Evidence-Based Management of Nocturnal Enuresis: An Overview of Systematic Reviews

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TABLE I SUMMARY OF SYSTEMATIC REVIEWS OF INTERVENTIONS FOR NOCTURNAL ENURESIS

Intervention(s) evaluated	Data updated till
Simple behavioural interventions(4)	21 Nov 2005
Complex educational and behavioural interventions(5)	19 Mar 2008
Alarms(6)	27 Feb 2007
Desmopressin(7)	09 May 2006
Tricyclic antidepressants(8)	18 Jun 2007
Other drugs(9)	18 Jun 2007
Complementary therapies(10)	15 Nov 2006
Acupuncture(11)	Not specified

Table II COMPARISON OF DIFFERENT INTERVENTIONS AGAINST NO TREATMENT OR PLACEBO

Intervention	Number of wet nights/ wk MD (95% CI)	treatment failure during treatment RR (95% CI)	Treatment failure or relapse RR (95% CI)
Behavioural interventions			
Retention control training *vs* control(6)	-1.90 (-3.67, -0.13); N=1, *n*=21	0.85 (0.63, 1.15); N=1, *n*=21	
Waking *vs* placebo(6)	-0.99 (-2.34, 0.56); N=1, *n*=32	1.22 (0.91, 1.64); N=1, *n*=32	
Dry bed training *vs* control(5)		0.82 (0.66, 1.03); N=2, *n*=60	NE; N=1
Education using CD *vs* nothing(5)	NE; N=1	NE; N=1	
Written education *vs* nothing(5)	NE; N=1	NE; N=1	
Play & supportive therapy *vs* placebo(10)		0.83 (0.45, 1.43); N=1, n=29	
Cognitive therapy/psychotherapy/ counselling *vs* control(10)		0.69 (0.56, 0.85); N=3, *n*=105	
Alarms			
Alarm *vs* control(6)	-3.34 (-4.14, -2.55); N=4, *n*=109	0.39 (0.33, 0.45); N=14, *n*=576	0.57 (0.47, 0.70); N=5, n=162
Drugs- Desmopressin(7)			
Desmopressin 10mg/d *vs* placebo	-2.30 (-3.42, -1.18); N=2, n=57; After treatment: 0.09 (-1.10, 1.27); N=2, *n*=54	0.64 (0.41, 0.98); N=1, *n*=32	
Desmopressin 20mg/d *vs* placebo	-1.34 (-1.57, -1.11); N=12, *n*=813; After treatment: 0.54 (-1.15, 2.23); N=1, *n*=22	0.84 (0.78, 0.89); N=6, *n*=463	NE; N=1, n=34
Desmopressin 40mg/d *vs* placebo	-1.33 (-1.67, -0.99); N=6, n=424	0.81 (0.74, 0.89); N=6, *n*=463	
Desmopressin 60mg/d *vs* placebo	-1.50 (-1.92, -1.08); N=2, *n*=164	0.94 (0.88, 1.00); N=2, *n*=165	
Desmopressin 80mg/d *vs* placebo		0.84 (0.71, 1.00); N=1, n=66	
Drugs- Tricyclic antidepressants(8)			
Imipramine *vs* placebo	-0.92 (-1.38, -0.46); N=3, *n*=329	0.77 (0.72, 0.83); N=11, *n*=813	0.98 (0.94, 1.03); N=5, n=416
Viloxazine *vs* placebo	-3.1 (-5.64, -0.56); N=1, *n*=24		
Desipramine *vs* placebo		0.83 (0.70, 0.97); N=1, *n*=100	
Mianserin *vs* placebo		0.86 (0.61, 1.22); N=1, *n*=55	
Amitriptyline *vs* placebo		0.82 (0.69, 0.98); N=2, *n*=98	
Nortriptyline *vs* placebo		NE; N=1, *n*=175	1.00 (0.97, 1.03); N=1, *n*=175

