

# WORKING P A P E R

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## A Meta-Analysis of Interventions to Improve Chronic Illness Care

### Technical Appendix

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## EVIDENCE TABLES

This online appendix contains the evidence tables, sensitivity analyses, and references to accompany the paper “A Meta-analysis of Interventions to Improve Care for Chronic Illnesses” by Alexander C. Tsai, Sally C. Morton, Carol M. Mangione, and Emmett B. Keeler, published in the August 2005 issue of the *American Journal of Managed Care*.

The final sample contained 27 articles on asthma,(1-27) 21 articles on congestive heart failure,(28-48) 33 articles on depression (one of which was unpublished at the time our review was undertaken),(49-81) and 31 articles on diabetes.(82-112) This evidence table provides further detail on the studies included for analysis. References are available at the end of the appendix.

**Appendix Table 1. Description of Studies Contributing Data on Clinical Outcomes (Continuous Variables)**

Source	Jadad Score	CCM Elements	Duration (months)	Intervention Group		Control Group		Instrument Used <sup>†</sup>
				No. at Follow Up	Outcome at Follow Up	No. at Follow Up	Outcome at Follow Up	
<b>Depression</b>								
Callahan et al, 1994	1	DSD DS	6	79	15.7	63	15	Ham-D
Blanchard et al, 1995	2	DSD SMS	3	43	5.88	39	7.15	DPDS
Katon et al, 1995	1	DSD SMS DS CIS	7	49	0.84	42	1.17	SCL-20
Banerjee et al, 1996	3	DSD	6	33	9.2	36	13.5	MADRS
Katon et al, 1996	1	DSD SMS DS	7	46	1	42	1.31	SCL-20
Mann et al, 1998	2	DSD	4	271	10.87	148	10.15	BDI
Leveille et al, 1998	3	SMS	12	100	10.07	100	8.76	CES-D
Goldberg et al, 1998	2	DS CIS HCO	6	210	1.61	171	1.58	SCL-20
Worrall et al, 1999	2	DS	6	91	19.4	56	22.2	CES-D
Llewellyn-Jones et al, 1999	3	DSD SMS DS	9.5	86	11.81	83	12.57	GDS
Coleman et al, 1999	2	DSD SMS DS	12	79	16	63	14.5	CES-D
Katon et al, 1999	3	DSD SMS DS CIS	6	87	1.15	80	1.3	SCL-20
Mynors-Wallis et al, 2000	3	SMS	12	30	5.7	30	7.2	Ham-D

Katzelnick et al, 2000	1	DSD SMS DS	12	203	9.9	177	13.6	Ham-D
Simon et al, 2000	2	DSD DS CIS	6	188	0.82	180	0.99	SCL-20
Tutty et al, 2000	0	SMS CIS	6	26	0.79	94	0.95	SCL-20
Hunkeler et al, 2000	2	DSD SMS	6	151	8.12	105	10.38	Ham-D
Rabins et al, 2000	3	CR	26	62	9.1	69	15.2	MADRS
Brown et al, 2000	0	SMS DS HCO	12	488	1.34	440	1.38	SCL-20
Whooley et al, 2000	3	SMS DS	24	97	5.8	109	6.3	GDS
Rost et al, 2001	3	DSD SMS DS	6	97	33.4	92	41.6	CES-D
Barrett et al, 2001	3	SMS	3	66	2.29	68	2.45	SCL-20
Unutzer et al, 2002	3	DSD SMS DS CIS	12	889	0.99	870	1.39	SCL-20
Rollman et al, 2002	2	DS CIS	6	65	13.8	59	14.8	Ham-D
Datto et al, 2003	2	DSD SMS	4	30	14.8	31	19.3	CES-D
Miranda et al, 2003	3	SMS	6	90	7.2	89	10.1	Ham-D
Rubenstein et al, 2003	1	DSD SMS DS HCO	12	369	34.87	198	37.77	CES-D
<b>Diabetes</b>								
Hoskins et al, 1993	2	DSD SMS DS	12	69	6.6	65	7.3	
Hurwitz et al, 1993	3	CIS	24	85	10.3	81	10.6	
Tu et al, 1993	2	DSD	3	15	11.76	12	11.33	
DICET et al, 1994	2	DSD DS CIS	24	124	5.3	111	5.3	
Weinberger et al, 1995	2	DSD SMS	12	188	10.5	63	11.1	
Pieber et al, 1995	0	SMS	6	45	8.11	49	9.03	
O'Connor et al, 1996	0	DSD SMS CIS HCO	18	134	7.9	133	8.8	
Jaber et al, 1996	2	DSD SMS	4	17	9.2	22	12.1	
De Sonnaville et al, 1997	0	DSD SMS DS	24	350	7	68	7.6	
Kinmonth et al, 1998	1	SMS DS	12	131	7.07	100	7.17	
Laffel et al, 1998	0	DSD	24	89	8.6	82	8.7	
Benjamin et al, 1999	2	DS	15	54	8.68	52	9.15	
Ridgeway et al, 1999	2	SMS	12	18	11.52	20	11.64	
Thompson et al, 1999	2	DSD	6	23	7.8	23	8.9	
Piette et al, 2000	3	DSD SMS CIS	12	124	8.2	124	8.3	
Glasgow et al, 2000	2	DSD SMS CR	6	68	7.5	67	7.4	
Whitlock et al, 2000	1	DSD SMS	3	15	8.2	13	8.6	
Olivarius et al, 2001	3	DSD SMS DS	72	450	8.72	408	9.21	

