Supplementary Online Content

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eAppendix. Example Search String

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This supplementary material has been provided by the authors to give readers additional information about their work.

eAppendix. Example Search String

Clinical Question: In adult surgical patients, does internal medicine (IM) physician involvement with or without a multidisciplinary team improve clinical or health service outcomes when compared to standard surgical care?

MEDLINE

	Search string	Results
1	TI surgery OR AB surgery OR TI surgical OR AB surgical OR TI surgeon OR AB surgeon OR MM "postoperative care" OR MM "postoperative complications" OR MM "postoperative period" OR MM "perioperative care" OR MM "preoperative care" OR MM "preoperative period"	1,790,187
2	TI hospitalist* OR AB hospitalist* OR TI internist* OR AB internist* OR TI physician OR AB physician OR TI "general medicine" OR AB "general medicine" OR TI "perioperative medicine" OR AB "perioperative medicine" OR MM hospitalists OR MM "internal medicine"	373,912
3	TI comanagement OR AB comanagement OR TI comanagement OR AB co-management OR TI "shared care" OR AB "shared care" OR TI consult OR AB consult OR TI consultant OR AB consultant OR TI consultation OR AB consultation OR MM "Referral and Consultation" OR MM "Models, Organizational"	116,213
4	1 AND 2 AND 3	2,301

eTable 1. Intervention Characteristics Described in Studies in Review, Based on Indicators Developed for Geriatric Comanagement Models¹

					:	Structure	indicators					Process	indicators		
Study	Specialty	Physician	MDT	Daily availabilit y	Regular QI	Selection Screening	Inclusion	Evidence- based protocols	Standard order sets	Co- manage- ment	Daily rounds	MDT	Advance care planning	Discharge planning	Pre-op assess- ment
Zuckerman (1992) ²	Orthopaedic	Internist ^a	✓			√	Age 65+, premorbid status					√ weekly			
Macpherson (1994) ³	Thoracic	Internist		✓			All patients			√	✓			✓	✓
Huddleston (2004) ⁴	Orthopaedic	Hospitalist		√		✓	Age 75+, co- morbidities		✓	√	✓			√	✓
Pinzur (2009) ⁵	Orthopaedic	Hospitalist		√		✓	Co-morbidity or social issue	√	√	√	✓			√	√
Salottolo (2009) ⁶	Trauma	Hospitalist		✓	✓	✓	11 exclusion criteria	√			✓				
Auerbach (2010) ⁷	Neurosurgery	Hospitalist		✓		✓	Comorbidities, high risk for complications		✓	✓	✓				
Della Rocca (2013) ⁸	Orthopaedic	Internistb	✓	✓	✓		Age 65+	√	√	√	✓	√ unclear		✓	✓
Montero Ruiz (2015a) ⁹	Otolaryngology	Internist		✓			All patients			✓					
Montero Ruiz (2015b) ¹⁰	Ophthal- mology	Internist		√			All patients			√					
Iberti (2016) ¹¹	Vascular	Hospitalist	✓	✓	✓	✓	ASA 3+, LOS >1 day			√	✓	√ daily			
Noticewala (2016) ¹²	Orthopaedic	Hospitalist	✓	√			All patients		√	√	✓	√ daily			
Rohatgi (2016) ¹³	Orthopaedic & Neurosurgery	Hospitalist	√	√	✓		All patients	√	✓	✓	✓	√ daily		✓	√

Soong (2016) ¹⁴	Orthopaedic	Hospitalist	√	√	√	All patients	✓	√	√	√	√ daily	✓ family meetings	✓	√
Rohatgi (2018) ¹⁵	Colorectal	Hospitalist	✓	✓	✓	All patients	✓	√	~	✓	√ daily		✓	√

MDT multidisciplinary team; QI quality improvement; ASA American society of anaesthesiologist physical status classification class; LOS length of stay

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^a model also included geriatricians

^b model also included geriatricians and family practitioners

eTable 2. Risk of Bias for Included Studies for the Outcomes of Length of Stay, Mortality, and Readmissions **Red indicates high risk, orange moderate and green low risk.**

