Supplementary Online Content

Title: Diagnostic Reliability in Teledermatology: A Systematic Review and Meta-Analysis

Authors
Adrienn N. Bourkas*[1] (MSc), Natasha Barone*[2] (MD, MSc), Matthew E.C. Bourkas[3] (PhD), Matthew Mannarino[4] (PhD), Robert D. J. Fraser[5,6] (RN, MN), Amy Lorincz (MSc), Sheila C. Wang[5,7] (MD, PhD), Jose L. Ramirez-GarciaLuna[4] (MD, PhD)
* Authors contributed equally

Affiliations
[1]Faculty of Health Sciences, Queen's University School of Medicine, Kingston, Ontario, Canada
[2]Faculty of Medicine and Health Sciences, McGill University, Montreal, Quebec, Canada
[3]Temerty Faculty of Medicine, Department of Biochemistry, University of Toronto, Toronto, Ontario, Canada
[4]Department of Surgery, McGill University, Montreal, Quebec, Canada
[5]Swift Medical Inc., Toronto, Ontario, Canada
[6]Arthur Labatt Family School of Nursing, Western University, London, Ontario Canada
[7]Department of Medicine, Division of Dermatology, McGill University Health Centre, Montreal, Quebec, Canada

Supplementary eMethods

Search Strategy

The search strategy was written for Ovid Medline and translated using each database's syntax, controlled vocabulary, and search fields. MeSH terms, Emtree terms, and free text words were used for teledermatology and skin conditions such as melanoma and related synonyms. To identify additional articles not captured through the aforementioned search, a manual search was conducted via reference search of the included studies.

All database records were downloaded to EndNote X9 (Clarivate) and uploaded to web-based software for deduplication, screening, and full-text evaluation (Covidence; Veritas Health Innovation). We contacted three study authors to gain access to their published work.(1, 2, 3) The search strategy is available below.

Ovid MEDLINE Search

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily <1946 to 2022 May 02>

1	e consult*.mp.	322
2	econsult*.mp.	218
3	electronic consult*.mp.	366
4	e health.mp.	4095
5	ehealth.mp.	6823
6	e visit*.mp.	88
7	evisit*.mp.	26
8	home video visit*.mp.	4
9	internet/ or internet-based intervention/	82046
10	internet.mp.	128675
11	offsite care.mp.	4
12	off site care.mp.	9
13	ontario telemedicine network.mp.	19
14	Remote Consultation/	5689
15	remote consultation*.mp.	6406
16	remote visit*.mp.	95
17	tele care.mp.	40
18	telecare.mp.	945
19	tele consult*.mp.	208
20	teleconsult*.mp.	2208
21	tele diagnos*.mp.	46
22	telehealth.mp.	13222
23	tele health.mp.	287
24	telemedicine/	36763
25	telemedicine.mp.	47751
26	tele medicine.mp.	197
27	telemonitor*.mp.	2380
28	tele monitor*.mp.	209
29	Telepathology/	918
30	telepatholog*.mp.	1223
31	tele patholog*.mp.	25
32	telepractice*.mp.	276
33	tele practice*.mp.	16
34	Therapy, Computer-Assisted/	6969
35	video consult*.mp.	827
36	videoconsult*.mp.	41
37	virtual care.mp.	1177
38	web based.mp.	42402
39	Telepathology/	918

40	or/1-39	216985	
41	Dermatology/21077		
42	dermatolog*.mp.	110593	
43	dermatopatholog*.mp.	2990	
44	exp Skin Diseases/di [Diagnosis]	196739	
45	exp Skin Neoplasms/	142454	
46	skin.mp.	880457	
47	exp Skin Abnormalities/	34228	
48	burns/ or burns, chemical/ or burns, electric/ or sunburn/	59533	
49	burn*.mp.	141877	
50	wound healing/ or cicatrix/	127484	
51	wound*.mp.	446154	
52	or/41-51	1580012	
53	40 and 52	7160	
54	teledermatolog*.mp.	1273	
55	tele dermatolog*.mp.	35	
56	54 or 55	1298	
57	53 or 56	7448	
58	limit 57 to dt=20100101-20220501 [January 1st, 2010 to May 1st, 2022]	4972	

Embase Search

Embase Classic+Embase <1947 to 2021 July 15>

1	computer assisted therapy/	4772
2	e consult*.mp.	411
3	econsult*.mp.	283
4	electronic consult*.mp.	461
5	e health.mp.	4440
6	ehealth.mp.	5099
7	e visit*.mp.	83
8	evisit*.mp.	30
9	home video visit*.mp.	10
10	internet/ or web-based intervention/	114861
11	internet.mp.	143810
12	offsite care.mp.	5
13	off site care.mp.	12
14	ontario telemedicine network.mp.	36
15	remote consultation*.mp.	808
16	remote visit*.mp.	79
17	tele care.mp.	55
18	telecare.mp.	983
19	teleconsultation/	11686
20	tele consult*.mp.	243
21	teleconsult*.mp.	12352
22	tele diagnos*.mp.	53
23	telehealth.mp.	15276
24	tele health.mp.	389
25	telemedicine/	31867
26	telemedicine.mp.	38951
27	tele medicine.mp.	333
28	telemonitor*.mp.	4838
29	tele monitor*.mp.	344
30	Telepathology/	869
31	telepatholog*.mp.	1265
32	tele patholog*.mp.	41
33	telepractice*.mp.	162

34 tele practice*.mp. 9
35 video consult*.mp. 751
36 videoconsult*.mp. 54
37 virtual care.mp. 496
38 web based.mp. 49157
39 or/1-38 240118
40 dermatology/ or cosmetic dermatology/ or pediatric dermatology/ or psychodermatology/ 51419
41 dermatolog*.mp. 161210
42 dermatopatholog*.mp. 3737
43 burn/ or burn contracture/ or electric burn/ or face burn/ or hand burn/ or ionizing radiation burn/ or scald/ or sunburn/ 74890
44 burn*.mp. 189010
45 exp skin disease/di [Diagnosis] 209136
46 exp skin tumor/ 213775
47 skin*.mp. 1294867
48 or/40-47 1665263
49 39 and 48 7063
50 teledermatology/ 1295
51 tele dermatolog*.mp. 42
52 teledermatolog*.mp. 1798
53 50 or 51 or 52 1812
54 49 or 53 8004
55 limit 54 to (books or chapter or conference abstract or conference paper or "conference review") 1828
56 54 not 55 6176
57 limit 56 to yr="2010 -Current" 4505

