

Title	Identification of behaviour change techniques in deprescribing interventions: a systematic review and meta-analysis
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Supplementary file - Tables S1 - S4

Supplementary tables to the manuscript "IDENTIFICATION OF BEHAVIOUR CHANGE TECHNIQUES IN DEPRESCRIBING INTERVENTIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS"

Population	Intervention	Outcome	Filters
Aged, aged 80 and over, adult*, older people, elderly	Deprescriptions, deprescri*, discontinu*, reduc*, ending, stopping	Drug prescriptions, polypharmacy, inappropriate prescribing, prescription*, inappropriate prescriptions, medication*, medicine*	Clinical trial, controlled clinical trial, randomised controlled trial

Table S1 Search strategy

Database	Search	Results
MEDLINE	(adult* OR aged OR "older patients" OR "old patients" OR elderly)	124
Dec 14 th , 2016	AND	
	((deprescriptions [MeSH] N2 drug prescriptions [MeSH] OR	
	deprescriptions [MeSH] N2 polypharmacy [MeSH] OR	
	deprescriptions [MeSH] N2 inappropriate prescribing [MeSH] OR	
	deprescriptions [MeSH] N2 prescriptions [MeSH] OR	
	deprescriptions [MeSH] N2 prescription OR	
	deprescriptions [MeSH] N2 polypharmacy OR	
	deprescriptions [MeSH] N2 'inappropriate prescribing' OR	
	deprescriptions [MeSH] N2 'inappropriate prescriptions' OR	
	deprescriptions [MeSH] N2 medication* OR	
	deprescriptions [MeSH] N2 medicine*)	
	OR	
	(deprescri* N2 drug prescriptions [MeSH] OR	
	deprescri* N2 polypharmacy [MeSH] OR	
	deprescri* N2 inappropriate prescribing [MeSH] OR	
	deprescri* N2 prescriptions [MeSH] OR	
	deprescri* N2 prescription OR	
	deprescri* N2 polypharmacy OR	
	deprescri* N2 'inappropriate prescribing' OR	
	deprescri* N2 'inappropriate prescriptions' OR	
	deprescri* N2 medication* OR	
	deprescri* N2 medicine*)	
	OR	
	(discontinu* N2 drug prescriptions [MeSH] OR	
	discontinu* N2 polypharmacy [MeSH] OR	
	discontinu* N2 inappropriate prescribing [MeSH] OR	
	discontinu* N2 prescriptions [MeSH] OR	
	discontinu* N2 prescription OR	
	discontinu* N2 polypharmacy OR	
	discontinu* N2 'inappropriate prescribing' OR	
	discontinu* N2 'inappropriate prescriptions' OR	
	discontinu* N2 medication* OR	
	discontinu* N2 medicine*)	
	OR	
	(reduc* N2 drug prescriptions [MeSH] OR	
	reduc* N2 polypharmacy [MeSH] OR	

	reduc* N2 inappropriate prescribing [MeSH] OR			
	reduc* N2 prescriptions [MeSH] OR			
	reduc* N2 prescription OR			
	reduc* N2 polypharmacy OR			
	reduc* N2 'inappropriate prescribing' OR			
	reduc* N2 'inappropriate prescriptions' OR			
	reduc* N2 medication* OR			
	reduc* N2 medicine*)			
	OR			
	(ending N2 drug prescriptions [MeSH] OR			
	ending N2 polypharmacy [MeSH] OR			
	ending N2 inappropriate prescribing [MeSH] OR			
	ending N2 prescriptions [MeSH] OR			
	ending N2 prescription OR			
	ending N2 polypharmacy OR			
	ending N2 'inappropriate prescribing' OR			
	ending N2 'inappropriate prescriptions' OR			
	ending N2 medication* OR			
	ending N2 medicine*)			
	OR			
	(stopping N2 drug prescriptions [MeSH] OR			
	stopping N2 polypharmacy [MeSH] OR			
	stopping N2 inappropriate prescribing [MeSH] OR			
	stopping N2 prescriptions [MeSH] OR			
	stopping N2 prescription OR			
	stopping N2 polypharmacy OR			
	stopping N2 'inappropriate prescribing' OR			
	stopping N2 'inappropriate prescriptions' OR			
	stopping N2 medication* OR			
	stopping N2 medicine*))			
	Filters applied:			
	Clinical trial			
	Controlled clinical trial			
	Randomised controlled trial			
Academic	(adult* OR aged OR "older patients" OR "old patients" OR elderly)	33		
Search	AND			
Complete	((deprescriptions [MeSH] N2 drug prescriptions [MeSH] OR			
Dec 14 th , 2016	deprescriptions [MeSH] N2 polypharmacy [MeSH] OR			
	deprescriptions [MeSH] N2 inappropriate prescribing [MeSH] OR			

