

Supplementary file 2

1. Matrix of how individual, included articles support the refinement of the initial programme theory by describing principles of academic detailing and educational outreach visiting and whether they support their relation to changes in prescribing (or not).

Outcomes: intended change in prescribing *qualitative studies in italics*Outcomes: equivocal / no change *qualitative studies in italics*

Articles in chronological order	Design programs to meet needs	Evidence-based approach Establish credibility	Concise educational materials	Acknowledge controversial issues.	Make practical recommendations	Hire and train clinicians	Training	Timing and location	Establish rapport	Elicit needs	Tailor EV	Interactive discussions	Repeat key messages	Elicit commitment	Provide resources	Sustain relationship
Avorn and Soumerai 1983 [2] / USA				X		X	X	X				X			X	X
Soumerai and Avorn 1987 [75] / USA										X						X
Yeo, de Burgh et al. 1994 [68] / Australia			X			X	X		X	X				X	X	
de Burgh, Mant et al. 1995 [66] / Australia			X		X	X	X									
Alvarez, Larmour et al. 2001 [49] / Australia	X		X				X								X	
Watson, Gunnell et al. 2001 [73] / UK		X				X	X				X					X
van Eijk, Avorn et al. 2001, van Eijk, Belitser et al. 2002 [69] / Netherlands			X								X		X			X
Freemantle, Eccles et al. 1999 [65], Freemantle, Nazareth et al. 2002 [71],		X	X		X	X	X		X		X					

Nazareth, Freemantle et al. 2002 [63] / UK																	
Fretheim, Oxman et al. 2003 [42], Fretheim, Aaserud et al. 2006 [72] / Norway	X					X	X										X
Habraken, Janssens et al. 2003 [60] / Belgium		X	X			X	X	X					X			X	
McDonald, Winkle et al. 2003 [62] / Australia		X															X
Coenen, Van Royen et al. 2004 [39] / Belgium	X	X	X			X	X				X	X	X	X			
<i>Janssens, De Meyere et al. 2005 [56] / Belgium</i>		X											X				
Simon, Majumdar et al. 2005 [48], Simon, Rodriguez et al. 2007 [54] / USA	X	X	X	X			X	X			X		X	X			
<i>Allen, Ferrier et al. 2007 [43] / Canada</i>	X	X	X			X	X		X								X
<i>May, Simpson et al. 2009 [52] / USA</i>		X	X					X	X	X	X	X		X		X	
Patel and Afghan 2010 [40] / UK	X	X	X				X	X						X	X	X	X
<i>Chhina, Hall et al. 2013 [24], Maltais, Schmidt et al. 2014 [46], Chhina, Hall et al. 2017 [38] / Canada</i>	X	X	X	X	X	X		X				X			X		
Carr, Patel et al. 2015 [47] / UK	X	X	X			X	X	X		X	X	X				X	X
Behar, Rowe et al. 2017 [61] / USA	X	X				X		X				X			X		

<i>Morrow, Tattelman et al. 2016 [55] / USA</i>		X				X	X		X		X			X		X
Bounthavong, Suh et al. 2020 [70], Gale, Wu et al. 2019 [67] / USA		X	X			X										
<i>Vasudev, Lamoure et al. 2017 / Canada</i>	X	X	X			X	X							X	X	X
<i>Anthierens, Verhoeven et al. 2017 [12], Bruyndonckx, Verhoeven et al. 2018 [57] / Belgium</i>	X	X	X	X	X	X	X	X	X	X	X	X		X		
Midboe, Wu et al. 2018 [64] / USA		X			X		X			X	X			X		
<i>Pinto, Heleno et al. 2018 [53] / USA</i>	X		X	X		X	X	X		X	X			X		X
Riordan, Hurley et al. 2019 [50] / Ireland	X		X				X	X	X		X					
Dyrkorn, Langaas et al. 2019 [11] / Norway	X	X	X			X	X	X				X	X		X	
<i>Carvalho Borin, Kakehasi et al. 2020 [45] / Brazil</i>	X	X	X			X				X	X					
Saffore, Tilton et al. 2020 [58], Saffore, Pickard et al. 2020 [59], Saffore, Pickard et al. 2021 [76] / USA		X				X	X			X		X	X	X	X	
<i>Smart, Mandava et al. 2021 [44] / USA</i>	X		X			X	X				X	X				X
Ragan, Aikens et al. 2021 [74] / USA						X				X	X					X

2. Timeline of main visiting topics described in included articles

1983	1995	2000-2005	2006-2010	2011-2015	2016-2022
Propoxyphene Vasodilators Antibiotics	BZD*	NSAIDs Antibiotics Antihypertensives Antidepressants Antiplatelets	Analgesics Antidiabetics Antidepressants	Antihypertensives DOACs	Opioids Naloxone NSAIDs BZD bDMARDs Antibiotics Antipsychotics

BZD: benzodiazepines

NSAIDS: non-steroidal anti-inflammatory drugs

DOAC: direct oral anticoagulant

bDMARD: biologic disease modifying antirheumatic drug

* in bold EV topics covered in multiple studies