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# Prognostic models for predicting remission of diabetes following bariatric surgery

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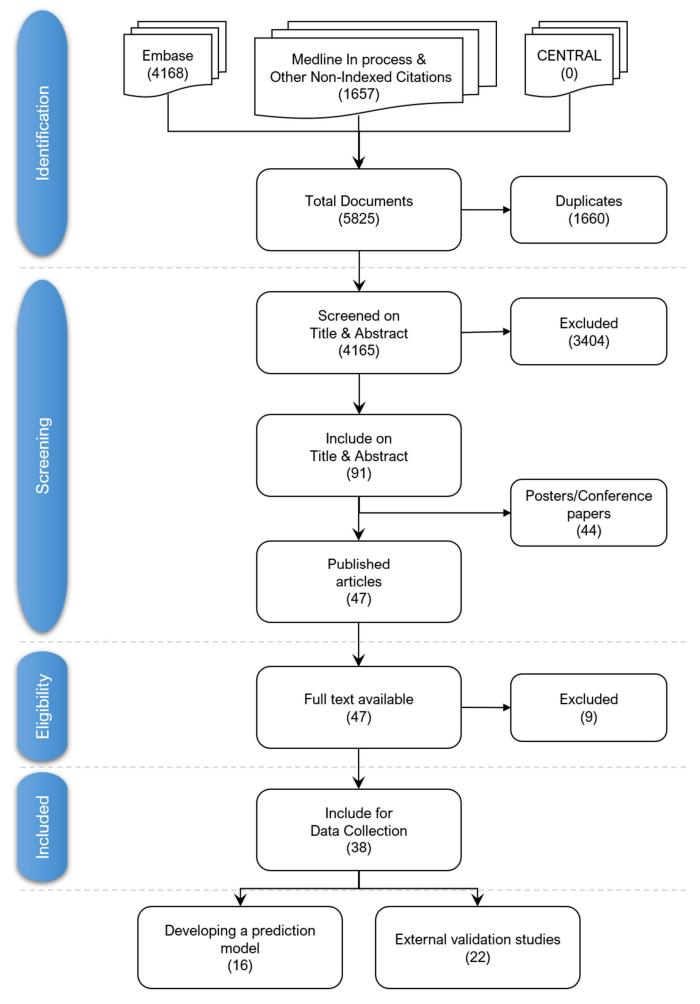
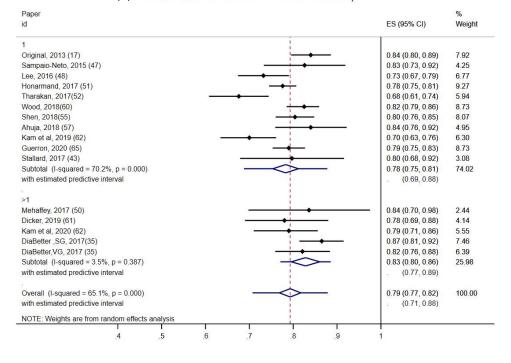


Figure 1: PRISMA flowchart

(b) Performance of DiaRem based on Follow up

Paper id						ES (95% CI)	% Weight
ſ				ł			
Original, 2013 (16)						0.79 (0.73, 0.86)	5.83
Modified ABCD, 2015 (44)						0.79 (0.69, 0.90)	3.37
Lee, 2015(46)		÷		<u> </u>		0.72 (0.61, 0.83)	3.25
_ee, 2016 (48)					-	0.82 (0.76, 0.87)	6.69
Lee, 2017 (49)			+			0.74 (0.65, 0.83)	4.30
Lee, 2017 (49)				. →	_	0.85 (0.81, 0.88)	8.33
Raj. 2017 (53)				- !		0.61 (0.45, 0.77)	1.80
Seki, 2018 (54)		-			-	0.75 (0.63, 0.87)	3.04
Shen, 2018 (55)				+		0.82 (0.78, 0.87)	7.14
Ahuja, 2018 (57)				•	_	0.79 (0.69, 0.88)	3.89
Almalki 1, 2018 (58)				+++		0.83 (0.78, 0.90)	6.25
Almalki 2, 2018 (58)				i		0.85 (0.80, 0.90)	6.77
Kam, 2019 (62)						0.74 (0.67, 0.79)	6.05
Lee, 2020 (64)						0.82 (0.72, 0.92)	3.60
MDR, 2020 (38)		-	+	- 1		0.67 (0.57, 0.77)	3.69
Umemura et al. 2020(39)						0.81 (0.69, 0.93)	3.00
Subtotal (I-squared = 56.0%, p =	0.003)			$\sim$	_	0.79 (0.76, 0.82)	76.99
with estimated predictive interval	/			1		. (0.70, 0.88)	
1 0				i i			
>1				1			
LeeMH, 2015 (45)						0.73 (0.62, 0.84)	3.19
Lee, 2017 (49)					•	0.87 (0.80, 0.93)	5.61
Chen, 2018 (59)			•	1	_	0.74 (0.60, 0.88)	2.32
Chen, 2018 (59)						0.85 (0.80, 0.90)	6.97
Kam, 2019 (62)			+			0.75 (0.67, 0.82)	4.93
Subtotal (I-squared = 60.7%, p =	0.038)	9 <u>7</u>		$\langle \rangle$		- 0.80 (0.74, 0.86)	23.01
with estimated predictive interval	1.1			1		. (0.62, 0.99)	
				i i		A second second	
Overall (I-squared = 55.2%, p = 0	0.001)			->	-	0.80 (0.77, 0.82)	100.00
with estimated predictive interval	***************			Ī		. (0.71, 0.88)	
NOTE: Weights are from random	effects analysi	s					
.4	.5	.6	.7	.8	.9	1	