deprescriptions [MeSH] N2 prescriptions [MeSH] OR	
deprescriptions [MeSH] N2 prescription OR	
deprescriptions [MeSH] N2 polypharmacy OR	
deprescriptions [MeSH] N2 'inappropriate prescribing' OR	
deprescriptions [MeSH] N2 'inappropriate prescriptions' OR	
deprescriptions [MeSH] N2 medication* OR	
deprescriptions [MeSH] N2 medicine*)	
OR	
(deprescri* N2 drug prescriptions [MeSH] OR	
deprescri* N2 polypharmacy [MeSH] OR	
deprescri* N2 inappropriate prescribing [MeSH] OR	
depreseri* N2 prescriptions [MeSH] OR	
depreseri* N2 prescription QR	
depreseri* N2 polypharmacy OR	
deprescri* N2 (inappropriate prescribing' OR	
deprescri* N2 inappropriate prescriptions' OR	
depreseri* N2 madication* OP	
depreseri* N2 medicine*)	
(discontinu* N2 drug prescriptions [MeSH] OP	
discontinu [*] N2 polypharmacy [MeSH] OP	
discontinu* N2 inappropriate prescribing [MeSH] OP	
discontinu* N2 mappropriate prescribing [MeShi] OR	
discontinut N2 prescription OP	
discontinut N2 prescription OR	
discontinut N2 (inconsentiate preseribing) OR	
discontinut N2 inappropriate prescriptions? OD	
discontinut N2 inappropriate prescriptions OR	
discontinu" N2 medication" OR	
discontinu" N2 medicine")	
(reduc" N2 drug prescriptions [MeSH] OR	
reduc [®] N2 inappropriate prescribing [MeSH] OR	
reduc [®] N2 prescriptions [MeSH] OR	
reduc* N2 prescription OR	
reduc* N2 polypharmacy OR	
reduc* N2 'inappropriate prescribing' OR	
reduc* N2 'inappropriate prescriptions' OR	
reduc* N2 medication* OR	
reduc* N2 medicine*)	

	OR			
	(ending N2 drug prescriptions [MeSH] OR			
	ending N2 polypharmacy [MeSH] OR			
	ending N2 inappropriate prescribing [MeSH] OR			
	ending N2 prescriptions [MeSH] OR			
	ending N2 prescription OR			
	ending N2 polypharmacy OR			
	ending N2 'inappropriate prescribing' OR			
	ending N2 'inappropriate prescriptions' OR			
	ending N2 medication* OR			
	ending N2 medicine*)			
	OR			
	(stopping N2 drug prescriptions [MeSH] OR			
	stopping N2 polypharmacy [MeSH] OR			
	stopping N2 inappropriate prescribing [MeSH] OR			
	stopping N2 prescriptions [MeSH] OR			
	stopping N2 prescription OR			
	stopping N2 polypharmacy OR			
	stopping N2 'inappropriate prescribing' OR			
	stopping N2 'inappropriate prescriptions' OR			
	stopping N2 medication* OR			
	stopping N2 medicine*))			
	AND			
	("clinical trial*") OR ("controlled clinical trial*") OR ("randomized			
	controlled trial*") OR ("randomised controlled trial*") OR ("controlled			
	trial")			
Web of	(adult* OR aged OR "older patients" OR "old patients" OR elderly)	642		
Science [†]	AND			
Dec 14 th , 2016	((deprescri* NEAR/2 "polypharmacy") OR			
	(deprescri* NEAR/2 "inappropriate prescribing") OR			
	(deprescri* NEAR/2 prescription*) OR			
	(deprescri* NEAR/2 medication*) OR			
	(deprescri* NEAR/2 medicine*) OR			
	(discontinu* NEAR/2 polypharmacy) OR			
	(discontinu* NEAR/2 "inappropriate prescribing") OR			
	(discontinu* NEAR/2 prescription*) OR			
	(discontinu* NEAR/2 medication*) OR			
	(discontinu* NEAR/2 medicine*) OR			
	(reduc* NEAR/2 polypharmacy) OR			
	(reduc* NEAR/2 "inappropriate prescribing") OR			

