# **Supplemental Online Content**

Lee JK, McCutcheon LRM, Fazel MT, Cooley JH, Slack MK. Assessment of interprofessional collaborative practices and putcomes in adults with diabetes and hypertension in primary care: a systematic review and meta-analysis. *JAMA Netw Open*. 2021;4(2):e2036725. doi:10.1001/jamanetworkopen.2020.36725

eMethods 1. Search Strategy for Ovid MEDLINE ALL (1946 to March 02, 2018)
eMethods 2. Meta-analysis Supplemental Materials
eTable. Characteristics of the Studies Not Included in the Meta-analysis
eFigure 1. Association of ICP With A1C Stratified by Study Design
eFigure 2. Funnel Plot for Hemoglobin A1C
eFigure 3. Funnel Plot for Systolic Blood Pressure
eFigure 4. Funnel Plot for Diastolic Blood Pressure

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

# eMethods 1. Search strategy for Ovid MEDLINE(R) ALL (1946 to March 02, 2018).

#### Search conducted March 5, 2018.

1	exp Primary Health Care/
2	General Practice/
3	Family Practice/
4	General Practitioners/
5	Physicians, Primary Care/
6	Physicians, Family/
7	Primary Care Nursing/
8	Community Health Services/
9	Ambulatory Care Facilities/
10	Ambulatory Care/
11	Internal Medicine/
12	internal medicine.tw.
13	((primary or ambulatory or community) adj3 care).tw.
14	((primary or ambulatory or community) adj3 healthcare).tw.
15	((primary or ambulatory or community) adj3 health service\$).tw.
16	(primary adj3 provider\$).tw.
17	((general or ambulatory or primary or family) adj3 pract\$).tw.
18	generalist\$.tw.
19	gp.tw.
20	gps.tw.
21	family health\$.tw.
22	family medicine.tw.
23	family physician\$.tw.
24	family doctor\$.tw.
25	aboriginal health centre\$.tw.
26	community health center\$.tw.
27	community health centre\$.tw.
28	centre local de services.tw.
29	clscs.tw.
30	communautaire\$.tw.
31	community service center\$.tw.
32	community service centre\$.tw.
33	(nurse adj3 led clinic\$).tw.
34	outpost nursing station\$.tw.
35	or/1-34

36	Patient Care Team/
37	Cooperative Behavior/
38	interprofessional relations/
39	interdisciplinary communication/
40	physician-nurse relations/
41	Group Processes/
42	interprofessional\$.af.
43	inter-professional\$.af.
44	interdisciplinary.tw.
45	inter-disciplinary.tw.
46	multidisciplinary.tw.
47	multi-disciplinary.tw.
48	transdisciplinary.tw.
49	trans-disciplinary.tw.
50	cross-disciplinary.tw.
51	multiprofessional\$.tw.
52	multi-professional\$.tw.
53	transprofessional\$.tw.
54	trans-professional\$.tw.
55	team\$.tw.
56	collaborat\$.tw.
57	shared care.tw.
58	(shared adj3 appointment\$).tw.
59	or/36-58
60	triple aim.tw.
61	(35 and 59) or 60
62	exp Hypertension/
63	hypertens\$.tw.
64	Blood Pressure/
65	
66	blood pressure.tw.
	blood pressure.tw. bloodpressure.tw.
67	blood pressure.tw. bloodpressure.tw. Prehypertension/
67 68	blood pressure.tw. bloodpressure.tw. Prehypertension/ prehypertension.tw.
67 68 69	blood pressure.tw. bloodpressure.tw. Prehypertension/ prehypertension.tw. systolic.tw.
67 68 69 70	blood pressure.tw. bloodpressure.tw. Prehypertension/ prehypertension.tw. systolic.tw. diastolic.tw.
67 68 69 70 71	blood pressure.tw. blood pressure.tw. Prehypertension/ prehypertension.tw. systolic.tw. diastolic.tw. exp DIABETES MELLITUS/
67 68 69 70 71 72	blood pressure.tw. blood pressure.tw. Prehypertension/ prehypertension.tw. systolic.tw. diastolic.tw. exp DIABETES MELLITUS/ diabet\$.tw.

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74	insulin resistance.tw.
75	IDDM.tw.
76	NIDDM.tw.
77	T2DM.tw.
78	T1DM.tw.
79	or/62-78
80	61 and 79
81	limit 80 to yr="2013 -Current"
82	limit 81 to english language

### eMedthods 2. Meta-analysis supplemental materials

The general procedure used was to enter the data into CMA spreadsheet based on the data reported. The tabs at the bottom of the page provide information on the types of data formats that can be used. For any study reporting Cl's without SD's, the SD was calculated from the CI interval using the following procedure: Calculate total width of CI, divide by 3.92, and multiply by the square root of N.