Cochrane Search

EBM Reviews - Cochrane Database of Systematic Reviews <2005 to July 14, 2021> EBM Reviews - ACP Journal Club <1991 to June 2021> EBM Reviews - Database of Abstracts of Reviews of Effects <1st Quarter 2016> EBM Reviews - Cochrane Clinical Answers <June 2021> EBM Reviews - Cochrane Central Register of Controlled Trials <June 2021> EBM Reviews - Cochrane Methodology Register <3rd Quarter 2012> EBM Reviews - Health Technology Assessment <4th Quarter 2016> EBM Reviews - NHS Economic Evaluation Database <1st Quarter 2016>

1 e consult*.mp. 44
2 econsult*.mp. 22
3 electronic consult*.mp. 29
4 e health.mp. 617
5 ehealth.mp. 766
6 e visit*.mp. 14
7 evisit*.mp. 1
8 home video visit*.mp. 3
9 internet/ or internet-based intervention/ 4,275
10 internet.mp. 15,059
11 offsite care.mp. 2
12 off site care.mp. 2
13 ontario telemedicine network.mp. 7
14 Remote Consultation/ 460
15 remote consultation*.mp. 551
16 remote visit*.mp. 17
17 tele care.mp. 34
18 telecare.mp. 249
19 tele consult*.mp. 59
20 teleconsult*.mp. 822
21 tele diagnos*.mp. 4
22 telehealth.mp. 2,308
23 tele health.mp. 128

24 telemedicine/ 2,617
25 telemedicine.mp. 4,819
26 tele medicine.mp. 57
27 telemonitor*.mp. 1,236
28 tele monitor*.mp. 115
29 Telepathology/ 8
30 telepatholog*.mp. 22
31 tele patholog*.mp. 2
32 telepractice*.mp. 37
33 tele practice*.mp. 0
34 Therapy, Computer-Assisted/ 1,391
35 video consult*.mp. 117
36 videoconsult*.mp. 8
37 virtual care.mp. 31
38 web based.mp. 9,110
39 Telepathology/ 8
40 or/1-39 29,268
41 Dermatology/ 124
42 dermatolog*.mp. 10,838
43 dermatopatholog*.mp. 80
44 exp Skin Diseases/di [Diagnosis] 630
45 exp Skin Neoplasms/ 1,738
46 skin.mp. 67,534
47 exp Skin Abnormalities/ 269
48 burns/ or burns, chemical/ or burns, electric/ or sunburn/ 1,779
49 burn*.mp. 12,780
50 wound healing/ or cicatrix/ 5,677
51 wound*.mp. 35,982
52 or/41-51 110,390
53 40 and 52 1,622
54 teledermatolog*.mp. 149
55 tele dermatolog*.mp. 20
56 54 or 55 151
57 53 or 56 1,684
58 limit 57 to yr="2010 -Current" 1,377

CINAHL Search

Searched keyword teledermatology and set limit to yr="2010-Current" 357

MedRxiv Search

Searched keyword teledermatology and set limit to yr="2010-Current" 13

Eligibility Criteria

Inclusion and exclusion criteria are summarized in **eTable 2**.

Data Selection and Extraction

Information extracted from full-text articles is summarized in **eTable 3**.

Data Analysis and Synthesis

In this study, a letter was assigned to each unique study grouping as explained in **eTable 4**. For both the percentage of agreement and kappa values, forest plots, the I^2 index, and the τ^2 statistic were used in combination to investigate statistical heterogeneity. To evaluate the statistical significance of differences between kappa values, we performed meta-regressions and derived corresponding p-values.

Cohen's kappa values for diagnostic concordance between teledermatology and F2F physicians were interpreted based on the following criteria.(4) Values between 0–.20 indicate no agreement, .21–.39 minimal agreement, .40–.59 weak agreement, .60–.79 moderate agreement, .80–.90 strong agreement, and above .90 almost perfect agreement.

Sub-group analysis included different skin conditions, specialization of the F2F physician, whether staff were trained on image acquisition, the technology used for image acquisition, the use of teledermoscopy, studies conducted pre- or post-pandemic, and the risk of bias. Confounding factors, such as technology type, year of publication, and training of study raters, were controlled using meta-regression.

Proportions meta-analysis looked at weighted averages, and 95% confidence intervals were reported. Given the unique properties of proportional data and the considerable heterogeneity observed, conventional publication bias tests, specifically designed for comparative data, were not considered applicable. As such, statistical pursuit of publication bias was not undertaken. Instead, a methodologically appropriate qualitative assessment of publication bias was implemented for this type of analysis. This approach was deemed to provide the most accurate and robust outcome.

Supplementary eResults

Our analysis incorporated forty-four relevant studies. Key study and participant details are summarized in **eTable 1**, with a concise overview provided in the main text. Articles excluded based on our criteria are listed in **eTable 5**.

Diagnostic reliability of teledermatology when compared to F2F (specialist and non-specialists) evaluation

Of the 40 studies that reported diagnostic agreement rates there were 72 unique comparisons made between F2F and teledermatology.(5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44) **eFigure 1A** shows that the mean percentage agreement of 68.9% (CI 64.4%-73.1%) ranged from 14% to 98%, where 35/72 had percentage agreement above 70% and 7 studies had over 90% agreement. The studies were heterogeneous (I^2=98%, p <0).

Of the 21 studies that reported concordance values, there were 45 unique comparisons made.(5, 6, 11, 14, 17, 20, 21, 22, 23, 24, 25, 28, 29, 32, 33, 34, 45, 46, 47, 48, 49) **eFigure 1B** shows that the mean diagnostic concordance of 0.67 (CI 0.60 to 0.74) ranged from 0.213 (CI 0.20 to 0.23) to 0.96 (CI 0.92 to 0.98), with 21 studies (47%) having moderate agreement (k=0.6 and above), and 13 (29%) studies having strong agreement. The studies were heterogeneous (I^2=100%, p <0.001).

Diagnostic agreement between teledermatologist and teledermatologist, F2F and F2F, and teledermatology and histopathology

Of the ten studies that reported diagnostic agreement rates between telermatologists, there were 17 unique comparisons made between F2F and teledermatology consults. **eFigure 2A** shows the mean percentage agreement of 76.4% (CI 69% to 82.5%) ranged from 37% to 91.5%, with 10/17 having percentage agreement above 70% and two studies having over 90% agreement. The studies were heterogeneous (I^2=97%, p <0.001).

From four studies that reported diagnostic agreement rates between F2F dermatologists there were 6 unique comparisons. **eFigure 2B** shows that the mean percentage agreement 82.4% (CI 76.7%-87.0%) ranged from 75.5% to 91%. The studies were heterogeneous (I^2=68%, p <0.001).

Five studies compared teledermatology to histopathology data, and there were six unique comparisons. **eFigure 2C** shows that the mean percentage agreement of 55.7% (CI 53% to 58.4%) ranged from 53.8% to 65.4%. The mean agreement rate between histopathology and teledermatology was 55.7% (CI 53.0 to 58.4). The studies were homogeneous (I^2=0%, p = 0.49).