Piette et al, 2001	3	DSD SMS CIS	12	132	8.1	140	8.1
Hirsch et al, 2002	2	DSD DS	14	44	7.56	65	8.2
Stroebe et al, 2002	1	DSD	6	356	7.9	396	8
Keyserling et al, 2002	3	DSD SMS CR	12	54	10.8	57	10.7
Brown et al, 2002	1	SMS CR	12	112	10.89	112	11.64
Meigs et al, 2003	2	DS CIS	12	307	8.4	291	8.1
Glasgow et al, 2003	1	SMS	10	80	7.42	80	7.67

† BDI = Beck Depression Inventory; CES-D = Center for Epidemiologic Studies Depression Scale; DPDS = Depression Diagnostic Scale; GDS = Geriatric Depression Scale; Ham-D = Hamilton Depression Scale; MADRS = Montgomery-Asberg Depression Rating Scale; SCL-20 = Hopkins Symptom Checklist Depression Scale

**Appendix Table 2. Description of Studies Contributing Data on Clinical Outcomes (Dichotomous Variables)**

Source	Jadad Score	CCM Elements	Duration (months)	No. Intervention Events/Patients	No. Control Events/Patients
<b>Asthma</b>					
Yoon et al, 1993	1	SMS	10	3/28	7/28
Garrett et al, 1994	2	SMS	9	85/251	82/249
Cowie et al, 1997	3	SMS	12	14/45	19/48
Ghosh et al, 1998	1	SMS	12	60/140	68/136
Bailey et al, 1999	2	DSD SMS	12	16/78	27/76
Heard et al, 1999	2	SMS	6	1/97	3/94
McCowan et al, 2001	3	CIS	6	0/147	2/330
Harish et al, 2001	1	DSD SMS	12	32/60	46/69
Yilmaz et al, 2002	1	SMS	36	0/25	7/27
<b>Congestive Heart Failure</b>					
Rich et al, 1993	2	DSD SMS	3	21/63	16/35
Schneider et al, 1993	0	SMS	1	2/26	8/28
Rich et al, 1995	2	DSD SMS	3	41/142	59/140
Weinberger et al, 1996	2	DSD SMS	6	124/222	97/221
Serxner et al, 1998	1	SMS	6	15/55	27/54
Cline et al, 1998	3	DSD SMS	12	22/56	43/79
Stewart et al, 1998	3	DSD SMS	6	24/49	31/48
Ekman et al, 1998	2	DSD SMS	6	48/79	45/79
Jaarsma et al, 1999	3	DSD SMS	9	31/84	47/95
Naylor et al, 1999	3	DSD SMS	6	19/53	25/56
Stewart et al, 1999	3	DSD SMS	6	49/100	62/100
Hughes et al, 2000	3	DSD	12	11/14	14/16
Philbin et al, 2000	1	DSD SMS DS HCO	6	363/840	293/664
Riegel et al, 2000	0	DSD SMS DS	6	48/140	46/140
Harrison et al, 2002	3	DSD SMS	3	21/92	31/100
Riegel et al, 2002	1	DSD SMS DS CIS	6	56/130	114/228
Capomolla et al, 2002	1	DSD SMS	12	9/112	37/122