Intervention	Number of wet nights/ wk MD (95% CI)	treatment failure during treatment RR (95% CI)	Treatment failure or relapse RR (95% CI)
Other drugs(9)			
Indomethacin suppository *vs* placebo		-3.06 (-3.89, -2.23); N=2, *n*=92	0.36 (0.16, 0.79); N=1, *n*=38
Diclofenac *vs* placebo		-4.21 (-5.76, -2.66); N=1, *n*=40	
Diazepam *vs* placebo		-4.87 (-6.25, -3.49); N=1, *n*=50	0.22 (0.11, 0.46); N=1, *n*=50
Chlorprotixine *vs* placebo		0.95 (0.85, 1.07); N=1, *n*=90	
Meprobamate *vs* placebo		1.11 (0.92, 1.35); N=1, *n*=67	
Hydroxyzine *vs* placebo		0.83 (0.70, 0.97); N=1, *n*=80	
Methylphenidate		0.79 (0.67, 0.94); N=1, *n*=83	
Piracetam *vs* placebo		1.38 (0.91, 2.11); N=1, *n*=32	
Propantheline *vs* placebo		0.98 (0.89, 1.08); N=2, *n*=226	
Oxybutinin *vs* placebo		0.80 (0.52, 1.24); N=1, *n*=39	1.13 (0.79, 1.62); N=1, *n*=23
Atomoxetine *vs* placebo		0.81 (0.70, 0.95); N=1, *n*=83	
Atropine + ephedrine *vs* placebo		1.00 (0.71, 1.41); N=1, *n*=50	0.92 (0.80, 1.06); N=1, *n*=50
Chlordiazepoxide + amitriptyline *vs* placebo(5)		0.98 (0.95, 1.01); N=1, *n*=215	1.00 (0.97, 1.03); N=1, *n*=200

CI = confidence interval, MD = mean difference, N = number of trials, n= number of participants, NE= not estimable, RR= relative risk

TABLE III COMPARISON OF INTERVENTIONS AGAINST OTHER SIMILAR INTERVENTIONS

Intervention	Number of wet nights/ wk MD (95% CI)	Treatment failure during treatment RR (95% CI)	Treatment failure or relapse RR (95% CI)
Behavioural interventions(6)			
Retention control training *vs* Dry bed training	1.85 (0.00, 3.70); N=1, *n*=22; after treatment: 1.10 (-1.22, 3.42); N=1, *n*=22	1.67 (0.85, 3.26); N=1, *n*=21	
Alarms(6)			
Bed Alarm *vs* Body alarm		1.00 (0.39, 2.58); N=1, *n*=40	1.11 (0.58. 2.14); N=1, *n*=40
Continuous alarm *vs* intermittent alarm		0.76 (0.37, 1.56); N=1, *n*=39	1.12 (0.79, 1.60); N=1, *n*=39
Immediate alarm *vs* delayed alarm		0.70 (0.48, 1.01); N=2, *n*=62	0.64 (0.37, 1.11); N=1, *n*=26
Supervised alarm *vs* unsupervised alarm		0.50 (0.15, 1.64); N=1, *n*=30	0.64 (0.34, 1.18); N=1, *n*=30
Loud alarm *vs* quiet alarm		0.50 (0.19, 1.33); N=2, *n*=40	1.10 (0.62, 1.96); N=2, *n*=40
Drugs			
Desmopressin 10 mg *vs* desmopressin 20 mg(7)	NE, N=1; after treatment: 0.10 (-1.85, 2.05); N=1, *n*=20	NE; N=2	
Desmopressin 20 mg *vs* desmopressin 40 mg(7)	0.42 (-0.01, -0.84); N=3, *n*=202		
Desmopressin 20 mg *vs* desmopressin 60 mg(7)	0.72 (0.30, 1.14); N=2, *n*=158	NE; N=2	
Desmopressin 40 mg *vs* desmopressin 60 mg(7)	0.23 (-0.24, 0.69); N=2, *n*=162	NE; N=2	
Desmopressin 40 mg *vs* desmopressin 80 mg(7)		NE; N=1	
Desmopressin oral *vs* desmopressin nasal(7)		0.95 (0.79, 1.13); N=1, *n*=40	
Desmopressin *vs* amitriptyline(7)	1.40 (0.12, 2.68); N=1, *n*=31	1.20 (0.89, 1.61); N=1, *n*=31	NE; N=1
Desmopressin *vs* imipramine(7)	-0.11 (-0.62, 0.41); N=3, *n*=300; after treatment: 0.20 (-1.20, 1.60); N=1, *n*=36	0.44 (0.27, 0.73); N=2, *n*=103	
Desmmopressin *vs* indomethacin(7)	-1.45 (-2.37, -0.53); N=1, *n*=60		
Desmopressin *vs* diclofenac(7)		0.52 (0.32, 0.89); N=1, *n*=62	
Imipramine *vs* viloxazine(8)	0.60 (-3.04, 4.24); N=1, *n*=21		
Imipramine *vs* clomipramine(8)	-1.20 (-3.20, 0.80): N=1, *n*=19		
Indomethacin (suppository) *vs* desmopressin (nasal) (9)	1.45 (0.53, 2.37); N=1, *n*=60		