The data was used from only one arm in 2 studies, Chwastiak, 2017, and Deichmann, 2013 and were classified as prepost studies.

Comprenensive meta ana	ilysis - [L:\PAPEK5\5ystematic Reviews\Jean	nie Jeannie M	eta-a 2019.cn	[הר										1 2
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Study name	Data format	Treatment Pre Mean	Treatment Pre SD	Treatment Post Mean	Treatment Post SD	Treatment Sample size	Control Pre Mean	Control Pre SD	Control Post Mean	Control Post SD	Control Sample size	Pre Post correlation	Effect direction	,
1 AAIAsmary, 2013	Paired groups (means, SD)													
2 ABarcelo, 2010	Means, p in each group													
3 ABeLue, 2014	Paired groups (means, SD)													
4 ABray, 2013	Means, SD in each group	7.900	2.100	7.400	1.600	368	7.900	2.200	7.700	1.900	359	0.400	) Negative	F
5 AChwastiak, 2017	Mean change, SD difference in each group													
6 AChwastiak, 2017pp	Paired groups (difference, p)													
7 ACohen, 2011	Mean change, SD difference in each group													
8 ACollier, 2014	Paired groups (means, SD)													
9 ACueto-Manzano, 2013	Means, SD in each group	10.200	2.200	9.100	2.400	39	9.400	2.300	9.600	2.300	39	0.400	Negative	F
10 AD eichmann, 2013	Means, SD in each group	8.430	2.200	7.280	1.500	121	7.130	1.300	7.020	1.100	95	0.400	Negative	F
11 AD eichmann, 2013pp	Paired groups (means, SD)													
12 ADePue, 2013	Means, SD in each group	9.800	2.200	9.300	2.000	104	9.800	2.200	10.000	2.300	164	0.400	Negative	
13 AEdelman, 2010	Independent groups (difference, SD)													
14 AFarrell, 2013	Paired groups (means, p)													
15 AGilstrap, 20138	Paired groups (means, p)													
16 AGover, 2013	Independent groups (means, SD's)													
7 AHassaballa, 2015	Paired groups (means, p)													
IB AJiao, 2014	Mean change, SD difference in each group													
9 ALiou. 2014	Means, SD in each group	8.300	1.200	7.600	1.100	54	8.100	1.200	8.100	1.300	41	0.400	Negative	
0 AMaislos, 2004	Means, SD in each group	11.600	1.300	9.800	1.900	48	11.100	1.100	10.800	1.600	34	0.400	Negative	
1 AMaiumdar, 2003	Cohort 2x2 (Events)													
2 AMartin 2015	Paired groups (means, p)													
3 AMoinfar, 2016	Paired groups (means, SD)													
4 ANagelkerk 2018	Paired groups (means, p)													
25 AParker, 2016	Means, SD in each group	10.500	2.140	9.750	2.400	32	8.300	2.010	8.270	1.960	45	0.400	Negative	
6 APimazoni-Netto 2011	Mean change SD difference in each group													an i
7 AProvest 2017	Matcherl 2x2 (All cells)													
8 ABamli 2016	Means SD in each group	8 400	1 950	8 300	1.950	471	8 400	1.830	8 500	2 640	417	0.400	Negative	-
9 ASchouten, 2010	Means, SD in each group	7.500	1.300	7.200	1.200	607	7.500	1.200	7.200	1.200	1254	0.400	Negative	
0 ASingh-Franco, 2013	Paired groups (means, p)													an)
1 ATang 2013	Means, SD in each group	9.240	1.590	8.100	1.680	202	9,280	1.740	8.330	1.810	213	0.400	Negative	1
n +T 2010	With the country and the second	0.010		0.100	1.000		0.200	1.1 10	0.000			0.100		

The next step was to select the model to be used, random or fixed, and examine the data output to be used for the forest plot.



The moderator variable was identified (baseline A1C group) and applied to the analysis.

No mean baseline mean HA1c was provided in Provost, 2017. The study was included in the <8 group because 63% of the sample had an HA1c less than 7. A weighted mean for baseline A1C was calculated for each A1C group.