Study	Randomization process	Confounding	Selection	Classification of interventions	Deviation from intended interventions	Missing data	Measurement of outcomes	Selection of reported result	Overall risk of bias
Zuckerman (1991)									
Macpherson (1994)									
Huddleston (2004)									
Pinzur (2006)									
Salottolo (2009)									
Auerbach (2010)									
Della Rocca (2013)									
Montero Ruiz (2015)									
Montero Ruiz (2015)									
Iberti (2016)									
Noticewala (2016)									
Rohatgi (2016)									
Soong (2016)									
Rohatgi (2018)									

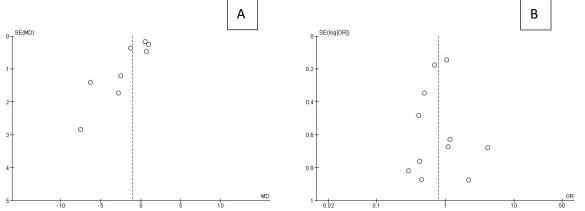
eFigure 1. Forest Plot for Unadjusted Length of Stay by Physician-Only or Multidisciplinary Team (MDT) Model

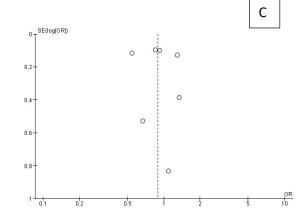
	Inte	rventio	on	Com	parat	or		Mean Difference		Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	Year	IV, Random, 95% CI
1.1.1 physician only										1
Macpherson 1994	19.7	18.2	79	27.2	18.2	86	3.1%	-7.50 [-13.06, -1.94]	1994	- 12
Salottolo 2009	4.15	2.04	261	3.64	1.91	239	19.0%	0.51 [0.16, 0.86]	2009	•
Montero Ruiz 2015a ENT Subtotal (95% CI)	3.5	9.05	642 982	2.8	9.62	987 1312	16.9% 39.0%	No. of the contract of the con	2014	•
Heterogeneity: Tau ² = 0.75;	Chi ² = 8	.14, dt	f = 2 (P	= 0.02);	$ ^2 = 75$	5%				
Test for overall effect: Z = 0	.33 (P =	0.74)								
1.1.2 MDT										
Della Rocca 2013	7.1	4.33	115	9.9	9.41	31	6.5%	-2.80 [-6.21, 0.61]	2013	
Noticewala 2016	8.2	4.1	129	10.7	13.6	138	9.9%	-2.50 [-4.88, -0.12]	2016	
berti 2016	6.1	6.17	1487	5.1	6.17	944	18.6%	1.00 [0.50, 1.50]	2016	*
Boong 2016	11.9	13.7	331	18.2	18.4	240	8.4%	-6.30 [-9.06, -3.54]	2016	
Rohatgi 2018	6.3	8.3	1062		8.5		17.7%		2018	-
Subtotal (95% CI)			3124			2291	61.0%	-2.03 [-4.05, -0.01]		•
Heterogeneity: Tau ^z = 4.20;	Chi2 = 5	3.99,	df = 4 (F	o.00	001);	$I^2 = 939$	6			
Test for overall effect: Z = 1	.97 (P=	0.05)								
Total (95% CI)			4106			3603	100.0%	-1.02 [-2.09, 0.04]		•
Heterogeneity: Tau ² = 1.53;	Chi ² = 8	5.71,	df = 7 (F	o.00	001);	l² = 899	6		8	-10 -5 0 5 10
Test for overall effect: Z = 1	.88 (P =	0.06)								Favours [experimental] Favours [control]
Test for subgroup differenc	es: Chi²	= 3.42	df = 1	(P = 0.0)	06), l ^z :	= 70.7%	5			r avours [experimentar] T avours [control]

eFigure 2. Forest Plot for Unadjusted Length of Stay by Elective or Emergency Status