CI = confidence interval, MD = mean difference, N = number of trials, n= number of participants, NE= not estimable, RR= relative risk

TABLE IV COMPARISON OF INTERVENTIONS AGAINST OTHER INTERVENTIONS IN A DIFFERENT CLASS

Intervention	Number of wet nights/ wk MD (95% CI)	Treatment failure during treatment RR (95% CI)	Treatment failure or relapse RR (95% CI)
Retention control training *vs* alarms(6)	2.25 (0.30, 4.20); N=1, *n*=21; after treatment: 2.60 (0.67, 4.53); N=1, *n*=21	1.15 (0.79, 2.84); N=1, *n*=21	
Waking *vs* alarm(6)	0.33 (-1.23, 1.89); N=1, *n*=30	1.17 (0.88, 1.55); N=1, *n*=30	
Dry bed training *vs* alarm(5)		4.56 (1.90, 10.91); N=2, *n*=54	1.7 (1.06, 2.73); N=1, *n*=40
Retention control training *vs* desmopresin(6)	-0.10 (-0.04, 0.20); N=1, *n*=114	1.25 (0.97, 1.62); N=1, *n*=114	0.92 (0.81, 1.05); N=1, *n*=114
Alarm *vs* cognitive treatment(6)		0.68 (0.52, 0.90); N=3, *n*=114	3.60 (1.18, 10.95); N=1, *n*=33
Alarm *vs* imipramine(6)	-0.65 (-2.21, 0.91); N=1, *n*=20	0.59 (0.32, 1.09); N=3, *n*=145	
Alarm *vs* clomipramine(6)	-1.90 (-4.14, 0.34); N=1, *n*=19		
Alarm *vs* desmopressin(6)	-0.41 (-1.20, 0.38); N=2, *n*=110	0.68 (0.48, 0.97); N=1, *n*=122	
Amitriptyline *vs* simple behavioural interventions(8)		0.35 (0.18, 0.71); N=1, *n*=40	NE
Desmopressin *vs* laser acupuncture(7)	0.67 (0.22, 2.01); N=1, *n*=65		0.71 (0.27, 1.88); N=1, *n*=40
Psychological counselling *vs* desmopressin(10)	1.42 (1.15, 1.75); N=1, *n*=151		
Psychological counselling + Placebo *vs* Psychological counselling + desmopressin(10)		1.23 (1.02, 1.48); N=1, *n*=145	
Psychological counselling + desmopressin *vs* desmopressin(10)		1.16 (0.91, 1.48); N=1, *n*=146	
Acupuncture *vs* star chart(10) (10)		0.36 (0.16, 0.80) ; N=1, *n*=40	
Cognitive therapy/ psychotherapy/ counselling *vs* alarm(10)		1.47 (1.11, 1.94); N=3, *n*=155	

CI = confidence interval, MD = mean difference, N = number of trials, n= number of participants, NE= not estimable, RR= relative risk

TABLE V COMPARISON OF MULTIPLE INTERVENTIONS OF SIMILAR OR DIFFERENT TYPE AGAINST NO TREATMENT OR ANOTHER INTERVENTION OR OTHER MULTIPLE INTERVENTIONS