Kasper et al, 2002	3	DSD	6	20/102	42/98
Laramie et al, 2003	2	DSD SMS DS	3	49/141	46/146
<b>Depression</b>					
Banerjee et al, 1996	3	DSD	6	14/33	27/36
Mann et al, 1998	2	DSD	4	84/271	40/148
Williams et al, 1999	3	DS	3	56/153	30/65
Llewellyn-Jones et al, 1999	3	DSD SMS DS	9.5	57/86	63/83
Katon et al, 1999	3	DSD SMS DS CIS	6	38/87	24/80
Wells et al, 2000	3	DSD SMS DS HCO	12	410/752	230/374
Mynors-Wallis et al, 2000	3	SMS	12	7/30	9/30
Katzelnick et al, 2000	1	DSD SMS DS	12	111/203	128/177
Simon et al, 2000	2	DSD DS CIS	6	17/188	27/180
Tutty et al, 2000	0	SMS CIS	6	2/26	14/94
Whooley et al, 2000	3	SMS DS	24	41/97	54/109
Unutzer et al, 2002	3	DSD SMS DS CIS	12	199/889	312/870
Rollman et al, 2002	2	DS CIS	6	51/65	46/59
Rubenstein et al, 2003	1	DSD SMS DS HCO	12	100/369	71/198
<b>Diabetes</b>					
De Sonnaville et al, 1997	0	DSD SMS DS	24	160/350	38/68
Piette et al, 2000	3	DSD SMS CIS	12	99/124	110/124
Renders et al, 2001	0	DS CIS	18	136/290	41/73
Meigs et al, 2003	2	DS CIS	12	256/307	230/291

**Appendix Table 3. Description of Studies Contributing Data on Quality of Life**

Source	Jadad Score	CCM Elements	Duration (months)	Intervention Group		Control Group		Instrument Used <sup>‡</sup>
				No. at Follow Up	Outcome at Follow Up	No. at Follow Up	Outcome at Follow Up	
<b>Asthma</b>								
Kotses et al, 1995	2	SMS	6	36	5.2	40	5.2	QWB
Lahdensuo et al, 1996	3	SMS	12	56	16.6	59	8.4	SGRQ
Cote et al, 1997	1	SMS	12	50	5.5	54	5.3	Juniper
Kauppinen et al, 1998	3	DSD SMS	12	77	16.5	80	20.5	SGRQ
Knoell et al, 1998	0	SMS	1.5	45	5.19	55	4.91	Juniper
Gallefoss et al, 1999	3	SMS	12	39	20.2	39	36.5	SGRQ
De Oliveira et al, 1999	3	SMS	6	22	28	20	50	
Premaratne et al, 1999	2	DS	36	659	2.64	903	2.68	AQLQ
Abdulwadud et al, 1999	3	SMS	6	30	2.73	47	2.72	AQLQ
Levy et al, 2000	3	SMS	6	99	30.25	98	28.73	SGRQ
Blixen et al, 2001	2	SMS	6	7	4.59	6	4.43	Juniper
Thoonen et al, 2003	2	SMS DS	24	85	5.71	86	5.83	Juniper
<b>Congestive Heart Failure</b>								
Rich et al, 1995	2	DSD SMS	3	142	94.3	140	85.7	CHFQ
Jaarsma et al, 1999	3	DSD SMS	9	84	6.7	95	6.2	LoL
Stewart et al, 1999	3	DSD SMS	6	100	48	100	50	MLHFQ
Philbin et al, 2000	1	DSD SMS DS HCO	6	840	6.5	664	6.5	LoL
Harrison et al, 2002	3	DSD SMS	3	92	25.76	100	38.39	MLHFQ
Kasper et al, 2002	3	DSD	6	102	35.7	98	45.3	MLHFQ
<b>Depression</b>								
Wells et al, 2000	3	DSD SMS DS HCO	12	752	40.9	374	39.3	MCS-12
Unutzer et al, 2002	3	DSD SMS DS CIS	12	889	6.58	870	6.02	QoL
Rubenstein et al, 2003	1	DSD SMS DS HCO	12	369	37.32	198	35.4	MCS-12

<b>Diabetes</b>								
Kinmonth et al, 1998	1	SMS DS	12	131	-1.09	100	-1.23	ADDQoL
Piette et al, 2000	3	DSD SMS CIS	12	124	2.1	124	2.1	DQOL
Glasgow et al, 2000	2	DSD SMS CR	6	68	29.2	67	26	IIRS