#### (d) Performance of DiaRem based on HbA1c cutoff

Original, 2013 (16) 0.79 (0.73, 0.66) 5.33   Modified ABCD, 2015 (44) 0.81 (0.71, 0.91) 0.81 (0.71, 0.91)   .ee, 2016 (48) 0.77 (0.68, 0.87) 3.21   .ee, 2016 (48) 0.82 (0.77, 0.87) 6.71   .ee, 2017 (49) 0.81 (0.77, 0.87) 6.71   Sek, 2018 (54) 0.85 (0.77, 0.87) 6.71   Sek, 2018 (54) 0.85 (0.77, 0.87) 6.71   Sumalki 2, 2019 (52) 0.85 (0.78, 0.94) 3.63   Subtotal (I-squared = 28, 1%, p = 0.169) 0.85 (0.78, 0.94) 3.63   Wid fied ABCD, 2015 (44) 0.79 (0.69, 0.80) 2.74   .ee, 2020 (5(4) 0.79 (0.69, 0.80) 2.74   Subtotal (I-squared = 28, 1%, p = 0.169) 0.79 (0.69, 0.80) 2.74   .ee, 2020 (5(4) 0.79 (0.69, 0.80) 2.74   .ee, 20215 (46) 0.79 (0.69, 0.80) 2.74   .ee, 2016 (48) 0.79 (0.69, 0.80) 2.74   .ee, 2016 (48) 0.79 (0.69, 0.80) 2.42   .shi, 2018 (55) 0.79 (0.69, 0.80) 2.43   .shi, 2018 (56) 0.79 (0.69, 0.80) 2.43   .shi, 2018 (56) 0.79 (0.69, 0.88) 2.43	Paper d	ES (95% CI)	% Weight
Modified ABCD, 2015 (44) Lee, 2015 (45) Lee, 2015 (45) Lee, 2017 (49) Lee, 2017 (49) Lee, 2017 (49) Lee, 2017 (49) Seki, 2018 (54) Almaki 1, 2018 (53) Almaki 2, 2018 (54) Almaki 2, 2015 (44) Lee, 2020 (64) Subtotal (I-squared = 28.1%, p = 0.169) Modified ABCD, 2015 (44) Lee, 2015 (45) Almaki 2, 2015 (45) Lee, 2016 (48) Raj, 2017 (53) Shen, 2018 (55) Ahuja, 2018 (55) Ahuja, 2018 (56) Chen, 2018 (56) Chen, 2018 (55) Ahuja, 2018 (55) Ahuja, 2018 (57) Chen, 2018 (56) Chen, 2018 (56)	6	1	
Lee, 2015(46) Lee, 2015(45) Lee, 2017 (49) Lee, 2017 (49) Lee, 2017 (49) Seki, 2018 (54) Almalki 1, 2018 (55) Almalki 2, 2018 (56) Almalki 2, 2018 (54) Almalki 2, 2018 (56) Almalki 2, 2018 (57) Chen, 2018 (59) Chen, 2018 (59) Chen	Original, 2013 (16)	0.79 (0.73, 0.86)	5.33
Lee MH, 2015 (45) Lee 2017 (49) Lee, 2018 (58) Almalki 2, 2018 (58) Almalki 2, 2018 (58) Almalki 2, 2018 (58) Lee, 2019 (48) Raj, 2017 (53) Shen, 2018 (55) Ahuja, 2018 (57) Chen, 2018 (59) Chen, 2018 (57) Chen, 2018 (59) Chen, 2018 (57) Chen, 2018 (57) Chen, 2018 (57) Chen, 2018 (57) Chen, 2018 (57) Chen, 2018 (59) Chen, 2018 (57) Chen, 2018 (59) Chen, 2020 (39) Chen,	Modified ABCD, 2015 (44)	• 0.77 (0.68, 0.87)	3.21