	Inte	rventi	on	Con	parat	or		Mean Difference		Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI	Year	IV, Random, 95% CI
1.9.1 elective										
Macpherson 1994	19.7	18.2	79	27.2	18.2	86	3.1%	-7.50 [-13.06, -1.94]	1994	
Montero Ruiz 2015a ENT	3.5	9.05	642	2.8	9.62	987	16.9%	0.70 [-0.22, 1.62]	2014	+
lberti 2016	6.1	6.17	1487	5.1	6.17	944	18.6%	1.00 [0.50, 1.50]	2016	•
Rohatgi 2018 Subtotal (95% CI)	6.3	8.3	1062 3270		8.5	938 2955	17.7% 56.2%		2018	-
Heterogeneity: Tau ² = 1.96;	Chi²= 3	3 76			0011					
Test for overall effect: Z = 0			a (.				-			
1.9.2 emergency										
Salottolo 2009	4.15	2.04	261	3.64	1.91	239	19.0%	0.51 [0.16, 0.86]	2009	•
Della Rocca 2013	7.1	4.33	115	9.9	9.41	31	6.5%	-2.80 [-6.21, 0.61]	2013	
Soong 2016	11.9	13.7	331	18.2	18.4	240	8.4%	-6.30 [-9.06, -3.54]	2016	
Noticewala 2016	8.2	4.1	129	10.7	13.6	138	9.9%	-2.50 [-4.88, -0.12]	2016	-
Subtotal (95% CI)			836			648	43.8%	-2.61 [-5.92, 0.69]		
Heterogeneity: Tau ² = 9.84;	$Chi^2 = 3$	31.95,	df = 3 (I	○< 0.00	(1001);	I ² = 919	6			
Test for overall effect: Z = 1	.55 (P =	0.12)								
Total (95% CI)			4106			3603	100.0%	-1.02 [-2.09, 0.04]		•
Heterogeneity: Tau ² = 1.53;	Chi ² = 8	5.71,	df = 7 (l	o.00	001);	l² = 899	6		87	-10 -5 0 5 10
Test for overall effect: Z = 1	.88 (P =	0.06)								Favours [experimental] Favours [control]
Test for subgroup differend	es: Chi²	= 1.45	5, df = 1	(P = 0.3)	23), I ² :	= 31.0%	5			Tavours [experimental] Tavours [control]

eFigure 3. Funnel Plots for Length of Stay, Mortality, and Readmissions





SE standard error, MD mean difference, OR odds ratio

eFigure 4. Forest Plot for In-Hospital Mortality by Physician-Only or Multidisciplinary Team (MDT) Model

	Interve	ntion	Compa	rator		Odds Ratio		Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	Year	M-H, Random, 95% CI
1.8.1 physician only								
Macpherson 1994	2	79	7	86	4.0%	0.29 [0.06, 1.46]	1994	-
Salottolo 2009	2	261	4	239	3.5%	0.45 [0.08, 2.50]	2009	-
Auerbach 2010	88	3393	104	4203	23.4%	1.05 [0.79, 1.40]	2010	-
Montero Ruiz 2015b Ophthal	0	244	0	345		Not estimable	2014	
Montero Ruiz 2015a ENT Subtotal (95% CI)	8	642 4619	3	987 5860	5.4% 36.3%	4.14 [1.09, 15.66] 0.98 [0.40, 2.41]	2014	
Total events	100		118					
Heterogeneity: Tau² = 0.48; Ch Test for overall effect: Z = 0.05		,	= 0.06);	²= 60%				
1.8.2 MDT								
Zuckerman 1992	25	431	3	60	6.1%	1.17 [0.34, 4.00]	1991	-
Della Rocca 2013	5	115	3	31	4.5%	0.42 [0.10, 1.88]	2013	-
Soong 2016	7	331	12	240	9.0%	0.41 [0.16, 1.06]	2016	-
Rohatgi 2016	40	4650	173	14156	21.8%	0.70 [0.50, 0.99]	2016	-
Noticewala 2016	4	129	2	138	3.5%	2.18 [0.39, 12.09]	2016	
lberti 2016	15	1487	19	944	13.3%	0.50 [0.25, 0.98]	2016	
Rohatgi 2018 Subtotal (95% CI)	5	1062 8205	4	938 16507	5.5% 63.7%	1.10 [0.30, 4.13] 0.67 [0.51, 0.88]	2018	•
Total events	101		216					
Heterogeneity: Tau² = 0.00; Ct Test for overall effect: Z = 2.88			= 0.50);	²=0%				
Total (95% CI)		12824		22367	100.0%	0.79 [0.56, 1.11]		•
Total events	201		334					
Heterogeneity: Tau ^z = 0.11; Ch	$ni^2 = 17.95$	df = 10	(P = 0.08)	$ \cdot ^2 = 44$	%			0.02 0.1 1 10 5
Test for overall effect: $Z = 1.34$	(P = 0.18)		35	100				Favours [experimental] Favours [control]
Test for subgroup differences:	$Chi^2 = 0.6$	2. df = 1	(P = 0.4)	3), $I^2 = 0^4$	%			ravours (experimental) ravours (control)

