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1 **Application of health psychology: Development of a practitioner training**
2 **intervention in anaphylaxis**

3

4 **Abstract**

5 Adrenaline auto-injectors (AAIs) improve outcomes and reduce fatalities in patients with
6 anaphylaxis, but many patients neither carry them nor know how to use them.

7 Practitioner training in evidence-based strategies designed to increase patient
8 adherence could improve the likelihood of AAI adherence, as well as increase
9 confidence amongst practitioners to initiate discussions about practical and perceptual
10 barriers to AAI adherence. This paper reports the development of a new practitioner
11 training intervention, grounded in health psychology theory and evidence designed for
12 practitioners in contact with patients with anaphylaxis to encourage adherence to AAIs.

13 Potential implications for the design, implementation and evaluation of future
14 practitioner training in strategies they can use to encourage anaphylaxis patients' AAI
15 adherence are discussed. Although designed for those working with anaphylaxis
16 patients, this step-by-step process to encouraging adherence could be adapted for
17 practitioners working with patients living with other long-term conditions.

18

19 **Keywords:** Anaphylaxis, adrenaline auto-injectors, adherence, behaviour change
20 intervention, practitioners

21

22 **Problem Statement**

23 Anaphylaxis is a “severe, life-threatening generalised or systemic hypersensitivity
24 reaction”.¹ p. 835 Hospital admission data indicates a UK population prevalence of 7 per
25 100,000 people, an increase of 615% from 1992-2012.² Early and appropriate
26 intervention with adrenaline auto-injectors (AAIs) improves outcomes and reduces
27 fatalities.³ Despite this, patients with anaphylaxis frequently do not adhere to essential
28 self-care behaviours; evidence suggests less than 30% of patients carry their AAI at all
29 times and only 44% are able to demonstrate correctly how to use them.⁴ Furthermore,
30 healthcare practitioners including physicians and pharmacists are frequently unable to
31 demonstrate the correct procedure for AAI use.⁵ Patients and practitioners both report
32 numerous practical, psychological and organisational barriers to adherence to
33 anaphylaxis self-care and /or treatment behaviours.⁶⁻⁹ Specialist Allergy staff may feel
34 ill-equipped to manage the psychological aspects associated with anaphylaxis, including
35 adherence, reporting time pressure, lack of clinic space and lack of confidence as key
36 barriers.⁹ This issue is not unique to anaphylaxis since approximately half of healthcare
37 practitioners perceive they have insufficient skills and confidence to promote behaviour
38 changes in their patients.¹⁰

39

40 Recent guidelines from the European Academy of Allergy and Clinical Immunology
41 state that current approaches to prescription and instruction for AAI use are generally
42 insufficient to promote patient adherence.¹¹ Given the vital function of AAIs in reducing
43 anaphylaxis-related fatalities³, improving the delivery of AAI training and evaluating the

44 impact on subsequent behaviour change (adherence) is a priority for research.¹¹
45 Evidence-based training interventions designed to support specialist and general
46 practitioners to work alongside patients to deliver AAI training and promote AAI
47 adherence are required urgently.

48

49 **Solution**

50 Health psychology involves the application of psychological theory and evidence to
51 health and healthcare delivery.¹² A key objective of this rapidly expanding discipline is
52 the development and evaluation of evidence-based behaviour change interventions to
53 enhance the physical and psychological health of patients living with long-term
54 conditions. Approaches such as Intervention Mapping (IM) outline step by step
55 procedures to identify the behavioural indicators associated with change, to develop,
56 then evaluate behaviour change interventions.¹³

57

58 This paper outlines how a health psychology informed approach was used to develop a
59 practitioner training workshop and focusses in detail on the processes involved with
60 adopting such an approach to develop training to enhance patient adherence to AAI_s.
61 This was informed by the principles of IM, a recently published guide to intervention
62 development for health behaviour change¹³⁻¹⁴ and grounded in previous qualitative
63 research conducted by the team, who comprised colleagues with academic and clinical
64 expertise in the area.⁹ The IM approach is comprised of six steps as shown in Figure
65 1.