Lee, 2016 (48) Lee, 2017 (49) Lee, 2017 (49) Lee, 2017 (49) Seki, 2018 (54) Almalki 1, 2018 (56) Almalki 2, 2018 (54) Almalki 2, 2015 (45) Lee, 2016 (48) Almalki 2, 2015 (45) Lee, 2016 (48) Almalki 2, 2018 (57) Chen, 2018 (57) Chen, 2018 (57) Chen, 2018 (57) Chen, 2018 (59) Chen, 2018 (59) Chen	Lee, 2015(46)	0.81 (0.71, 0.91)	3.07
Lee, 2017 (49) Lee, 2017 (49) Lee, 2017 (49) Lee, 2017 (49) Lee, 2017 (49) Lee, 2017 (49) Lee, 2018 (54) Almalki 2, 2018 (56) Almalki 2, 2018 (56) Almalki 2, 2018 (56) Almalki 2, 2018 (56) Subtotal (L-squared = 28.1%, p = 0.169) with estimated predictive interval 5.5 Modified ABCD, 2015 (44) Lee, 2015 (46) Lee, 2015 (46) Lee, 2015 (46) Lee, 2015 (46) Lee, 2015 (46) Lee, 2016 (48) Raj, 2017 (53) Shen, 2018 (55) Alhuja, 2018 (57) Chen, 2018 (59) Alhuja, 2018 (59) A	LeeMH, 2015 (45)	0.76 (0.69, 0.84)	4.28
Lee, 2017 (49) Seki, 2018 (54) Anmalki 2, 2018 (55) Anmalki 2, 2018 (56) Anmalki 2, 2018 (56) Anmalki 2, 2018 (56) Anmalki 2, 2018 (58) Anmalki 2, 2018 (58) Anmalki 2, 2018 (58) Subtotal (-squared = 28.1%, p = 0.169) with estimated predictive interval 5.5 Modified ABCD, 2015 (44) Lee, 2020 (54) Shen, 2018 (55) Anualki 2, 2018 (55) Anualki 2, 2018 (56) Chen, 2018 (59) Chen, 2020 Chen, 2020 Ch	Lee, 2016 (48)	0.82 (0.77, 0.87)	6.71
Seki 2018 (54) Almalki 2, 2018 (56) Almalki 2, 2018 (56) Almalki 2, 2018 (56) Almalki 2, 2018 (56) Almalki 2, 2018 (56) Subtotal (-squared = 54, 1%, p = 0.169) with estimated predictive interval S.5 Modified ABCD, 2015 (44) Lee, 2015 (45) Lee Alticle ABCD, 2015 (45) Alticle ABCD, 2015 (45) Alticle ABCD, 2015 (45) Alticle ABCD, 2018 (56) Chen, 2018 (56) Chen, 2018 (59) Chen, 2017 Chen, 2018 Chen, 2017 Chen, 2017 Chen, 2017 Chen,	Lee. 2017 (49)	0.74 (0.65, 0.83)	3.65
Almalki 1, 2018 (58) Almalki 2, 2018 (54) 5.5 Modified ABCD, 2015 (44) Lee, 2015 (45) Lee, 2015 (45) Almalki 2, 2018 (54) Shen, 2018 (55) Ahuja, 2018 (57) Chen, 2018 (59) Chen, 2020 (39) Chen durated the therval Chen, 2018 (59) Chen, 2020 (39) Chen durated therval Chen, 2018 (59) Chen durated therval Chen, 2018 (59) Chen durated therval Chen, 2018 (59) Chen durated therval Chen dur	Lee, 2017 (49)	0.85 (0.81, 0.88)	8.71