Subgroup analyses

Diagnostic reliability of teledermatology vs F2F specialist and non-specialist

Within the same modality, **eFigure 3A** shows that teledermatologists had a diagnostic agreement rate of 70.96% (CI 69.8% to 72.1%) with F2F dermatologists, while the agreement rate with F2F non-specialists was 44.1% (CI 39.9% to 48.4%). Comparing telermatologists to non-specialists showed significantly lower agreement among non-specialists (p < 0.001, heterogeneity: I^2 = 98%). Among 35 studies reporting diagnostic agreement rates, 44 out of 64 comparisons between teledermatology and F2F dermatologists had a percentage agreement above 60%, with seven studies reporting over 90% agreement. The mean kappa concordance value for diagnostic agreement between teledermatology and F2F dermatologists shown in **eFigure 3B** was 0.69 (CI 0.60 to 0.75). Additionally, telermatologists had a mean concordance value of 0.52 (CI 0.25 to 0.71) when compared to non-specialists. Non-specialists showed significantly lower diagnostic concordance compared to dermatologists for F2F vs. teledermatology (p = 0.031, heterogeneity: I^2 = 100%). Moreover, studies comparing teledermatologists to F2F and teledermatology to histopathology showed a range of agreement rates, with heterogeneity observed in the former (I^2 = 97%, p < 0.001) and homogeneity in the latter (I^2 = 0%, p = 0.49).

Diagnostic reliability of teledermatology vs F2F by the inclusion of teledermoscopy in both teledermatology and F2F assessments

Overall, twelve studies with 22 unique comparisons used teledermoscopy for diagnosing suspicious lesions.(8, 11, 15, 29, 32, 34, 38, 39, 42, 44) **eFigure 4A** shows that with teledermoscopy, the mean diagnostic agreement rates was 69.1% (CI 66.8% to 71.4%), and this percentage ranged between from 31.6% to 92.3%. Without the use of

teledermsocopy, the mean agreement rate was 68.3% (CI 66.8% to 69.8%). The means were not significantly different between the two groups and the studies were heterogeneous (I^2=97%, p<0.001). **eFigure 4B** shows concordance values of seven studies that adapted teledermoscopy had a mean of 0.71 (CI 0.58 to 0.80).(11, 29, 32, 34, 39, 47, 48) Without teledermsocopy, the mean was 0.65 (CI 0.54 to 0.74). This difference was not statistically significant, and the studies were heterogeneous (I^2=100%, p<0.001).

Diagnostic reliability of teledermatology vs F2F by the inclusion of lesion category

Twenty-six studies with 39 unique comparisons reporting percentage agreement rates that were inclusive to all lesion types as shown in e**Figure 5A.**(5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19, 22, 24, 25, 26, 28, 29, 30, 31, 32, 33, 36, 37, 40, 41, 43) The mean percentage agreement was 69.9% (CI 67.9% to 71.7%) and ranged from 30.9% to 98%, with the majority (26/39) having percentage agreement above 60% and 4 studies having over 90%. Eleven studies only looked at suspicious lesions,(11, 12, 14, 20, 23, 34, 35, 38, 39, 42, 44) and the mean percentage agreement was 68.1% (CI 66.3% to 69.8%). Three studies excluded skin cancers(13, 21, 27) and the mean percentage agreement was 62.2% (CI 56.2% to 67.8%). No statistical significance could be identified between the three lesion groups and the studies were heterogeneous (I^2=98%, p<0.001).

Concordance values for studies inclusive to all lesions seen in **eFigure 5B** were reported in ten studies with a mean of 0.62 (CI 0.48 to 0.74).(5, 6, 17, 22, 24, 25, 28, 29, 32, 33) Six studies that looked at cancerous skin lesions only reported a mean of 0.70 (CI 0.59 to 0.78).(11, 14, 20, 23, 34, 39) Only one study that looked at all lesions except cancerous ones reported a concordance value.[22] No statistical significance could be identified between the three lesion groups and the studies were heterogeneous (I^2=100%, p<0.001).

Diagnostic reliability of teledermatology vs F2F by pre- and post-pandemic timelines

When comparing telermatologists to all F2F physicians, the average agreement rate was 65.5% (CI 64.0-66.9) for pre-pandemic studies, and 75.3% (CI 73.4% to 77.2%) for studies published after January 2020. When the percentage agreements were compared between the two groups, they were not statistically significant (p = 0.421) and also heterogeneous (I^2=98%, p<0.001). eTable not included.