	(reduc* NEAR/2 prescription*) OR				
	(reduc* NEAR/2 medication*) OR				
	(reduc* NEAR/2 medicine*) OR				
	(ending NEAR/2 polypharmacy*) OR				
	(ending NEAR/2 prescription*) OR				
	(ending NEAR/2 "inappropriate prescribing") OR				
	(ending NEAR/2 medication*) OR				
	(ending NEAR/2 medicine*) OR				
	(reduction NEAR/2 "inappropriate prescribing") OR				
	(stopping NEAR/2 polypharmacy) OR				
	(stopping NEAR/2 "inappropriate prescribing") OR				
	(stopping NEAR/2 prescription*) OR				
	(stopping NEAR/2 medication*) OR				
	(stopping NEAR/2 medicine*))				
	AND				
	("clinical trial") OR ("controlled clinical trial") OR ("randomized				
	controlled trial") OR ("randomised controlled trial") OR ("controlled				
	trial")				
EMBASE [‡]	('adult'/de OR 'adult' OR 'aged'/de OR 'aged' OR 'older people' OR	645			
Dec 14 th , 2016	elderly)				
	AND				
	Deprescription NEAR/2 prescription				
	Deprescription NEAR/2 polypharmacy				
	Deprescription NEAR/2 'inappropriate prescribing'				
	Deprescription NEAR/2 medication				
	Deprescription NEAR/2 medicine				
	Discontinu* NEAR/2 prescription				
	Discontinu* NEAR/2 polypharmacy				
	Discontinu*NEAR/2 'inappropriate prescribing'				
	Discontinu* NEAR/2 medication				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine Reduc* NEAR/2 prescription				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine Reduc* NEAR/2 prescription Reduc* NEAR/2 polypharmacy				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine Reduc* NEAR/2 prescription Reduc* NEAR/2 polypharmacy Reduc* NEAR/2 'inappropriate prescribing'				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine Reduc* NEAR/2 prescription Reduc* NEAR/2 polypharmacy Reduc* NEAR/2 'inappropriate prescribing' Reduc* NEAR/2 medication				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine Reduc* NEAR/2 prescription Reduc* NEAR/2 polypharmacy Reduc* NEAR/2 'inappropriate prescribing' Reduc* NEAR/2 medication Reduc* NEAR/2 medication				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine Reduc* NEAR/2 prescription Reduc* NEAR/2 polypharmacy Reduc* NEAR/2 'inappropriate prescribing' Reduc* NEAR/2 medication Reduc* NEAR/2 medication Ending NEAR/2 prescription				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine Reduc* NEAR/2 prescription Reduc* NEAR/2 polypharmacy Reduc* NEAR/2 'inappropriate prescribing' Reduc* NEAR/2 medication Reduc* NEAR/2 medication Ending NEAR/2 prescription Ending NEAR/2 polypharmacy				
	Discontinu* NEAR/2 medication Discontinu* NEAR/2 medicine Reduc* NEAR/2 prescription Reduc* NEAR/2 polypharmacy Reduc* NEAR/2 'inappropriate prescribing' Reduc* NEAR/2 medication Reduc* NEAR/2 medicine Ending NEAR/2 prescription Ending NEAR/2 polypharmacy Ending NEAR/2 'inappropriate prescribing'				

Ending NEAR/2 medicine	
Stopping NEAR/2 prescription	
Stopping NEAR/2 polypharmacy	
Stopping NEAR/2 'inappropriate prescribing'	
Stopping NEAR/2 medication	
Stopping NEAR/2 medicine	
Filters:	
'controlled clinical trial'	
'randomized controlled trial'	

[†]It is not possible to use MeSH terms in Web of Science and the filters available did not match the search strategy, therefore additional keywords were added to the search, i.e. "clinical trials" etc. [‡]EMTREE mapping used for all relevant words, i.e. adult, aged, deprescription, prescription, inappropriate prescribing and polypharmacy.

Table S2 Risk of bias assessment

Description of risk of bias assessment

Random sequence generation and allocation concealment were judged to be at low risk of bias if methods for both were described in sufficient detail to determine its adequateness. Inadequate sequence generation methods (such as date of entry) and concealment methods were judged to have high risk of bias. Blinding procedures were considered to carry a low risk of bias if the description of the procedure reflected blinding. Absence of blinding or unblinding of participants and personnel were both deemed to introduce high risk of bias. Selective outcome reporting was assessed at low risk of bias if all patient-relevant outcomes described in the methods section were fully addressed in the paper. Incomplete outcome data were typically rated as high risk of bias if the loss of patients to follow-up was $\geq 20\%$ and rated as low risk if $\leq 10\%$. Imbalance in the proportions of patients lost to follow-up between intervention and control groups was also considered to introduce bias. Unclear risk of bias was judged for any study element for which there was insufficient information.

