients or family
51 members on how to use it. However, no structured provision of naloxone exists in Irish general
52 practice and previous research elsewhere has shown that GPs lack skills and knowledge

53 regarding naloxone administration and require more training [9]. Our preliminary work
54 suggested this training should include elements of the ‘Clinical Practice Guidelines (CPG)
55 approved by the Pre-Hospital Emergency Care Council of Ireland in October 2013 (Emergency
56 First Response)’, specifically initiating contact with emergency services, cardio-pulmonary
57 resuscitation (CPR), and the administration of intranasal naloxone (INN) [10, 11]. However, the
58 feasibility and acceptability of such training for GPs has not been previously reported. Therefore,
59 the current study aimed:

- 60 - To develop an educational intervention that enables doctors in specialist training for GP
61 to support bystander response to overdose (i.e., initiating contact with emergency
62 services, CPR, etc.), and the administration of intranasal naloxone (INN),
- 63 - To determine the potential feasibility, acceptability and usefulness of this training to
64 trainee GPs.

65

66

Methods

67 **Design, sample and intervention.** Ireland’s population of 4.6m is served by approximately
68 2,600 GPs; around 160 doctors enter one of 14 specialist-training programmes in GP each year.
69 Each programme is accredited nationally and follows a standard four-year programme, the final
70 two years of which are spent in supervised training practices. Participants (N=23) from the
71 Dublin Mid Leinster Specialist Training Programme in GP, affiliated with University College
72 Dublin in Ireland, were invited to participate in a one-hour training session. All accepted and
73 took part in the study voluntarily. They were currently based in a designated training general
74 practice, under the supervision of an accredited GP trainer.

75

76 Most practices were in Dublin (43%), with 1000 or more patients on their General Medical
77 Services list (The GMS is a government subsidised health plan providing free point of care
78 primary care and medicines for those on low incomes); only six practices (26%) prescribed
79 methadone.

80 Most practices had one to three full-time GPs (16, 70%) and one to four part-time GPs (15,
81 83%). More than half of the practices had a practice nurse. Trainees were on average 25-34 years
82 old (91%), and mostly female (78%). Eight (35%) were trained methadone prescribers and 11
83 (48%) have witnessed an opioid overdose (Table 1).

84

85 <insert Table 1 here>

86 **Ethical considerations / Adherence to the International guidelines**

87 The Irish College of General Practitioners Research Ethics Committee approved this study
88 (August 27th, 2014). Research carried out on humans in this study is in compliance with the
89 Helsinki Declaration (<http://www.wma.net/en/30publications/10policies/b3/index.html>). This
90 study adheres to the RATS guidelines on qualitative research

91 (<http://www.biomedcentral.com/ifora/rats>). We informed the trainees about the study and
92 consented them to participate one week before the educational session. Our convenience sample
93 is likely to be representative of the national profile of doctors in specialist training for GP.

94

95 **Development of the educational session**

96 The educational session was developed as part of an evolving system of lay delivered INN. The
97 key components of the system include:

- 98 1. One-year prospective audit of characteristics of opioid overdoses reported to ambulance
99 services in Dublin [4, 12], and
- 100 2. Development and implementation of CPG-led lay administration of naloxone [13].
- 101 3. Exploration of mechanisms for roll-out of naloxone by registered Medical Practitioners,
102 since it remains a prescription-only drug in Ireland.

103

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

113

114 In the preclinical stage of the intervention development, we identified a need and targets for
115 naloxone distribution by geo-locating the urban overdose hotspots – areas with high rates of
116 overdoses [4]. They helped us to concentrate our efforts on general/ addiction care services in
117 inner city, Dublin. The subsequent modelling phase formulated clinical practice guidelines
118 (CPG). The Pre-hospital Emergency Care Council of Ireland approved it in October 2013
119 (PHECC, i.e., the Statutory Regulator for Pre-Hospital Emergency Care in Ireland). UCD
120 emergency medical science centre concurrently collaborated with PHECC and the Naloxone

121 Advisory Group to develop and pilot an educational session led by the guidelines. The guidelines
122 allow for training of lay people and health professionals in overdose prevention and naloxone
123 use, subject to previous CPR training.