‡ ADDQoL = Audit of Diabetes Dependent Quality of Life; AQLQ = Asthma Quality of Life Questionnaire; CHFQ = Chronic Heart Failure Questionnaire; DQOL = Diabetes Quality of Life Scale; IIRS = Illness Intrusiveness Ratings Scale; Juniper = Juniper Asthma Quality of Life Questionnaire; LoL = Ladder of Life; MCS-12 = Mental Health Component Summary Score; MLHFQ = Minnesota Living with Heart Failure Questionnaire; QoL = (non-validated quality of life measure); QWB = Quality of Well Being Scale; SGRQ = St. George's Respiratory Questionnaire



**Appendix Table 4. Description of Studies Contributing Data on Processes of Care**

Source	Jadad Score	CCM Elements	Duration (months)	No. Intervention Events/Patients	No. Control Events/Patients
<b>Asthma</b>					
Gallefoss et al, 1999	3	SMS	12	10/39	3/39
Eccles et al, 2002	3	CIS	12	198/1391	183/1385
<b>Congestive Heart Failure</b>					
Weinberger et al, 1996	2	DSD SMS	6	167/222	161/221
Cline et al, 1998	3	DSD SMS	12	41/56	41/79
Gattis et al, 1999	2	DSD SMS	6	78/90	72/91
Philbin et al, 2000	1	DSD SMS DS HCO	6	529/840	438/664
Akosah et al, 2002	0	DSD SMS	12	19/38	17/63
Kasper et al, 2002	3	DSD	6	78/102	60/98
<b>Depression</b>					
Callahan et al, 1994	1	DSD DS	6	21/79	5/63
Dowrick et al, 1995	1	DS	12	14/52	9/64
Mann et al, 1998	2	DSD	4	198/271	112/148
Worrall et al, 1999	2	DS	6	51/91	22/56
Coleman et al, 1999	2	DSD SMS DS	12	37/79	32/63
Katon et al, 1999	3	DSD SMS DS CIS	6	83/87	58/80
Weatherall et al, 2000	3	DS	0	6/42	3/46
Wells et al, 2000	3	DSD SMS DS HCO	12	233/752	90/374
Bashir et al, 2000	0	DSD	4	55/571	68/741
Brown et al, 2000	0	SMS DS HCO	12	249/488	197/440
Rost et al, 2001	3	DSD SMS DS	6	67/97	26/92
Unutzer et al, 2002	3	DSD SMS DS CIS	12	649/889	497/870
Rollman et al, 2002	2	DS CIS	6	48/65	35/59
Rubenstein et al, 2003	1	DSD SMS DS HCO	12	285/369	170/198
Aubert et al, 2003	0	DSD	6	393/505	1853/3744

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<b>Diabetes</b>					
DICET et al, 1994	2	DSD DS CIS	24	124/124	87/111
O'Connor et al, 1996	0	DSD SMS CIS HCO	18	122/134	121/133
Branger et al, 1999	0	CIS	12	123/215	32/60
Davidson et al, 2000	0	DSD DS	12	79/89	73/92
Kiefe et al, 2001	1	CIS	36	475/678	443/682
Reed et al, 2001	0	DSD SMS DS	12	31/109	2/110
McDermott et al, 2001	0	DS	12	205/282	247/396
Stroebe et al, 2002	1	DSD	6	277/356	292/396
Meigs et al, 2003	2	DS CIS	12	264/307	256/291

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## SENSITIVITY ANALYSES

**Appendix Table 5. Pooled Estimates by Absence of Chronic Care Model Element\***

Element absent	Clinical Outcome				Quality of Life		Process of Care	
	[Continuous] <sup>†</sup> (Lower is Better)		[Dichotomous] (Lower is Better)		(Higher is Better)		(Higher is Better)	
	Effect Size (95% CI)	N	RR (95% CI)	N	Effect Size (95% CI)	N	RR (95% CI)	N
Delivery System Design	-0.15 (-0.24, -0.05)	19	0.87 (0.76, 0.99)	16	-0.00 (-0.19, 0.19)	12	1.12 (1.03, 1.22)	11
Self-Management Support	-0.15 (-0.27, -0.02)	17	0.84 (0.70, 1.00)	10	0.17 (-0.17, 0.50)	2 <sup>‡</sup>	1.18 (1.06, 1.31)	17
Decision Support	-0.22 (-0.32, -0.13)	28	0.78 (0.70, 0.87)	29	0.11 (-0.07, 0.29)	17	1.16 (1.03, 1.30)	14
Clinical Information Systems	-0.25 (-0.34, -0.16)	39	0.83 (0.76, 0.89)	36	0.11 (-0.00, 0.21)	22	1.24 (1.11, 1.38)	23
Community Resources	-0.23 (-0.31, -0.15)	48	0.84 (0.78, 0.90)	46	0.13 (0.03, 0.22)	23	1.19 (1.10, 1.28)	32
Health Care Organization	-0.24 (-0.33, -0.15)	48	0.83 (0.76, 0.90)	43	0.11 (-0.01, 0.24)	21	1.23 (1.13, 1.34)	27