a entry	t <sup>1</sup> Next table	🕀 High reso	olution plot	E Select by	+ Eff	ect measure: S	td diff in means	-=	11 I I I I	. E 1	Q					
roups		Effect			ence interv	al	Test of null (2-Tail)			Heterogeneity			Tau-squared			
roup	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	l-squared	Tau Squared	Standard Error	Variance	Tau
ixed effect a	nalysis															
1.000	12	-0.130	0.020	0.000	-0.169	-0.090	-6.435	0.000	19.280	11	0.056	42.945	0.004	0.004	0.000	0.06
2.000	10	-0.163	0.020	0.000	-0.201	-0.125	-8.341	0.000	37.418	9	0.000	75.948	0.016	0.014	0.000	0.12
3.000	12	-0.477	0.042	0.002	-0.559	-0.395	-11.409	0.000	59.555	11	0.000	81.530	0.099	0.061	0.004	0.31
otal within									116.253	31	0.000					
otal between									57.401	2	0.000					
verall	34	-0.180	0.013	0.000	-0.207	-0.154	-13.555	0.000	173.654	33	0.000	80.997	0.028	0.013	0.000	0.16
ixed effects	analysis															
1.000	12	-0.131	0.030	0.001	-0.191	-0.071	-4.299	0.000								
2.000	10	-0.237	0.052	0.003	-0.339	-0.135	-4.556	0.000								
3.000	12	-0.600	0.105	0.011	-0.805	0.395	-5.739	0.000								
otal between									19.898	2	0.000					
verall	34	-0.184	0.026	0.001	-0.234	-0.134	-7.231	0.000								

The HKSJ adjustment was used to correct the confidence intervals for each group. No overall SMD was calculated for A1C given that patients with different baseline A1C levels represent different populations.

The forest plot was generated.



After generation of the forest plot, other analyses were generated using the non-stratified data, for example, the funnel plot, fail-safe N, and Kendall's tau. Cl's and p-values were corrected using the HKSJ procedure and changed in the Word version of the forest plot.

Reference:

IntHout J, Ioannidis JPA, Borm GF. The Hartung-Knapp-Sidik-Jonkman method for random effects meta-aanlysis is straightforward and considerably outperforms the standard DerSimonian-Laird method. BMC Medical Research Methodology. 2014; 14:25.

Source	Study design	Setting	Total No.ª	Age mean (SD), y	% Male	Duration, months	Outcome measures	Team members (No. of professions in team) <sup>b</sup>	Main ICP team features or process (name of intervention program/model if specified OR other notable specifics) <sup>c</sup>	
Randomi	zed clinic	al trials (RC	Ts)							
Hutchis on et al, <sup>1</sup> 2014 United States	RCT <sup>d</sup>	Volunteer driven communi ty health center	124	Not report ed	Not repor ted	I: 24 + follow-up at 36	HbA <sub>1c</sub> SBP DBP	Physician/doct or of nursing practice; clinical pharmacist; NP; physician; students (pre- medical, pharmacy, nursing)	Students had team building activities; co-location	
Katon et al, <sup>2</sup> 2004 United States	RCT₫	Ambulato ry care clinics	329	I: 58.6 (11.8) C: 58.1 (12.0)	l: 34. C: 35.2	12	HbA <sub>1c</sub>	Physician; nurse; psychologist; psychiatrist	CPA; co-location; shared EMR; face-to-face (Individualized-stepped- care depression treatment program) <sup>e,f,g</sup>	
Lin et	RCT <sup>d</sup>	Group	214	1: 57.4	l: 52	12 +	HbA <sub>1c</sub>	Physician;	Weekly case reviews;	
al, <sup>3</sup> 2014 United States		nealth primary care clinics		(10.5) C: 56.3 (12.1)	C: 44	at 12	SBP	medical consultant; patients; psychiatric consultant; TEAMcare nurse care managers	shared EMRs; co-location; face-to-face communication <sup>e,f,g,h</sup>	
Prospect	ive cohor	t studies								
Tobe et al, <sup>4</sup> 2014 Canada	Prospe ctive cohort	Ambulato ry care clinic/ center/ office	2855	64.5 (12.1)	44	9	SBP DBP	Physician; community pharmacists; nurse; NP	IP group educational sessions; shared EMRs; regular team meetings, teleconferences, email; face-to-face communication; practice- based tools <sup>e,f,g,h</sup>	
Retrospe	ctive cohe	ort studies		•		•	•			
De La Rosa et al, <sup>5</sup> 2020 United States	Retros pective cohort	Family Practice Center	119	l: <u>58</u> C: 59	Not repor ted	12	HbA <sub>1c</sub> BP	Physician; medical assistants; medical students; nursing students	Interactive teamwork led by attending physician with nursing students serving as case managers	
Reiss- Brennan et al, <sup>6</sup> 2016 United States	Retros pective cohort	Health Systems Primary Care Clinics	113 452	56.1	39.81	36	HbA <sub>1c</sub> SBP DBP	Primary care physician; clinic managers; medical support staff; mental health specialists; nurse care managers	Shared EMR; co-location (also established protocols, knowledge of team roles, use of decision support tools, standard assessment.)	