Intervention	Number of wet nights/ wk MD (95% CI)	Treatment failure during treatment RR (95% CI)	Treatment failure or relapse RR (95% CI)
Star charts + rewards *vs* control(6)	-4.63 (-6.41, -2.85); N=1, *n*=30	0.71 (0.53, 0.95); N=1, n=38	
Star charts + lifting *vs* control(6)		0.22 (0.06, 0.78); N=1, n=20	0.22 (0.06, 0.78); N=1, n=20
Dry bed training + alarm *vs* control(5)	-4.09 (-5.44, -2.74); N=2, n=43; after treatment: -1.78 (-3.28,-0.28); N=2, n=43	0.19 (0.12, 0.30); N=4, n=143	NE; N=1
Full spectrum home therapy + alarm *vs* control(5)		0.34 (0.16, 0.72); N=1, n=24	NE; N=1
Imipramine + chlordizaepoxide *vs* placebo(8)		0.98 (0.95, 1.01); N=1, n=215	1.00 (0.97, 1.03); N=1, n=200
Imipramine + oxybutinin *vs* placebo(8)		0.43 (0.23, 0.78); N=1, n=47	0.58 (0.34, 0.99); N=1, n=36
Star chart + rewards *vs* cognitive treatment(6)	0.77 (-0.29, 1.83); N=1, n=32; after treatment: 3.43 (1.11, 10.59); N=1, n=32	2.80 (1.24, 6.30); N=1, n=40	
Dry bed training *vs* Dry bed training + alarm(5)		24.73 (6.25, 97.85); N=2, n=100	
Star chart + reward *vs* alarm(6)	0.70 (-0.65, 2.05); N=1, n=29; after treatment: 1.14 (0.60, 2.18); N=1, n=32	1.90 (0.99, 3.66); N=1, n=39	
Alarm *vs* alarm + retention control training(6)	-0.04 (-0.07, 0.61); N=2, n=40	0.39 (0.20, 0.77); N=5, n=122	1.12 (0.77, 1.64); N=4, n=98
Alarm *vs* alarm + dry bed training(6)	1.00 (-0.20, 2.20); N=2, n=43	1.21 (0.82, 1.81); N=5, n=234	1.29 (0.94, 1.77); N=3, n=152
Desmopressin *vs* desmopressin + alarm(7)	1.30 (0.25, 2.35); N=1, n=65; after treatment: 0.80 (-0.57, 2.17); N=1, n=58	1.54 (0.92, 2.60); N=1, n=70	1.33 (0.96, 1.85); N=1, n=70
Desmopressin + alarm *vs* alarm(7)	-0.83 (-1.11, -0.55); N=4, n=380; after treatment: 0.10 (-.1.35, 1.55); N=1, n=48	0.88 (0.73, 1.05); N=5, n=486	0.91 (0.76, 1.08); N=4, n=427
Desmopresin *vs* desmopresin + amitriptyline(7)	1.40 (-0.14, 2.68); N=1, n=31	1.32 (0.93, 1.87): N=1, n=31	NE; N=1
Desmopresin *vs* desmopressin + oxybutynin(7)	0.10 (-0.51, 0.71): N=1, n=45	1.08 (0.51, 2.28); N=1, n=45	
Imipramine *vs* desmopressin + oxybutynin(8)	1.07 (0.06, 2.08); N=1, n=45		
Amitriptyline *vs* desmopressin + amitriptyline(8)	NE; N=1	NE; N=1	NE; N=1
Desmopressin + psychology + retention control training *vs* desmopressin(7)	-1.5 (-2.15, -0.85); N=1, n=146	1.16 (0.91, 1.48); N=1, n=146	
Imipramine *vs* 3-step therapy (reassurance, retention control training, wakening, parental involvement) (8)		1.83 (1.08, 3.12); N=1, n=72	NE
Imipramine *vs* 3 step therapy + motivation/counselling (8)		3.91 (2.30, 6.66); N=1, n=132	NE

Intervention	Number of wet nights/ wk MD (95% CI)	Treatment failure during treatment RR (95% CI)	Treatment failure or relapse RR (95% CI)
Amitriptyline *vs* simple behavioural intervention + amitriptyline(8)		0.55 (0.25, 1.19); N=1, n=40	NE
Multiple behavioural interventions *vs* amitriptyline(6)	2.00 (1.33, 3.00); N=1, n=60		
Fluid restriction + avoidance of punishment *vs* imipramine(6)	2.00 (1.12, 3.57); N=1, n=40		
Fluid restriction + avoidance of punishment *vs* Fluid restriction + avoidance of punishment + imipramine(6)			8.00 (2.11, 30.34); N=1, n=40
Retention control training + wakening + parental reassurance *vs* same + counselling + education(5)	2.13 (1.11, 4.11); N=N=1, n=132	2.07 (1.16, 3.72); N=1, n=132	
3 step therapy (retention control training, wakening, parental reassurance) *vs* imipramine(5)	NE; N=1	NE; N=1	
3 step therapy + counselling + educational reinforcement *vs* imipramine(5)		NE; N=1	
Multiple behavioural/ educational interventions *vs* desmopressin(5)	1.67 (0.35, 2.99); N=1, n=30	NE; N=1	

CI = confidence interval, MD = mean difference, N = number of trials, n= number of participants, NE= not estimable, RR= relative risk