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

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

129
130 All trainees were required to achieve the CFR standard as a prerequisite of the session (already
131 held by all participants). After completion of this pilot study, the session will be evaluated with a
132 group of community health professionals. Data from this feasibility evaluation will inform
133 design of the final stage of development of the national implementation of the INN distribution.

134

135 **Content and delivery of the educational session**

136 We based the intervention on our previous work, pre-implementation assessments from Scotland
137 and training of family members to manage heroin overdose and administer naloxone in England
138 [6]. More specifically, factors enabling naloxone distribution and use were incorporated:

139 evidence of effectiveness, appropriate training, and developing a policy regulation – the CPG –
140 that would allow intranasal administration [9, 16]. The intervention was facilitated by:

- 141 - a small group session,
- 142 - a practical exercise,

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

147

148

149 The video clip ensured fidelity and consistency of the information distribution. This was an
150 evidence-based methodology in emergency care training, used with emergency services globally
151 [17]. Multi-media theory was reinforced at each stage with practical application and exercises.

152 The video was three minutes long and its headings included:

- 153 - Recognition of overdose,
154 - Assembly of the drug administration system,
155 - INN administration.

156

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

162 The aims of the educational session, described in the current study, were to ensure that GP
163 trainees had the skills to manage an overdose (i.e., initiating contact with emergency services,

164 CPR, using INN and acquired sufficient knowledge, understanding and motivation to be willing
165 to undertake INN distribution and training. The key learning outcomes of the educational session
166 were to teach GPs how to i) recognise opioid overdose, ii) assemble INN, and iii) administer
167 INN (Figure 1).

168 <insert Figure 1 here>

169

170 **Data collection**

171

172 A repeated-measures design, using the validated Opioid Overdose Knowledge (OOKS) and
173 Attitudes (OOAS) Scales, examined changes immediately before and after the training.

174 Acceptability and satisfaction with training were measured with a self-administered
175 questionnaire (acceptability of the session, learning needs and suggested improvements).

176

177 OOKS has 45 items organised in four sub-scales (risks, signs, actions and naloxone use, range 0-

178 45). The OOAS has 28 items grouped in three sub-scales (competence, concerns and readiness,

179 range 28-140). Both scales were developed and psychometrically evaluated with a convenient

180 sample of friends and family members of heroin users and healthcare professionals in England.

181 Both OOKS and OOAS were shown internally reliable (Cronbach's alpha = 0.83 and 0.90,

182 respectively). Retest after 14 days also showed fair-to-excellent values (OOKS, ICC = 0.90 and

183 OOAS, ICC = 0.82). Professionals scored significantly higher on both scales than family

184 members [18]. We changed two questions about needles and deleted two items about injecting

185 naloxone in the attitudes scale (new range 26-130).

186

187 *Acceptability* of the session to trainees was assessed with open-ended questions that asked
188 trainees to write what was good or bad about each of the five training delivery methods. The
189 trainees rated each session based on its usefulness (5-point Likert scales); the rating scales were
190 taken from our previous study [19].

191

192 **Data analysis**

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

199

200

Results

201 **Pre-training and post-training knowledge**

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

205

<insert Table 2>

206

207 **Skills**

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

211

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

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

216

217 **Evaluation of the educational session**

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

220 <insert Table 3 here>

221

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

226 In the video, the trainees were able to "*actually see the device [Mucosal Atomiser Device]*". The
227 sound could be improved. During the practical simulation it was "*helpful to see how easy it is*
228 [*administration*]". More time could be spent on this. The trainees perceived the small-group
229 discussion as an "*opportunity to ask questions*". One commented, "*Would be nice to discuss*
230 *pros/cons of lay people having naloxone and where GP would avail of it.*"

231 Finally, trainees were given an opportunity to comment on their educational needs or provide
232 suggestions for improvement of the session (Table 3). Several wanted more examples or real life
233 situations to play with and two other trainees wished for more time or booster sessions: “*Very*
234 *quick session so difficult to fully answer all Q's [questions], however, very useful and would*
235 *definitely allow us/help us to know what to do in OD setting.*”

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Discussion

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.