Almaiki 1, 2018 (58) 0.83 (0.78, 0.90) 5.83   Almaiki 2, 2018 (58) 0.85 (0.80, 0.90) 6.49   Construction of the structure o			
Almaki 2, 2018(58) 0.85 (0.80, 0.90) 6.49   Kam, 2019 (62) 0.75 (0.67, 0.82) 4.31   Lee, 2020 (64) 0.77 (0.65, 0.88) 2.42   Subtotal (I-squared = 28.1%, p = 0.169) 0.77 (0.65, 0.88) 57.63   Widhied ABCD, 2015 (44) 0.77 (0.65, 0.88) 2.42   Lee, 2020 (54) 0.79 (0.69, 0.89) 2.42   0.81 (0.79, 0.83) 57.63 . (0.76, 0.86)   8.5 0.79 (0.69, 0.89) 2.42   0.81 (0.79, 0.83) 57.63 . (0.76, 0.86)   8.6 0.79 (0.69, 0.89) 2.42   0.72 (0.61, 0.83) 2.63 0.73 (0.62, 0.64)   Lee, 2015 (45) 0.79 (0.69, 0.80) 2.74   0.72 (0.61, 0.83) 2.63 0.73 (0.62, 0.64)   Shen, 2018 (54) 0.73 (0.63, 0.87) 6.39   Shen, 2018 (57) 0.51 (0.64, 0.77) 1.37   Chen, 2018 (59) 0.74 (0.69, 0.88) 3.24   Orter, 0.280 (39) 0.74 (0.69, 0.88) 3.24   Orter, 0.280 (39) 0.85 (0.80, 0.90) 6.76   0.87 (0.059, 0.89) 2.40 0.74 (0.69, 0.88) 3.24   Orter, 0.280 (39) </td <td></td> <td></td> <td></td>			
Kam, 2019 (62) 0.75 (0.67, 0.82) 4.31   Lee, 2020 (64) 0.77 (0.65, 0.88) 2.42   Subtotal (1-squared = 28.1%, p = 0.169) 0.76 (0.67, 0.82) 4.31   with estimated predictive interval 0.76 (0.67, 0.82) 4.31   6.5 0.79 (0.69, 0.90) 2.74   Lee, 2015 (46) 0.79 (0.69, 0.90) 2.74   Lee, 2015 (45) 0.73 (0.62, 0.84) 2.63   Lee, 2015 (44) 0.72 (0.61, 0.83) 2.63   Lee, 2015 (43) 0.73 (0.62, 0.84) 2.57   Beki, 2018 (54) 0.73 (0.62, 0.87) 6.39   Shen, 2018 (55) 0.73 (0.63, 0.87) 2.43   Anuja, 2018 (57) 0.75 (0.63, 0.87) 2.43   Chen, 2018 (59) 0.79 (0.69, 0.88) 3.24   Ortz (0.60, 0.88) 1.80 0.79 (0.69, 0.88) 3.24   Ortz (0.60, 0.89) 0.79 (0.69, 0.88) 3.24   Ortz (0.60, 0.88) 1.80 0.79 (0.69, 0.88) 3.24   Ortz (0.60, 0.89) 0.85 (0.68, 0.69) 0.85 (0.68, 0.69) 0.85 (0.68, 0.69) 0.85 (0.68, 0.69) 0.85 (0.68, 0.69) 0.85 (0.68, 0.69) 0.85 (0.68, 0.69) 0.85 (0.68, 0.69) <t< td=""><td></td><td></td><td></td></t<>			