66

<Insert figure 1 here>

67

68 IM was used because evidence suggests interventions developed using it have greater
69 uptake of the behaviours being promoted compared to interventions developed using
70 alternative models.¹⁵ Additionally, unlike other models of health promotion such as
71 *PRECEDE/PROCEED* and logic models, IM provides a step - by - step protocol that
72 health promotion and education planners can use to develop behaviour change
73 interventions based on available theory and empirical evidence.^{16 – 19} The IM protocol
74 starts with an early assessment of the health behaviours associated with the problem,
75 which are then mapped to relevant health behaviour change theories that can be
76 applied to underpin the subsequent intervention for development and evaluation .¹⁸

77

78 Step 1 in developing this training intervention comprised of a needs assessment. A
79 multi-disciplinary working group, including representatives from health psychology,
80 allergy, clinical immunology and general practice was set-up to conduct this assessment
81 specifying (1) the target population, (2) defining the health problem and (3) the
82 behaviour(s) associated with the problem/s as defined. The target population in this
83 case were:

84 (1) *Primary and secondary healthcare staff who train adults, adolescents and parents*
85 *of children with a diagnosis of anaphylaxis (any trigger) to use AAls.*

86 To understand the health problem, a definition of poor anaphylaxis self-care
87 management was identified from the literature:

88 (2) *Approximately 7 in 100,000 people experience anaphylaxis in the UK. Of these,*
89 *less than 30% carry an AAI at all times. Poorly managed anaphylaxis includes*
90 *failure to carry, use and maintain AAI and continuation of exposure to known,*
91 *avoidable triggers. The consequences of poorly managed anaphylaxis include*
92 *A&E admission, fatality (approximately 2% of cases) and psychological distress.*²

93 Finally, the problematic patient health behaviours which the intervention would target
94 were identified as:

95 (3) *Failure to carry an AAI at all times, check AAI in date/ renew prescriptions at*
96 *appropriate intervals, use the device when experiencing anaphylaxis and follow*
97 *the correct step-by-step procedure for use.*

98 Due to the target population for the proposed intervention, problematic practitioner
99 behaviours were also identified:

100 *Failure to ask patients about barriers to carrying and using AAI, and use*
101 *established behaviour-change techniques in training delivery*

102 Step 2 involved identifying determinants of the problematic patient and practitioner
103 behaviours to target in the training intervention. To identify key determinants, research
104 completed and published by the authors was used⁹, followed by consultation with
105 patients and healthcare practitioners working in primary and secondary care. Thus, a
106 range of evidence informed the final framework of determinants. Identified determinants
107 were then integrated and grouped according to theories of behaviour change, including
108 the Theoretical Domains Framework (TDF) and the COM-B model.^{20 - 21} The COM – B
109 model is a supra – theory that proposes individuals need capability, opportunity and

110 motivation to perform a health behaviour.^{22 - 23} The Theoretical Domains Framework
111 (TDF) is a more granular description of the components which comprise the COM – B
112 model, including the specific behavioural domains and determinants of a target health
113 behaviour²⁴ The TDF was applied in this instance given that it has previously served as
114 a practical guide for developers of health behaviour change interventions.²⁵ The
115 determinants of the problematic patient and practitioner AAI behaviour as identified
116 within Step 2 can be found in Table 1.

117 <Insert table 1 here>

118

119 Step 3 comprised of identifying, then setting objectives for the training intervention for
120 patients and practitioners. Select determinants were mapped against key performance
121 objectives to create a series of change objectives. An example of this mapping exercise
122 can be found in Table 2:

123 <Insert table 2 here>

124

125 Step 4 comprised of the identification of behaviour change techniques (BCTs) which
126 could help practitioners to target problematic behaviour, ready for inclusion in the
127 training intervention. BCTs are known as the active ingredients of interventions or
128 mechanisms of change within specified behaviour change theories. The TDF specifies
129 and defines 93 potentially relevant BCTs developed using a consensus method²⁹, for
130 example goal setting, action planning and habit formation.²⁶ In the current intervention,

131 15 relevant BCTs were selected on the basis of having reviewed the 93 BCTs and
132 selecting those relevant to the specific target problem behaviours of this project.