259 The feasibility and acceptability of our session for medical trainees were comparable with
260 previous research in other groups [22, 23, 25, 26]. In this study, some aspects of the educational
261 session were more helpful than has been reported in previous literature, *i.e.* hands-on experience
262 with materials and access of GPs to INN kit [27].

263

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

269

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

282 while half of the GPs were unsure about GP-based naloxone, the other half were willing to
283 provide this drug to family or buddies of opioid users.

284

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

291

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

298

299

Conclusion

300

301 General practice trainees can be trained to support bystander response to overdose with
302 intranasal naloxone. Appropriate training is a key requirement for distribution of naloxone
303 through general practice. In future studies, our educational session should be used to inform a
304 train-the-trainer model, whereby healthcare professionals and other frontline service providers

305 will be trained to instruct opioid users and their families in overdose prevention and naloxone
306 use. If feasible, such research can expand the role of general practice in the management of
307 opioid overdose and distribution of naloxone to opioid users, buddies, families, frontline service
308 providers and other professions.

309

310 **Abbreviations**

311 INN = Intranasal naloxone

312 GP = General Practice

313 MRC = Medical Research Council

314 OOKS = Opioid Overdose Knowledge Scale

315 OOAS = Opioid Overdose Attitudes Scale

316 SD = Standard Deviation

317 CPG = Clinical Practice Guidelines

318 CPR = cardio-pulmonary resuscitation

319 PHECC = The Pre-hospital Emergency Care Council of Ireland

320 UCD = University College Dublin

321 BLS = Basic Life Support

322 CFR= Cardiac First Response - Community (CFR)

323 CFR-A = Cardiac First Response - Advanced (CFR-A)

324 NHS = National Health Service

325 ICC =Intracluster correlation coefficient

326

327 **Availability of Supporting Data**

328 None.

329 **Competing interests**

330 None reported.

331 **Authors' contributions**

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

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341
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462 **Tables and Figures**

463 Table 1 Sample characteristics

464

	N	%
PROFILES OF TRAINING PRACTICES		
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%

	15+ years	2	8%
TRAINEE PROFILE			
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		2	
(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%

465 *One trainee witnessed more than 10 hospital overdoses

466

467
 468 Table 2 Self-reported change in knowledge and attitudes pre-/post-training, and usefulness of the
 469 session

<i>Knowledge / attitudes</i>	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
<i>The following were useful in education</i>	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)

470

471 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	<ul style="list-style-type: none"> - Clear 4/15 - Informative 7/15 - Concise 8/15 	<ul style="list-style-type: none"> - Less rushed, more interactive 2/3 - Stimulating questions 1/3
Video	<ul style="list-style-type: none"> - Visual 3/11 - Practical or demonstrative 5/11 - Easy to follow 2/11 	<ul style="list-style-type: none"> - Audio 6/7 - More time 1/7
Simulation	<ul style="list-style-type: none"> - Hands on experience of usage 13/18 - Very/ good 2/18 - Informative 2/18 - Demonstrated ease of use, increased confidence 3/18 	<ul style="list-style-type: none"> - More time 2/6 - Practice 1/6 - Facilitators 1/6 - Sound 1/6
Q& A discussion	<ul style="list-style-type: none"> - Opportunity to ask questions 4/6 - Collaborative 1/6 - Good/ clear 2/6 	<ul style="list-style-type: none"> - No major questions asked 2/5 - More time 1/5 - Naloxone for lay people and access for GPs 1/5
<p><i>Would any other educational interventions / activities help trainees?</i></p> <ul style="list-style-type: none"> • 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

472 *Numbers in brackets indicate how many trainees reported about the particular item

473

474 Figure 1: Learning outcomes, delivery method / content and initial evaluation of the session

Figure 1: Learning outcomes, delivery method / content and initial evaluation of the session

<p>Learning outcomes</p> <ul style="list-style-type: none">• To recognise opioid overdose• To assemble naloxone• To administer INN <p>Delivery method</p> <ul style="list-style-type: none">• 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 <p>Evaluation of education session</p> <ul style="list-style-type: none">• 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>