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Subtotal (1-squared = 28 1%, p = 0.169) 0.81 (0.79, 0.83) 57.63   with estimated predictive interval 0.79 (0.69, 0.80) 57.63   S.5 0.79 (0.69, 0.90) 2.74   Modified ABCD, 2015 (44) 0.79 (0.63, 0.87) 2.63   Lee, 2016 (48) 0.73 (0.62, 0.84) 2.57   Seki, 2018 (54) 0.82 (0.76, 0.87) 6.39   Shen, 2018 (55) 0.73 (0.62, 0.87) 6.39   Anuja, 2018 (55) 0.73 (0.62, 0.87) 6.39   Chen, 2018 (59) 0.74 (0.60, 0.88) 3.24   Chen, 2018 (59) 0.74 (0.60, 0.88) 3.24   Umemura et al, 2020 (39) 0.85 (0.87, 0.77) 3.05   Subtotal (1-squared = 51.3%, p = 0.020) 0.81 (0.69, 0.83) 2.43   Vorrall (I-squared = 42.0%, p = 0.017) 0.80 (0.78, 0.82) 100.00			
with estimated predictive interval . (0.76, 0.86)   6.5 . (0.76, 0.86)   Modified ABCD, 2015 (44) . (0.76, 0.86)   Lee, 2015 (46) . (0.76, 0.86)   Lee, 2015 (43) . (0.76, 0.86)   Raj, 2017 (53) . (0.76, 0.86)   Seki, 2018 (54) . (0.76, 0.86)   Shen, 2018 (55) . (0.76, 0.87)   Ahuja, 2018 (57) . (0.76, 0.86)   Chen, 2018 (59) . (0.76, 0.86)   MDR, 2020 (38) . (0.76, 0.86)   Umemura et al, 2020 (39) . (0.76, 0.86)   Subtotal (1-squared = 51.3%, p = 0.020) . (0.77, 0.88)   Overall (I-squared = 42.0%, p = 0.017) . (0.80 (0.78, 0.82) 100.00			
Modified ABCD, 2015 (44) 0.79 (0.69, 0.90) 2.74   Lee, 2015 (46) 0.73 (0.62, 0.84) 0.73 (0.62, 0.84) 2.63   Lee, 2015 (45) 0.73 (0.62, 0.84) 2.57   Lee, 2016 (48) 0.73 (0.62, 0.84) 2.57   Seki, 2018 (54) 0.75 (0.63, 0.87) 6.39   Shen, 2018 (55) 0.75 (0.69, 0.88) 2.43   Orta (0.69, 0.88) 3.24 0.74 (0.69, 0.88) 3.24   Chen, 2018 (59) 0.85 (0.80, 0.90) 6.76 0.85 (0.80, 0.90) 6.76   Umemura et al, 2020 (39) 0.81 (0.69, 0.88) 1.80 0.85 (0.87, 0.77) 3.05   Subtotal (1-squared = 51.3%, p = 0.020) 0.81 (0.69, 0.83) 2.43 0.74 (0.69, 0.88) 2.43   Overall (1-squared = 42.0%, p = 0.017) 0.80 (0.78, 0.82) 100.00 100.00			
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Lee, 2015 (46) Lee, 2015 (45) Lee, 2015 (45) Lee, 2015 (45) Lee, 2015 (45) Lee, 2015 (45) Lee, 2016 (48) Shen, 2018 (55) Shen, 2018 (55) Chen, 2018 (59) Chen, 2018 (5		0.79 (0.69, 0.90)	274
LeeMH, 2015 (45) Lee, 2016 (48) Ray, 2017 (53) Shen, 2018 (54) Shen, 2018 (55) Ahuja, 2018 (57) Chen, 2018 (59) Chen, 2018 (59) MDR, 2020 (38) WDR, 2020 (39) With estimated predictive interval Vorall (I-squared = 42.0%, p = 0.017) Other (10, 45, 0.77) Other (10, 45, 0.77)			