133

134 In step 5 practical plans were developed to translate these BCTs into a feasible training
135 package for practitioners. Feedback from the consultation with patients and staff was
136 taken into consideration, for example, practitioners suggested that the training be
137 delivered at their work place, over a lunch-time to maximise engagement. The final
138 intervention comprised of an interactive workshop delivered in a 90 minute session by a
139 trainee Health Psychologist. Four workshops were delivered in total across three sites
140 to mixed groups of specialist and non-specialist nurses, GPs and pharmacists. The
141 presentation and supporting manual for the workshop incorporated brief lectures,
142 application of principles to case studies and reflective exercises and was organised into
143 4 sections:

144 (1) What is adherence and why do we need to improve it for AAls? (a brief 15 minute
145 lecture)

146 (2) Barriers and facilitators to behaviour change (a brief 15 minute lecture)

147 (3) Theory-based AAI training using behaviour change techniques (a brief 15 minute
148 lecture followed by the application of techniques to two case studies with attendees
149 working in groups of 3-5 individuals lasting 25 minutes) and

150 (4) Reflection and taking things forward (discussion of how the techniques learnt could
151 be applied in attendees practice with attendees working in groups of 3-5 individuals
152 lasting 20 minutes).

153 Additional worksheets were developed to support the workshop (introduced at (3)) but
154 also to guide practitioners with their strategies with patients following the workshops.
155 The worksheets included an “AAI training checklist” and “Anaphylaxis management
156 plan”. The AAI training checklist detailed a step by step approach to patient training in
157 AAI use linked to the identified BCTs and supporting resources. The management plan
158 was designed to facilitate the delivery of specific BCTs such as action planning, goal
159 setting and problem solving. All materials were developed in consultation with patients
160 and practitioners and were informally piloted to check for suitability.

161

162 In step 6 the evaluation of the intervention is described to provide an example of how
163 an evaluation could be undertaken in line with the IM approach. Evaluations of any
164 behaviour change training intervention should not rely solely on the assessment of
165 effectiveness or outcomes, but also consider mechanisms involved in the process of
166 change and the acceptability of the training.²⁶ A mixed - methods evaluation designed
167 for a ‘real-world’ setting (i.e. without randomisation) was deemed the most suitable
168 approach that could be used to evaluate an intervention of this nature. Given the focus
169 on adherence and any change in practitioner behaviour, self-reported outcome
170 measures for practitioners and patients, designed to capture any behaviour changes as
171 targeted by the intervention, were identified as important to evaluate.²⁷ A mixed
172 methods evaluation of this type could provide an opportunity for qualitative feedback
173 from participant groups to enhance understanding of any quantitatively estimated
174 outcomes. Such approaches move beyond the traditional ‘black box’ evaluation of pre-
175 and post- outcomes, accounting for detailed feedback about the ‘why’ and ‘how’ of

176 outcomes. Evaluators are increasingly considering how to evaluate longer-term impact
 177 of training on practice. Given the desire to capture longer-term impact of such
 178 interventions, evaluators should consider how to ‘contract’ participants to the provision
 179 of ongoing feedback – for example the sharing of contact details for online survey
 180 contact or invitations to focus group sessions. Project leads also need to consider how
 181 to accommodate longer-term evaluations within their own training and project planning.
 182 Disseminating early findings from evaluations, with participants and other stakeholders,
 183 can be another mechanism to engender longer-term commitment to evaluation.
 184 Adoption of an Action Research-type cycle to evaluation, where the trainers evaluate
 185 and amend their intervention work in line with feedback iteratively, rather than as a pre-
 186 post model, could be another method for consideration. This approach could
 187 potentially help evaluators fully account for any practical, as well as any psychological,
 188 barriers to the implementation of behaviour changes into practice. The evaluation
 189 proposed for this particular intervention is provided here as a guide and shown in Table
 190 3:

191 <Insert table 3 here>

192
 193 The approach outlined demonstrates in detail the step-by-step development of a
 194 comprehensive, evidence-based practitioner training intervention designed to support
 195 practitioners and patients with strategies to encourage AAI adherence. The application
 196 of health psychology theory (via the COM-B model and TDF) are crucial in providing a
 197 clear framework to enable multi-disciplinary teams to articulate the target problem and

198 target population, then to identify the potential mechanisms associated with desired
199 behaviour change and relevant behaviour change techniques. The use of consultation
200 with practitioner and patient groups helps to ensure the training has face validity in
201 terms of targeted relevant problematic behaviours. Consultation is also vital to ensure
202 training amongst the target population is delivered in an acceptable, practical format
203 that is relevant for a 'real-world' rather than research environment. The multi-
204 disciplinary input (e.g. health psychology, allergy and clinical immunology, general
205 practice) and subsequent consensus approach enables synthesis of expertise to inform
206 the development of the training intervention. It is anticipated that the consensus
207 approach will increase the likelihood that the intervention as developed will be adopted,
208 implemented and sustained over the longer-term, embedding into routine practice.

209

210 Whilst there are many advantages to this approach, a potential limitation relates to
211 resources. This approach to the design of training is time consuming. The development
212 of the intervention reported here took around 8 weeks to complete using steps 1 – 6 of
213 the IM protocol. In addition, the IM approach captures context specific information to
214 identify determinants of the target problem health behaviours, and health education and
215 promotion developers would need to start the design process from step 1 each time in
216 order to develop a training intervention with contextual relevance. Furthermore,
217 opportunities for trainees to practice the learnt behaviours are important for effective
218 interventions but not included as part of the design reported. Specialist health
219 psychology expertise is also needed in following through this complex approach to
220 intervention design. Therefore, use of the COM – B Model and TDF must be planned

221 and resourced carefully. This may present a challenge to implementation in practice but
222 should be weighed against evidence that traditional CPD activities are often ineffective
223 at improving healthcare practitioner and /or patient outcomes.³⁰ Evidence-based, multi-
224 disciplinary approaches to training, which incorporate methods for overcoming barriers
225 to change, are required for successful knowledge translation.³⁰ Where time is
226 particularly limited for the development period, lengthy processes such as identifying
227 determinants can be shortened using existing literature reviews and greater emphasis
228 on clinical experience.¹⁴ A lack of consensus between patients and staff feedback on
229 the proposed intervention is a key risk associated with this approach, particularly at the
230 earliest stage of intervention development. For those adopting this method, the
231 sensitive management of expectations and regular communication is vital.

232

233 **Conclusion**

234 Health psychology approaches to intervention development can be applied to the
235 design and evaluation of healthcare staff training. However, they take time to carry out
236 and require stakeholder investment at each stage. Although the training intervention in
237 this case was developed for a specific target population and health problem, there are
238 key areas of transferability for the development of accessible, evidence-based CPD
239 training, particularly for staff working alongside patients with long-term conditions who
240 commonly experience challenges associated with self-care behaviours, including
241 adherence to prescribed treatments.³¹

242

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338

339 **Lessons for practice**

- 340 • CPD training designed to tackle adherence in relation to AAls could be enhanced
341 by utilizing the principles of Intervention Mapping when developing new
342 materials.
- 343 • Intervention Mapping principles provide step-by-step guidance around the
344 development, implementation and evaluation of programmes, including those
345 developed for multi-disciplinary audiences.
- 346 • Drawing together behaviour change techniques, staff expertise and experience
347 from practice, with the principles of Intervention Mapping to inform training
348 content, design, delivery, and the acceptability of CPD opportunities for staff
349 could be enhanced, maximizing the potential for impact on practice.