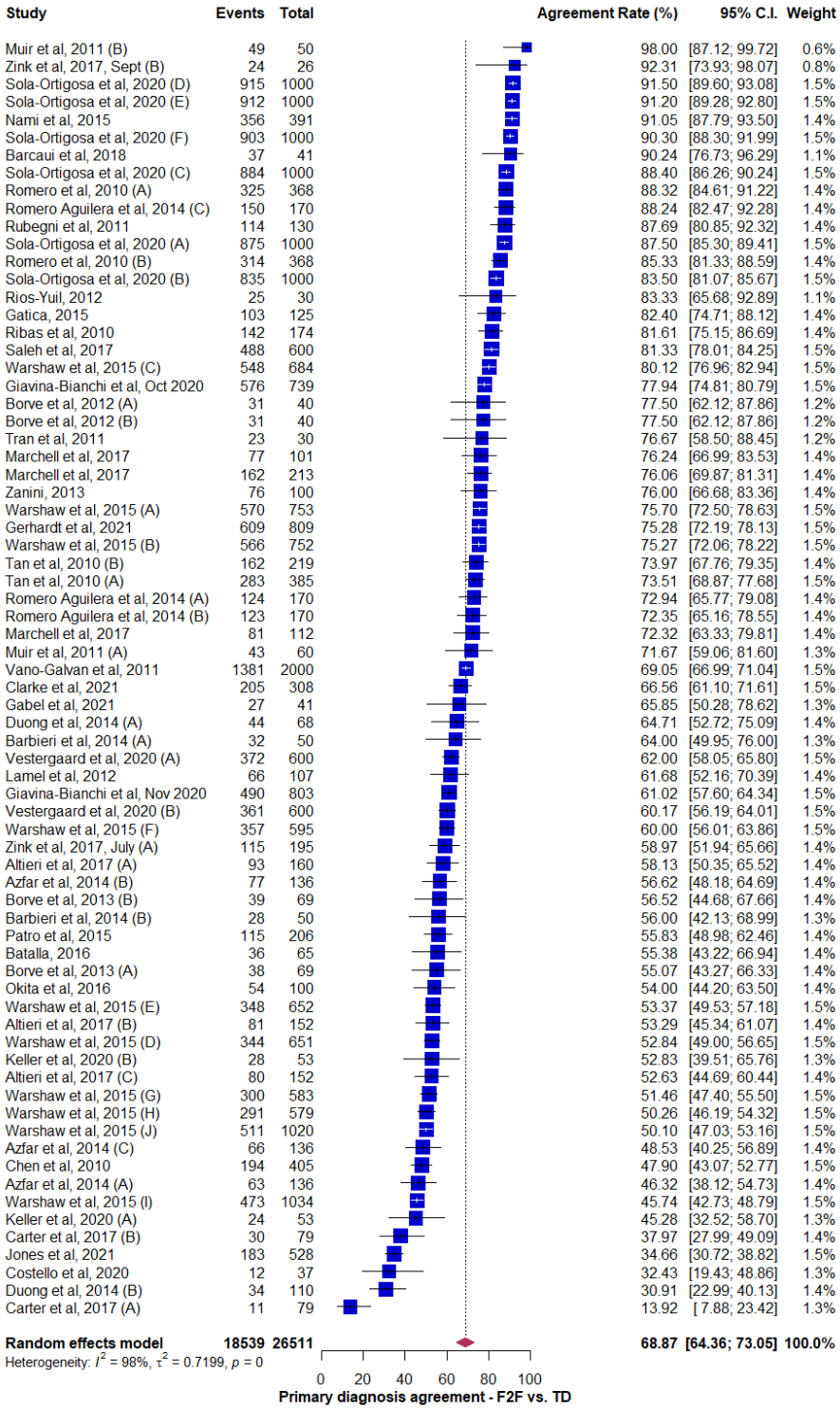
Risk of bias and quality assessment

The QUADAS-2 framework was utilized to evaluate bias and applicability across four essential domains, ensuring that our conclusions are both accurate and applicable to real-life clinical situations. **eTable 6A** summarizes the QUADAS-2 criteria tailored to this study.

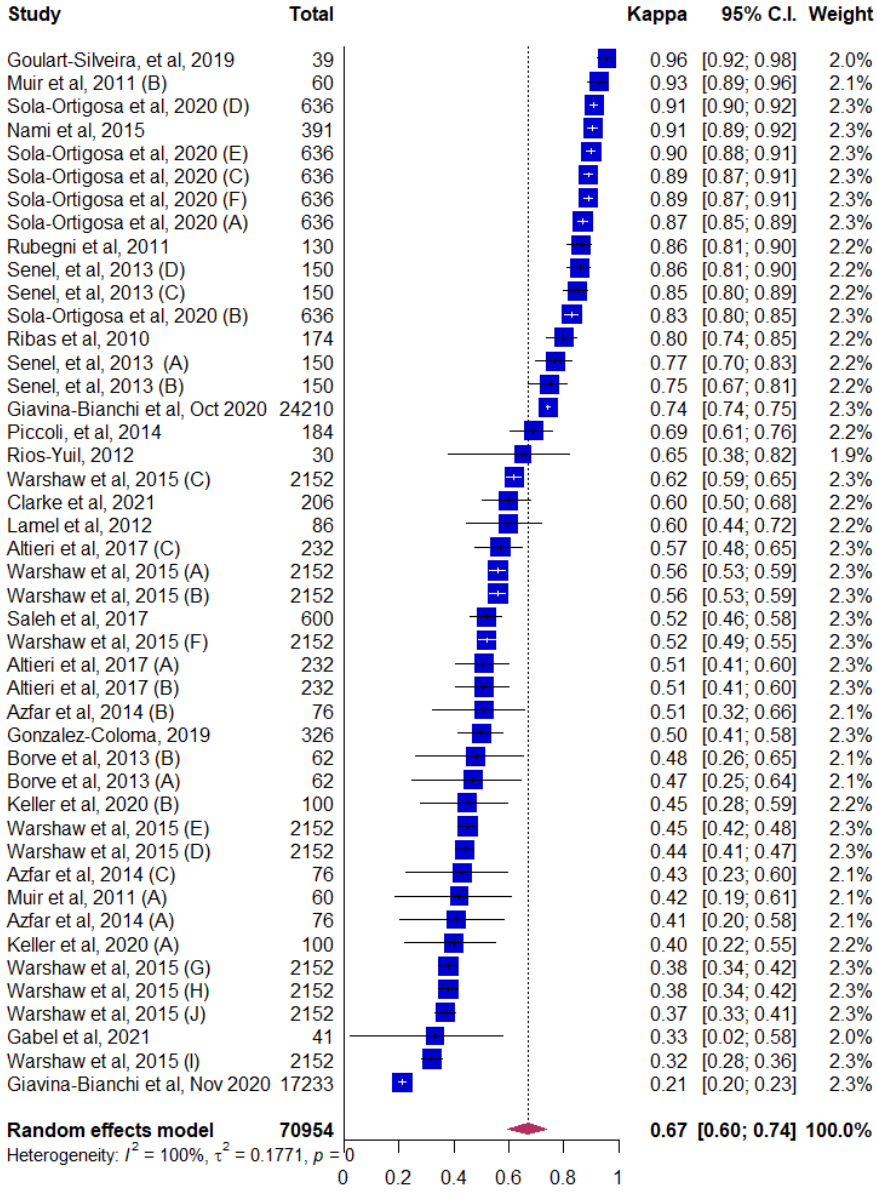
The results of quality assessment for risk of bias and applicability in individual studies are displayed in**. eTable 6B-E.** Six of the studies had low risk of bias, nine had moderate risk, and 29 had high-risk of bias. There were no systematic differences between the results of studies that attempted to reduce risk of bias, compared with those with higher risk of bias. The mean diagnostic agreement rate between F2F and teledermatology was 66.4% (CI 62.4% to 70.1%) for low risk, and 69.1% (CI 67.6% to 70.6%) for high risk (p = 0.932). When the percentage agreements were compared between groups, they were heterogeneous (I^ 2=98%, p<0.001). eTable not included.