# eTable. Characteristics of the studies not included in the meta-analysis

Prospect	ive pre-po	st studies							
Fortuna, <sup>7</sup> 2015 United States	Prospe ctive pre- post	Urban internal medicine practice	13 404	Not report ed	44.8	42	BP	Physician; pharmacist; nurse	Co-management by pharmacist (patient and physician education, self- management for medication adherence) and RN (intensive self-management education, BP monitoring, reports to physicians) <sup>f,i</sup>
Retrospe	ctive pre-	post studies	S	1			1	1	
Otero- Sabogal et al, <sup>8</sup> 2010 United States	Retros pective pre- post	Communi ty Health Center	114	35	30.70	Up to 24	HbA <sub>1c</sub> SBP DBP	Physician; CHW; social worker; CDEs (profession unspecified)	Group patient educational sessions; Transforming primary care practice to PCMH; shared-medical appointments or group visits; co-location; face-to- face communication (Healthfirst Model) <sup>e,f,g,h,i</sup>
Rossom et al, <sup>9</sup> 2017 United States	Retros pective pre- post	Group- model; 18 care systems and 172 clinics in rural, urban, suburban settings	3609	60 (12)	62	Mean (range): 11 (1-26)	HbA <sub>1c</sub> SBP DBP	Physician; care manager; psychiatrist	Weekly meeting for case reviewsj; co-location; telecommunication/telemedi cine; electronic care management tracking system
Edward set al, <sup>10</sup> 2019 United States	Retros pective pre- post	Veteran Affairs primary care clinics	44 527	l: 59.3 (15.2) C: 61.8 (15.3)	l: 83.6 C: 91.6	48	HbA <sub>1c</sub>	Physician; NP; pharmacist; psychologist trainees	IP education; shared EMRs; co-location (CoEPCE, an initiative designed to promote IP education)
Hull et al, <sup>11</sup> 2014 United Kingdo m	Retros pective pre- post <sup>j</sup>	Networks of Ambulato ry care practices	41 210	Not report ed	Not repor ted	36	HbA <sub>1c</sub>	General Practitioner; care coordinator; community- based diabetes specialist nurses; consultant diabetologist	Joint IP or group patient educational sessions; shared EMRs; co- location <sup>e,g,h</sup>

Abbreviations: CDE, board certified diabetes educator; CoEPCE, centers of excellence in primary care education; CPA, collaborative practice agreement; DBP, diastolic blood pressure; EMR, electronic medical record; HbA<sub>1c</sub>, hemoglobin A<sub>1c</sub>; ICP, interprofessional collaborative practice; IP, interprofessional; NP, nurse practitioner; PCMH, patient-centered medical home; RCT, randomized clinical trial; RN, registered nurse, SBP, systolic blood pressure; SD, standard deviation; TEAMcare, treatment, enhancement, activation, and motivation care.

<sup>a</sup> Total number of enrolled patients.

<sup>b</sup> First team member listed represents the primary care professional who served the gatekeeper functions of the "primary care provider".

<sup>c</sup> Data reported descriptively as each manuscript described/defined the interprofessional team/features/processes and based on the predetermined data extraction categories used in this systematic review.

<sup>d</sup> Patient-level.

<sup>e</sup> Patient education/counseling.

<sup>f</sup> Medication management.

<sup>g</sup> Chronic disease management.

<sup>h</sup> Health promotion/disease prevention.

<sup>1</sup>Adherence support.

<sup>j</sup> Pre-post study comparing 2 independent groups before and after the intervention (before-and-after study).



### eFigure 1. Association of ICP with A1C stratified by study design

Std diff = standard difference; CI = confidence interval; ICP = Interprofessional Collaborative Practice; PC = prospective cohort studies; PP = pre-post studies; RC = retrospective cohort study; RCT = randomized control trial; Total N for SBP=35,668; Total N for DBP=35,656; the overall SMD for SBP=-0.31, 95% CI, -0.46 to -0.17, p<0.001; the overall SMD for DBP=-0.28, 95% CI, -0.42 to -0.14, p<0.001. For SBP, the SMD for the RC study was less than the SMD for PP studies (p=0.021) and RCTs (p=0.015) but not different from PC studies (p=0.286). For DBP, the SMD for RC study was statistically less than for PP studies (<0.001) and RCTs (p=0.006), but not different from PC studies (p=0.387). For both SBP and DBP there was no difference between the PC, PP, or RCT groups (p>0.270). Heterogeneity  $I^2$ =95.4% for SBP and 97.2% for DBP.



**eFigure 2. Funnel plot for hemoglobin A1C** Std diff = standard difference; Std Err = standard error; The p-value for Kendall's tau was 0.002.



eFigure 3. Funnel plot for systolic blood pressure Std diff = standard difference, Std Err = standard error. The p-value for Kendall's tau was 0.008, indicating that publication bias was likely present in this group of studies.



**eFigure 4. Funnel plot for diastolic blood pressure** Std diff = standard difference, Std err = standard error. The p-value for Kendall's tau was 0.137, indicating that publication bias was not likely in this group of studies.

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