eFigure 5. Forest Plot for In-Hospital Mortality by Elective or Emergency Status

	Interve	ntion	Compa	rator		Odds Ratio		Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	Year	M-H, Random, 95% CI
1.10.1 elective								
Macpherson 1994	2	79	7	86	4.0%	0.29 [0.06, 1.46]	1994	- · · · · · · · · · · · · · · · · · · ·
Auerbach 2010	88	3393	104	4203	23.4%	1.05 [0.79, 1.40]	2010	+
Montero Ruiz 2015a ENT	8	642	3	987	5.4%	4.14 [1.09, 15.66]	2014	
Montero Ruiz 2015b Ophthal	0	244	0	345		Not estimable	2014	
lberti 2016	15	1487	19	944	13.3%	0.50 [0.25, 0.98]	2016	1 Total Control of the Control of th
Rohatgi 2016	40	4650	173	14156	21.8%	0.70 [0.50, 0.99]	2016	-
Rohatgi 2018	5	1062	4	938	5.5%	1.10 [0.30, 4.13]	2018	-
Subtotal (95% CI)		11557		21659	73.4%	0.84 [0.55, 1.30]		•
Total events	158		310					
Heterogeneity: Tau ^z = 0.14; Ch	$ni^2 = 12.91$	df = 5 (P = 0.02)	$I^2 = 619$	6			
Test for overall effect: Z = 0.77	(P = 0.44)							
1.10.2 emergency								
Zuckerman 1992	25	431	3	60	6.1%	1.17 [0.34, 4.00]	1991	
Salottolo 2009	2	261	4	239	3.5%	0.45 [0.08, 2.50]	2009	8
Della Rocca 2013	5	115	3	31	4.5%	0.42 [0.10, 1.88]	2013	
Noticewala 2016	4	129	2	138	3.5%	2.18 [0.39, 12.09]	2016	
Soong 2016	7	331	12	240	9.0%	0.41 [0.16, 1.06]	2016	2 T
Subtotal (95% CI)		1267		708	26.6%	0.65 [0.35, 1.19]		•
Total events	43		24					
Heterogeneity: Tau² = 0.02; Ch	$ni^2 = 4.18, i$	df = 4 (P)	= 0.38); I	$^{2} = 4\%$				
Test for overall effect: Z = 1.41	(P = 0.16)							
Total (95% CI)		12824		22367	100.0%	0.79 [0.56, 1.11]		•
Total events	201		334					
Heterogeneity: Tau ² = 0.11; Ch	ni ² = 17.95	df = 10	(P = 0.08)	$ \cdot ^2 = 44$	%			0.02 0.1 1 10 50
Test for overall effect: $Z = 1.34$	(P = 0.18)		85	36				Favours [experimental] Favours [control]
Test for subgroup differences:	$Chi^2 = 0.4$	9. df = 1	(P = 0.49)	9), $I^2 = 0$ 9	X ₀			ravours (experimental) Favours (control)

eFigure 6. Forest Plot for 30-Day Readmissions

	Interver	ntion	Compa	rator		Odds Ratio		Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	IV, Random, 95% CI	Year	IV, Random, 95% CI
Macpherson 1994	3	79	3	86	2.5%	1.09 [0.21, 5.58]	1994	
Auerbach 2010	192	3393	277	4203	21.6%	0.85 [0.70, 1.03]	2010	
Della Rocca 2013	16	115	6	31	5.4%	0.67 [0.24, 1.90]	2013	
Soong 2016	20	331	11	240	8.4%	1.34 [0.63, 2.85]	2016	
lberti 2016	306	1487	207	944	21.4%	0.92 [0.76, 1.13]	2016	-
Rohatgi 2016	88	4650	481	14156	20.6%	0.55 [0.44, 0.69]	2016	-
Rohatgi 2018	172	1062	122	938	20.1%	1.29 [1.01, 1.66]	2018	-
Total (95% CI)		11117		20598	100.0%	0.89 [0.68, 1.16]		•
Total events	797		1107					
Heterogeneity: Tau ² =	0.08; Chi	2 = 26.99	9, df = 6	P = 0.00	01); $I^2 = 7$	8%		
Test for overall effect:	Z = 0.86 (P = 0.39)					0.1 0.2 0.5 1 2 5 10 Favours [experimental] Favours [control]