Supplementary eFigures and Legends

A

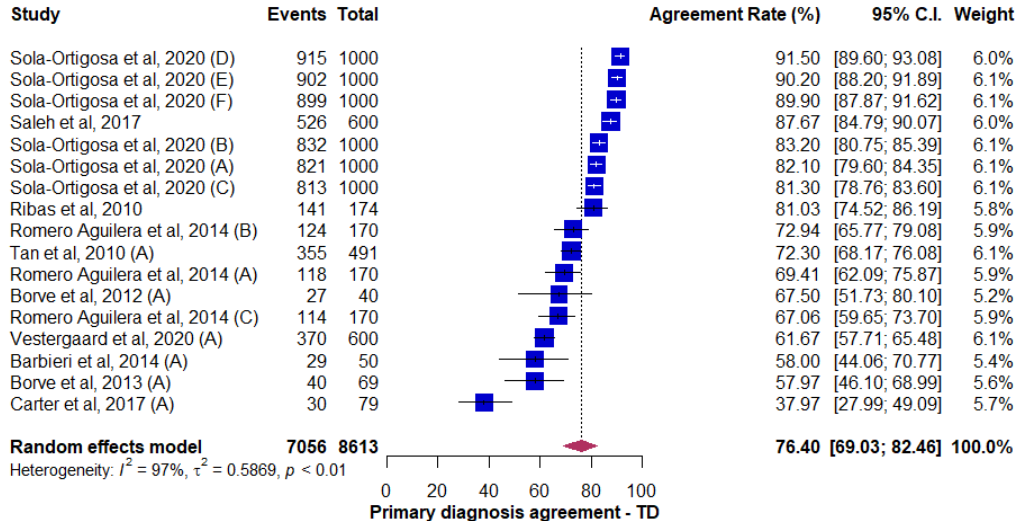


B

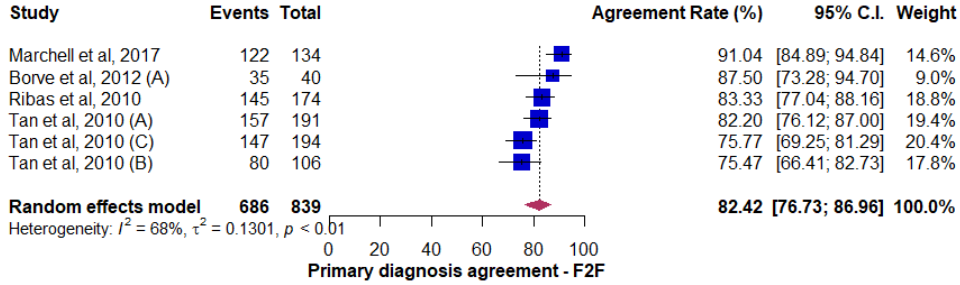


eFigure 1. Forest plot representing F2F and teledermatology primary diagnostic agreement. (A) Forest plot representing percentage agreement and 95% C.I. for overall concordance across 40 studies with a total of 72 unique number of comparisons, N of events and total included participants. (B) Forest plot representing kappa concordance and 95% C.I. for overall concordance across 21 studies with a total of 45 unique number of comparisons, N of total included participants. Abbreviations: F2F (Face-to-Face), PCP (Primary Care Provider), TD (Teledermatology or Teledermatologist)**.**