\* For example, 21 of the 32 studies reporting data on processes of care incorporated Delivery System Design into the intervention. The remaining 11 studies that did not involve Delivery System Design were pooled for a relative risk of 1.12, as shown in the first row, fourth column of the table.

<sup>†</sup> Includes data only on studies related to depression and diabetes.

<sup>‡</sup> Pooled estimates based on fewer than five studies should be interpreted with caution.

**Appendix Table 6. Pooled Estimates by Condition (Jadad Score  $\geq 3$ )**

	Clinical Outcome				Quality of Life		Process of Care	
	[Continuous] <sup>†</sup> (Lower is Better)		[Dichotomous] (Lower is Better)		(Higher is Better)		(Higher is Better)	
	Effect Size (95% CI)	N	RR (95% CI)	N	Effect Size (95% CI)	N	RR (95% CI)	N
<b>Overall</b>	-0.24 (-0.38, -0.10)	16	0.80 (0.72, 0.88)	19	0.14 (-0.03, 0.30)	13	1.34 (1.20, 1.50)	9
Asthma			0.77 (0.45, 1.34)	2 <sup>‡</sup>	-0.08 (-0.54, 0.38)	6	1.61 (0.56, 4.64)	2 <sup>‡</sup>
CHF			0.75 (0.66, 0.85)	8	0.34 (0.09, 0.58)	4 <sup>‡</sup>	1.30 (1.12, 1.52)	2 <sup>‡</sup>
Depression	-0.31 (-0.49, -0.12)	11	0.82 (0.69, 0.97)	8	0.21 (0.10, 0.32)	2 <sup>‡</sup>	1.42 (1.21, 1.67)	5
Diabetes	-0.12 (-0.27, 0.03)	5	NE	1	NE	1	NE	0

<sup>†</sup> Includes data only on studies related to depression and diabetes.

<sup>‡</sup> Pooled estimates based on fewer than five studies should be interpreted with caution.

**Appendix Table 7. Pooled Estimates by Chronic Care Model Element (Jadad Score  $\geq 3$ )**

Element present	Clinical Outcome				Quality of Life		Process of Care	
	[Continuous] <sup>†</sup> (Lower is Better)		[Dichotomous] (Lower is Better)		(Higher is Better)		(Higher is Better)	
	Effect Size (95% CI)	N	RR (95% CI)	N	Effect Size (95% CI)	N	RR (95% CI)	N
Delivery System Design	-0.35 (-0.86, 0.17)	9	0.66 (0.50, 0.87)	14	0.36 (-0.74, 1.47)	8	1.24 (1.03, 1.50)	6
Self-Management Support	-0.06 (-0.31, 0.19)	13	0.82 (0.58, 1.18)	14	-0.15 (-0.67, 0.36)	12	2.35 (1.48, 3.73)	6
Decision Support	-0.62 (-1.09, -0.15)	6	0.75 (0.53, 1.06)	6	0.17 (-1.87, 2.20)	2 <sup>‡</sup>	3.26 (1.68, 6.29)	5
Clinical Information Systems	-0.31 (-0.70, 0.09)	5	0.76 (0.43, 1.34)	4 <sup>‡</sup>	-0.40 (-2.38, 1.57)	2 <sup>‡</sup>	1.08 (0.90, 1.30)	3 <sup>‡</sup>
Community Resources	-0.49 (-0.94, -0.05)	2 <sup>‡</sup>	NE	0	NE	0	NE	0
Health Care Organization	NE	0	NE	1	NE	1	NE	1

<sup>†</sup> Includes data only on studies related to depression and diabetes.

<sup>‡</sup> Pooled estimates based on fewer than five studies should be interpreted with caution.

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