Lee, 2016 (48) Raj, 2017 (53) Shen, 2018 (54) Shen, 2018 (55) Chen, 2018 (57) Chen, 2018 (59) Chen, 20			
Raj. 2017 (53) 0.61 (0.45, 0.77) 1.37   Seki, 2018 (54) 0.75 (0.63, 0.87) 2.43   Shen, 2018 (55) 0.82 (0.78, 0.87) 6.98   Ahuja, 2018 (57) 0.79 (0.69, 0.88) 3.24   Chen, 2018 (59) 0.85 (0.80, 0.90) 6.76   MDR, 2020 (38) 0.87 (0.57, 0.77) 3.05   Umemura et al, 2020 (39) 0.81 (0.69, 0.93) 2.40   Subtata (1-squared = 51.3%, p = 0.020) 0.81 (0.69, 0.93) 2.40   Vorail (1-squared = 42.0%, p = 0.017) 0.80 (0.78, 0.82) 100.00			
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Ahuja, 2018 (57) Chen, 2018 (59) MDR, 2020 (38) Jmemura et al, 2020 (39) Subtal (1-squared = 51.3%, p = 0.020) with estimated predictive interval Overall (1-squared = 42.0%, p = 0.017) Overall (1-squared = 42.0%, p = 0.017)			
Chen, 2018 (59)   0.74 (0.60, 0.89)   180     Chen, 2018 (59)   0.85 (0.80, 0.90)   6.76     MDR, 2020 (38)   0.85 (0.80, 0.90)   6.76     Umemura et al, 2020 (39)   0.81 (0.69, 0.93)   2.40     Subtotal (-squared = 51.3%, p = 0.020)   0.74 (0.61, 0.89)   1.23     Overall (I-squared = 42.0%, p = 0.017)   0.80 (0.78, 0.82)   100.00			
Chen, 2018 (59)   0.85 (0.80, 0.90)   6.76     VDR, 2020 (38)   0.67 (0.57, 0.77)   3.05     Jmemura et al, 2020 (39)   0.81 (0.69, 0.83)   2.40     Subtotal (I-squared = 51.3%, p = 0.020)   0.78 (0.74, 0.81)   42.37     Vith estimated predictive interval   0.80 (0.78, 0.82)   100.00			
MDR, 2020 (39) Unremura et al, 2020 (39) Unremura et al, 2020 (39) Subtral (1-squared = 51.3%, p = 0.020) With estimated predictive interval Overall (1-squared = 42.0%, p = 0.017) Overall (0-squared = 42.0%, p = 0.017) Overall (0-squared = 42.0%, p = 0.017) Overall (0-squared = 42.0%, p = 0.017)			
Umemura et al, 2020 (39)   0.81 (0.69, 0.93)   2.40     Subtotal (I-squared = 51.3%, p = 0.020)   0.78 (0.74, 0.81)   42.37     with estimated predictive interval   0.67, 0.88)   0.00 (0.78, 0.82)     Overall (I-squared = 42.0%, p = 0.017)   0.80 (0.78, 0.82)   100.00			