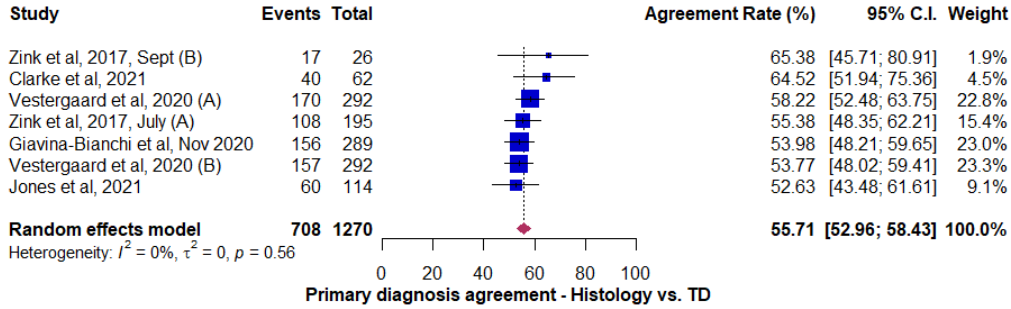
A



B

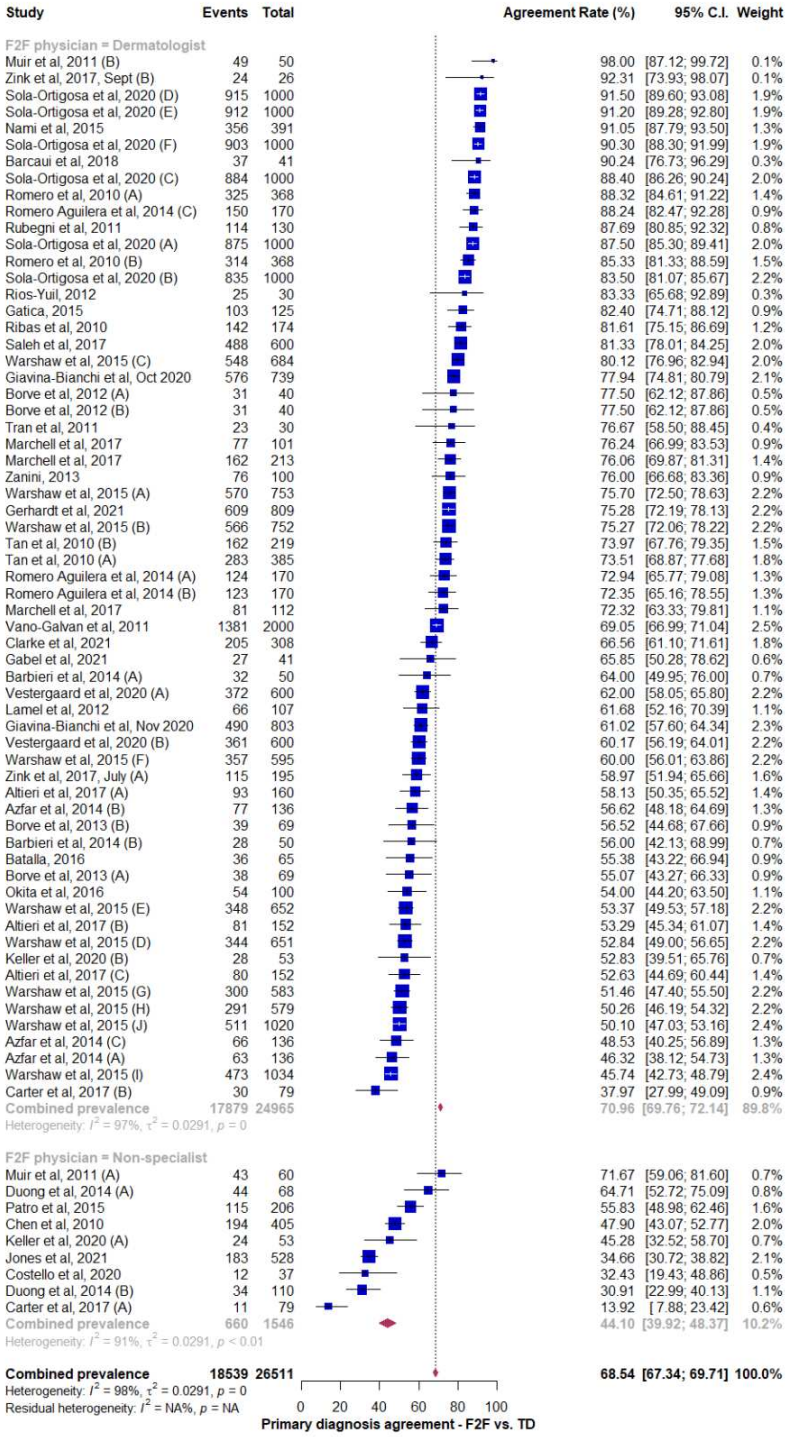


C



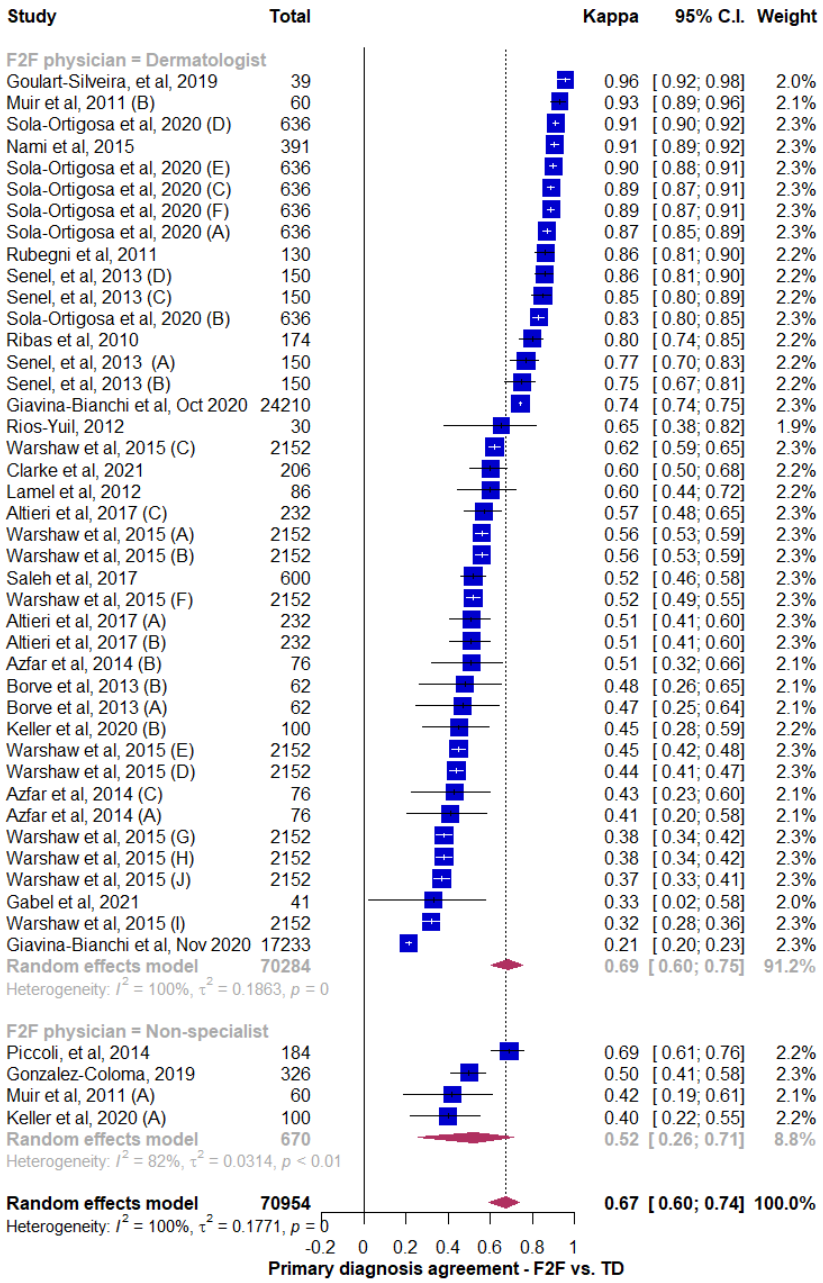
eFigure 2. Forest plot representing teledermatologists, F2F physicians, and histopathology primary diagnostic agreements. (A) Forest plot representing percentage agreement between teledermatologist and teledermatologist and 95% C.I. for overall concordance across ten studies with a total of 17 unique number of comparisons, N of events and total included participants. (B) Forest plot representing kappa concordance and 95% C.I. for overall concordance between two F2F physician diagnoses across four studies with a total of six unique number of comparisons, N of total included participants. (C) Forest plot representing percentage agreement between teledermatologists and histopathology with 95% C.I. for overall concordance across six studies, N of events and total included participants. Abbreviations: F2F (Face-to-Face), PCP (Primary Care Provider), TD (Teledermatology or Teledermatologist).