Description of risk of bias categorised as 'other bias' in the assessment

Allard et al. (2001) - High risk

No information on how the study chose which physician to contact for each patient, i.e. no information of whether it was the primary prescriber or the prescriber who prescribed most of the medications. This may have had an effect on their actions on the recommendations given and their collaboration.

Some of the prescribers had patients in both experimental and control group and there may have been a carry-over-effect. However, the study reported that this had no effect on the outcomes. No control for number of prescribers and some patients had multiple prescribers which may have had an effect on the outcomes.

Crotty et al. (2004) - Unclear risk

The study is a cluster-RCT but the clustering was not accounted for in the data analysis. Rather than analysing the data at cluster-level, the data were analysed at patient-level by pooling the data for the intervention clusters into one group and pooling the data for the control cluster into one group (i.e. one control group and one within-facility control group). The study did not account for correlation between observations for patients in the same cluster.

Fick et al. (2004) - Unclear risk

During the 6-month follow-up after the end of the study, the study mentioned that: "During our study period, major changes occurred in the primary care physician network, with 78 primary care

providers leaving the network, 129 joining the network....so we did not conduct a further analysis of PIM use at the provider level".

Pitkälä et al. (2014) - Low risk

There may have been potential contamination if some of the healthcare professionals worked in multiple wards during the study.

Pope et al. (2011) - High risk

Prior to admission, the suitability of each patient for admission to a continuing-care ward had been assessed by a multidisciplinary panel chaired by a consultant geriatrician. Some medication-related problems may have been solved prior to randomisation. The study commented on this. GPs in the control group had access to specialist geriatric medicine advice on request. The study did not report how often the GPs requested this and what the outcome was. This may have affected the outcomes for the control group and "hidden" the "true" effect of the intervention.

Richmond et al. (2010) - High risk

The study had underestimated the number of drugs prescribed to patients at the final time point used in the study. As a result, there was a significant difference in the mean number of drugs shown on prescription at the final time point compared with the number over the four previous months (diff=1.14, 95% CI 1.01, 1.27). The number of drugs affects the UK-MAI score (primary outcome), and this appeared to indicate that medication appropriateness had improved at the final follow-up time point. The study commented on this and corrected for this.

Saltvedt et al. (2005) - High risk

"Suitable patients were screened when there was a free bed in the specialist ward. Eligible patients who had been recently admitted to the department were preferred over those who had been there longer." This could have introduced a selection bias which could have affected the generalisability of the findings to the wider population.

Spinewine et al. (2007) - Low risk

Because the same physicians were caring for control and intervention patients, contamination of control patients was possible. To assess this bias, two investigators applied the outcome assessment to a random sample of 90 patients to the unit 1 year before the study, i.e. a "historical control group". This could only be done for two of three primary outcome measures.

Tamblyn et al. (2003) - Unclear risk

The study experienced two problems that influenced the effectiveness of the computer-system intervention, these being co-payments for prescription drugs increased when the study began and many software problems that resulted in information downloaded less often.

Another potential bias was the study design using cluster-randomisation. However, the study did account for the clustering in the data analysis: "Physicians were identified as the clustering factor within which rates were examined, and an exchangeable correlation structure was used to take into account the dependence of observations for patients of the same physician." We consider no risk of bias associated with clustering and data analysis.

Tannenbaum *et al.* (2014) - Low risk

The study design was a cluster-RCT with community pharmacies as the clusters. When assessing the primary outcome (complete cessation of benzodiazepine use) the study used the participant as the unit of analysis, the community pharmacy as the cluster, an exchangeable correlation coefficient to account for clustering effects of participants within the same cluster.