Subtotal (I-squared = 51.3%, p = 0.020)   0.78 (0.74, 0.81)   42.37     with estimated predictive interval   1   0.67, 0.88)   0.80 (0.78, 0.82)     Overall (I-squared = 42.0%, p = 0.017)   0.80 (0.78, 0.82)   100.00			
with estimated predictive interval . (0.67, 0.88) Overall (I-squared = 42.0%, p = 0.017) 0.80 (0.78, 0.82) 100.00			
			42.31
	- 		100.00
(0.73, 0.87)			100.00
	with estimated predictive interval	. (0.73, 0.87)	

Paper	F0 /050/ 00	%
id	ES (95% CI)	Weigh
6		
Sampaio-Neto, 2015 (47) -	• 0.84 (0.76, 0.92)	4.58
Lee, 2016 (48)	0.73 (0.67, 0.79)	6.45
Honarmand, 2017 (51)		9.30
Tharakan 2,2017(52)	0.73 (0.67, 0.80)	5.81
Kam et al, 2020 (62)	0.79 (0.71, 0.86)	5.16
Subtotal (I-squared = 38.5%, p = 0.165)	0.77 (0.74, 0.80)	31.30
with estimated predictive interval	(0.68, 0.86)	
6.5		
Original, 2013 (17)	0.84 (0.80, 0.89)	7.72
Sampaio-Neto, 2015 (47)	0.83 (0.73, 0.92)	3.85
Mehaffey, 2017 (50)	• 0.84 (0.70, 0.98)	2.14
Tharakan 1, 2017(52)	0.68 (0.61, 0.74)	5.56
Wood, 2017(60)	0.82 (0.79, 0.86)	8.65
Shen, 2018(55) -	0.80 (0.76, 0.85)	7.89
Ahuja, 2018 (57) -	0.84 (0.76, 0.92)	4.55
Dicker, 2019 (61)	• 0.78 (0.69, 0.88)	3.74
Guerron, 2020 (65) -	0.79 (0.75, 0.83)	8.65
DiaBetter (SG), 2017(35)	0.87 (0.81, 0.92)	7.20
DiaBetter( VG), 2017 (35)	0.82 (0.76, 0.88)	6.03
Stallard, 2017 (43)	0.80 (0.68, 0.92)	2.73
Subtotal (I-squared = 54.6%, p = 0.012)	0.81 (0.78, 0.84)	68.70
with estimated predictive interval	. (0.73, 0.89)	
	1	
Overall (I-squared = 59.2%, p = 0.001)	0.80 (0.77, 0.82)	100.00
with estimated predictive interval	. (0.72, 0.87)	
NOTE: Weights are from random effects analysis		
	1 1	
.4 .5 .6 .7	.8 .9 1	

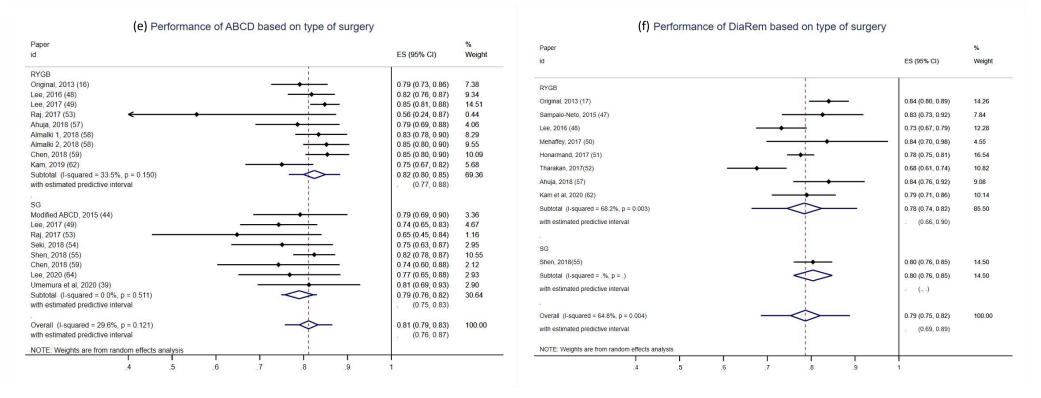


Figure 2 – Meta Analysis (a) – Performance of ABCD based on Follow up; (b) – Performance of DiaRem based on Follow up; (c) Performance of ABCD based on HbA1c cut off defining diabetes duration; (d) - Performance of DiaRem based on HbA1c cut off defining diabetes duration; (e) – Performance of ABCD based in type of bariatric surgery; (f) Performance of ABCD based i