A


Study Events Total Agreement Rate (%) 95% C.I. Weight
F2F physician = Dermatologist
Muir et al, 2011 (B) 49 50 98.00 [87.12; 99.72] 0.1%
Zink et al, 2017, Sept (B) 24 26 92.31 [73.93; 98.07] 0.1%
Sola-Ortigosa et al, 2020 (D) 915 1000 91.50 [89.60; 93.08] 1.9%
Sola-Ortigosa et al, 2020 (E) 912 1000 91.20 [89.28; 92.80] 1.9%
Nami et al, 2015 356 391 91.05 [87.79; 93.50] 1.3%
Sola-Ortigosa et al, 2020 (F) 903 1000 90.30 [88.30; 91.99] 1.9%
Barcaui et al, 2018 37 41 90.24 [76.73; 96.29] 0.3%
Sola-Ortigosa et al, 2020 (C) 884 1000 88.40 [86.26; 90.24] 2.0%
Romero et al, 2010 (A) 325 368 88.32 [84.61; 91.22] 1.4%
Romero Aguilera et al, 2014 (C) 150 170 88.24 [82.47; 92.28] 0.9%
Rubegni et al, 2011 114 130 87.69 [80.85; 92.32] 0.8%
Sola-Ortigosa et al, 2020 (A) 875 1000 87.50 [85.30; 89.41] 2.0%
Romero et al, 2010 (B) 314 368 85.33 [81.33; 88.59] 1.5%
Sola-Ortigosa et al, 2020 (B) 835 1000 83.50 [81.07; 85.67] 2.2%
Rios-Yuil, 2012 25 30 83.33 [65.68; 92.89] 0.3%
Gatica, 2015 103 125 82.40 [74.71; 88.12] 0.9%
Ribas et al, 2010 142 174 81.61 [75.15; 86.69] 1.2%
Saleh et al, 2017 488 600 81.33 [78.01; 84.25] 2.0%
Warshaw et al, 2015 (C) 548 684 80.12 [76.96; 82.94] 2.0%
Giavina-Bianchi et al, Oct 2020 576 739 77.94 [74.81; 80.79] 2.1%
Borve et al, 2012 (A) 31 40 77.50 [62.12; 87.86] 0.5%
Borve et al, 2012 (B) 31 40 77.50 [62.12; 87.86] 0.5%
Tran et al, 2011 23 30 76.67 [58.50; 88.45] 0.4%
Marchell et al, 2017 77 101 76.24 [66.99; 83.53] 0.9%
Marchell et al, 2017 162 213 76.06 [69.87; 81.31] 1.4%
Zanini, 2013 76 100 76.00 [66.68; 83.36] 0.9%
Warshaw et al, 2015 (A) 570 753 75.70 [72.50; 78.63] 2.2%
Gerhardt et al, 2021 609 809 75.28 [72.19; 78.13] 2.2%
Warshaw et al, 2015 (B) 566 752 75.27 [72.06; 78.22] 2.2%
Tan et al, 2010 (B) 162 219 73.97 [67.76; 79.35] 1.5%
Tan et al, 2010 (A) 283 385 73.51 [68.87; 77.68] 1.8%
Romero Aguilera et al, 2014 (A) 124 170 72.94 [65.77; 79.08] 1.3%
Romero Aguilera et al, 2014 (B) 123 170 72.35 [65.16; 78.55] 1.3%
Marchell et al, 2017 81 112 72.32 [63.33; 79.81] 1.1%
Vano-Galvan et al, 2011 1381 2000 69.05 [66.99; 71.04] 2.5%
Clarke et al, 2021 205 308 66.56 [61.10; 71.61] 1.8%
Gabel et al, 2021 27 41 65.85 [50.28; 78.62] 0.6%
Barbieri et al, 2014 (A) 32 50 64.00 [49.95; 76.00] 0.7%
Vestergaard et al, 2020 (A) 372 600 62.00 [58.05; 65.80] 2.2%
Lamel et al, 2012 66 107 61.68 [52.16; 70.39] 1.1%
Giavina-Bianchi et al, Nov 2020 490 803 61.02 [57.60; 64.34] 2.3%
Vestergaard et al, 2020 (B) 361 600 60.17 [56.19; 64.01] 2.2%
Warshaw et al, 2015 (F) 357 595 60.00 [56.01; 63.86] 2.2%
Zink et al, 2017, July (A) 115 195 58.97 [51.94; 65.66] 1.6%
Altieri et al, 2017 (A) 93 160 58.13 [50.35; 65.52] 1.4%
Azfar et al, 2014 (B) 77 136 56.62 [48.18; 64.69] 1.3%
Borve et al, 2013 (B) 39 69 56.52 [44.68; 67.66] 0.9%
Barbieri et al, 2014 (B) 28 50 56.00 [42.13; 68.99] 0.7%
Batalla, 2016 36 65 55.38 [43.22; 66.94] 0.9%
Borve et al, 2013 (A) 38 69 55.07 [43.27; 66.33] 0.9%
Okita et al, 2016 54 100 54.00 [44.20; 63.50] 1.1%
Warshaw et al, 2015 (E) 348 652 53.37 [49.53; 57.18] 2.2%
Altieri et al, 2017 (B) 81 152 53.29 [45.34; 61.07] 1.4%
Warshaw et al, 2015 (D) 344 651 52.84 [49.00; 56.65] 2.2%
Keller et al, 2020 (B) 28 53 52.83 [39.51; 65.76] 0.7%
Altieri et al, 2017 (C) 80 152 52.63 [44.69; 60.44] 1.4%
Warshaw et al, 2015 (G) 300 583 51.46 [47.40; 55.50] 2.2%
Warshaw et al, 2015 (H) 291 579 50.26 [46.19; 54.32] 2.2%
Warshaw et al, 2015 (J) 511 1020 50.10 [47.03; 53.16] 2.4%
Azfar et al, 2014 (C) 66 136 48.53 [40.25; 56.89] 1.3%
Azfar et al, 2014 (A) 63 136 46.32 [38.12; 54.73] 1.3%
Warshaw et al, 2015 (I) 473 1034 45.74 [42.73; 48.79] 2.4%
Carter et al, 2017 (B) 30 79 37.97 [27.99; 49.09] 0.9%
Combined prevalence 17879 24965 70.96 [69.76; 72.14] 89.8%
Heterogeneity: I^2 = 97%, τ^2 = 0.0291, p = 0
F2F physician = Non-specialist
Muir et al, 2011 (A) 43 60 71.67 [59.06; 81.60] 0.7%
Duong et al, 2014 (A) 44 68 64.71 [52.72; 75.09] 0.8%
Patro et al, 2015 115 206 55.83 [48.98; 62.46] 1.6%
Chen et al, 2010 194 405 47.90 [43.07; 52.77] 2.0%
Keller et al, 2020 (A) 24 53 45.28 [32.52; 58.70] 0.7%
Jones et al, 2021 183 528 34.66 [30.72; 38.82] 2.1%
Costello et al, 2020 12 37 32.43 [19.43; 48.86] 0.5%
Duong et al, 2014 (B) 34 110 30.91 [22.99; 40.13] 1.1%
Carter et al, 2017 (A) 11 79 13.92 [7.88; 23.42] 0.6%
Combined prevalence 660 1546 44.10 [39.92; 48.37] 10.2%
Heterogeneity: I^2 = 91%, τ^2 = 0.0291, p < 0.01
Combined prevalence 18539 26511 68.54 [67.34; 69.71] 100.0%
Heterogeneity: I^2 = 98%, τ^2 = 0.0291, p = 0
Residual heterogeneity: I^2 = NA%, p = NA
0 20 40 60 80 100
Primary diagnosis agreement - F2F vs. TD