Table S3 Data extraction form

Author (year)	Country	Setting primary/secondary/tertiary (specified)	Aim

Intervention type (e.g. medication reviews, electronic alerts, education etc.)	Intervention description	Control type (e.g. usual care, different education/training)	Who delivered the intervention? (researcher, pharmacists etc.)	
Intervention target person (i.e. whose behaviour was changed/targeted?)	Follow-up duration	Primary outcome	Secondary outcomes	
Tool /Measure to identify target/outcome (only for prescribing appropriateness)	Number of participants enrolled in total and for individual arm	N (participants, total)	Gender female (%) (both total, intervention group and control group)	
Age of study population (specify mean or median)	Average of Mean (SD)	Ethical considerations (yes/no/cant' tell)	The study conclusion (short!)	
Trial design	Where were participants recruited from?	How were participants recruited? (database, telephone etc.)	Sample size calculation/consideration reported (yes/no)	
Data collection (i.e. source of information)	Blinding (who was blinded or what process what blinded?)	Randomisation strategy	Eligibility criteria of study subject/patients (who was invited?)	
Inclusion criteria (study subjects/patients)	Exclusion criteria (study subjects/patients)	Medication use/prescribing rate at baseline	Number of participants experiencing reduction in number of prescriptions (in all intervention and control groups) Event/Intervention and event/control	
Number of participants experiencing reduction in number of medication (in all control and intervention groups)	Number of participants experiencing reduction in number of PIPs/PIMs (in all control and intervention groups)	Change in number of PIPs/Rx/Drugs/Dosages	Change in MAI-score	

Healthcare services	ADRs/ADEs	Medication costs	Other comments on
utilization (hospital	prevalence		outcomes (if relevant to
admission, GP visits			the review)
etc.)			

Table S4 Behaviour change techniques taxonomy version 1 (BCTTv1) applied to the included studies and the prevalence of each BCT and BCT cluster [1].

					Weighted
			Weighted		frequency
			frequency for		for
		Studies	studies	Studies	studies
	All studies	reporting	reporting	reporting no	reporting
BCTTv1 cluster	(n=23)	effect (n=9)	effect	effect (n=14)	no effect
1. Goals and		. ,			
planning	19	11	28	8	13
1.1 Goal setting					
(behaviour)	1	1	3	0	0
1.2 Problem solving	6	3	8	3	5
1.2 Froblem Solving	Ŭ	3	0		5
(outcome)	3	2	E	1	2
	0	4	10	4	
1.4 Action planning	ð	4	10	4	/
1.5 Review	1	1		0	
behaviour goal(s)			3		0
2. Feedback and					
monitoring	29	10	26	19	31
2.1 Monitoring of					
behaviour by others	4	2	-	2	2
without feedback			5		3
2.2 Feedback on	14	4	10	10	16
2.2 Solf monitoring of			10		10
hehaviour	3	2	5	1	2
2.4 Self-monitoring of					
outcome(s)	2	0	0	2	3
2.7 Feedback on					
outcome(s) of	6	2		4	
behaviour			5		7
3. Social support	12	5	13	7	12
3.1 Social support	10	F		Г	
(unspecified)	10	5	13	5	8
3.2 Social support	2	0		2	
(practical)	2	0	0	2	3
4. Shaping					
knowledge	17	7	18	10	16
4.1 Instruction on how	16	7		q	
to perform a behaviour	10	,	18	5	15
4.3 Re-attribution	1	0	0	1	2
5. Natural					
consequences	10	5	13	5	8
5.1 Information about	Q	Δ		Λ	
health consequences	0	+	10	-	7

5.2 Salience of	1	1		0	
consequences	-	-	3	•	0
5.3 Information about					
social and	1	0		1	
environmental	-	Ū		-	
consequences			0		2
6. Comparison of					
behaviour	4	2	5	2	3
6.1 Demonstration of	3	1		2	
the behaviour	,	-	3	-	3
6.3 Information about	1	1	3	0	
others' approval					0
7. Associations	4	0	0	4	7
7.1 Prompts/cues	4	0	0	4	7
8. Repetition and					
substitution	6	2	5	4	7
8.1 Behavioural	2	1		2	
practice/rehearsal	5	1	3	2	3
8.2 Behaviour	2	1		2	
substitution	5	1	3	2	3
9. Comparison of					
outcomes	16	7	18	9	15
9.1 Credible source	16	7	18	9	15
10. Reward and					
threat	1	0	0	1	2
10.4 Social reward	1	0	0	1	2
11. Regulation	1	1	3	0	0
11.1 Pharmacological	1	4		0	
support	1	1	3	0	0
12. Antecedents	4	2	5	2	3
12.1 Restructuring the				0	
physical environment	1	1	3	U	0
12.5 Adding objects to	2	<i>,</i>		2	
the environment	3	1	3	2	3
13. Identity	1	1	3	0	0
13.2	1	1		0	
Framing/reframing	1	T	3	U	0

1. Michie S, Richardson MN, Johnston M, Abraham C, Francis J, Hardeman W, et al. The Behaviour Change Tecnique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behaviour Change Interventions. Ann Behav Med. 2013;46:81-95.