376

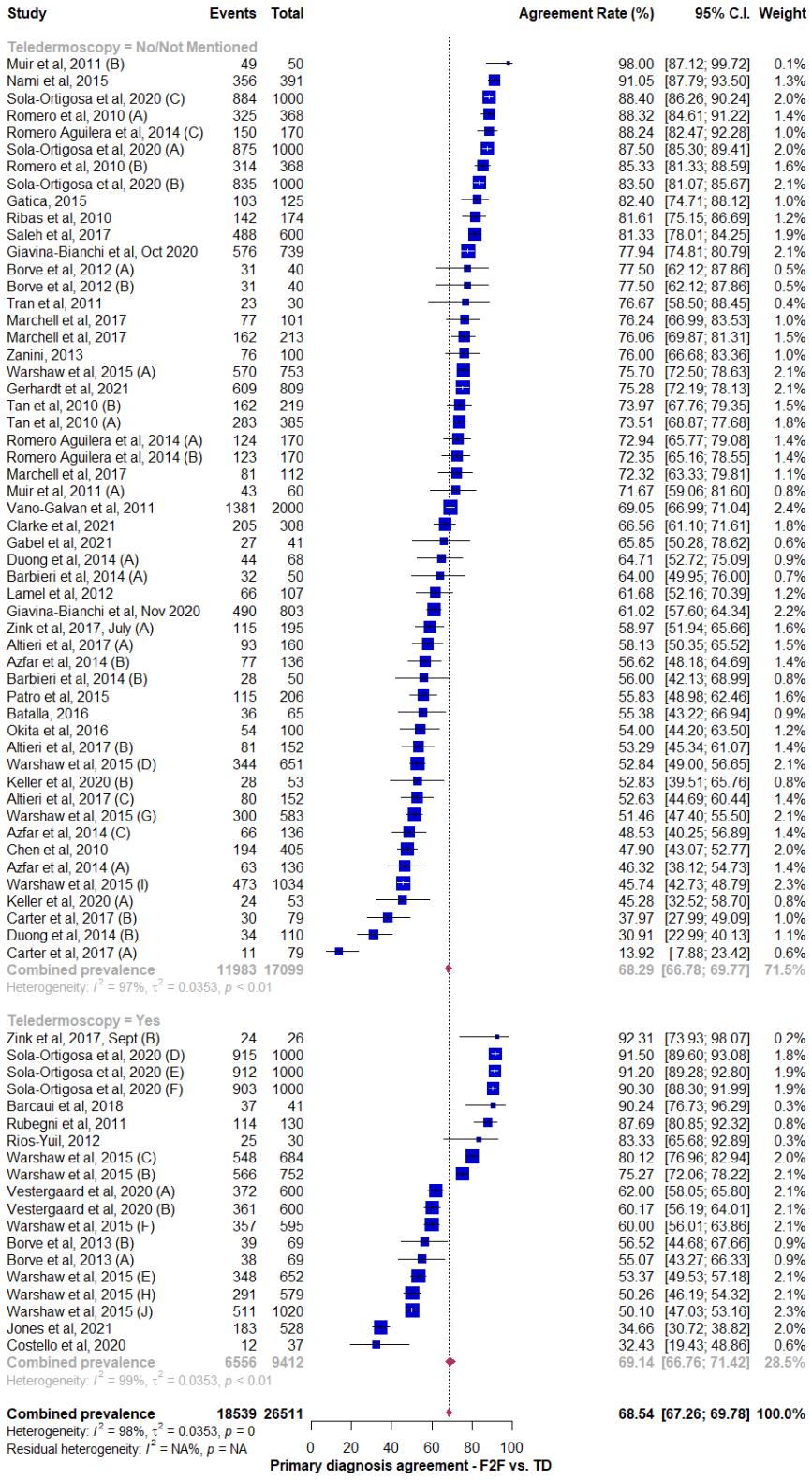
B



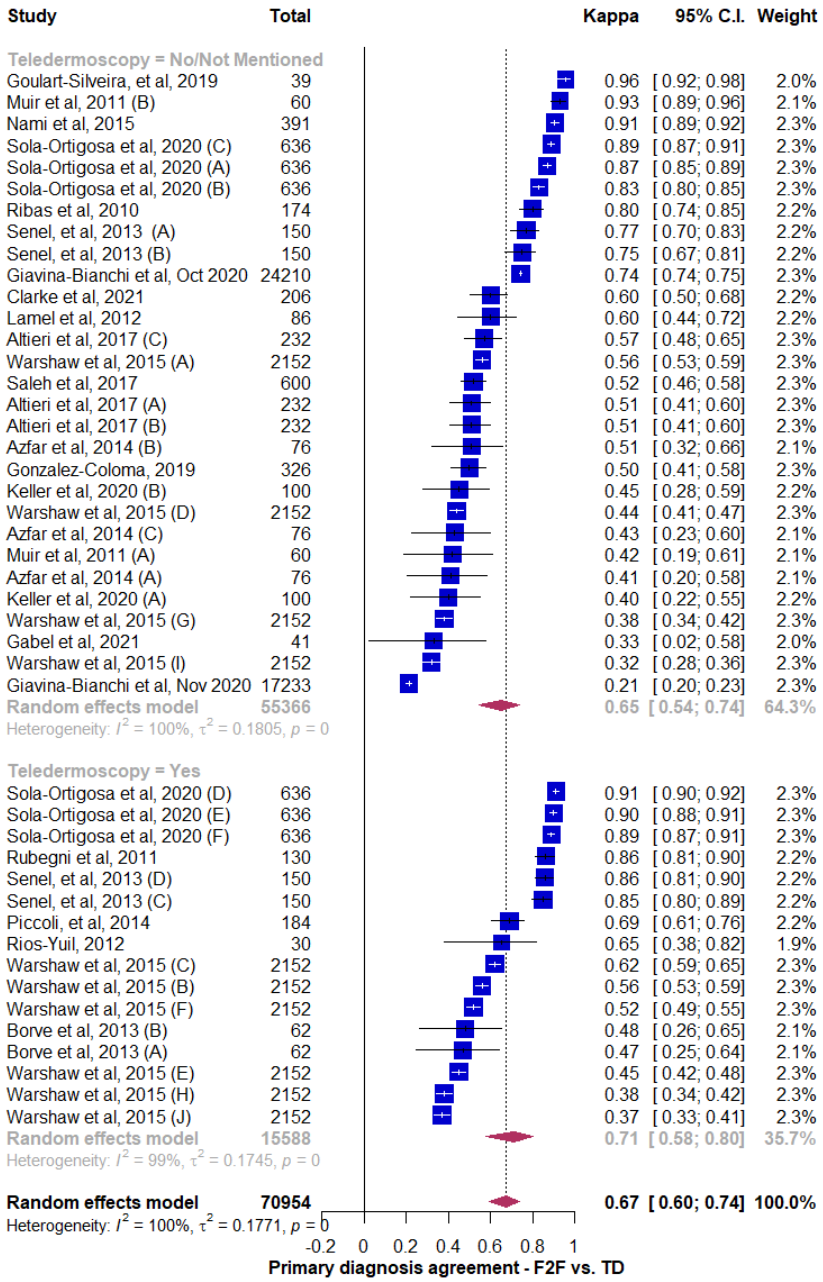
eFigure 3. Forest plot representing F2F and teledermatology primary diagnostic agreement by specialization status of the F2F physician. Studies were sorted into two groups, a) F2F diagnosis completed by a board-certified dermatologist; b) F2F diagnosis completed by a non-specialist (e.g., general practitioner). (A) Forest plot representing percentage agreement and 95% C.I. for overall concordance across 40 studies with a total of 72 unique number of comparisons, N of events and total included participants. (B) Forest plot representing kappa concordance and 95% C.I. for overall concordance across 21 studies with a total of 45 unique number of comparisons, N of total included

participants. Abbreviations: F2F (Face-to-Face), PCP (Primary Care Provider), TD (Teledermatology or Teledermatologist).

A

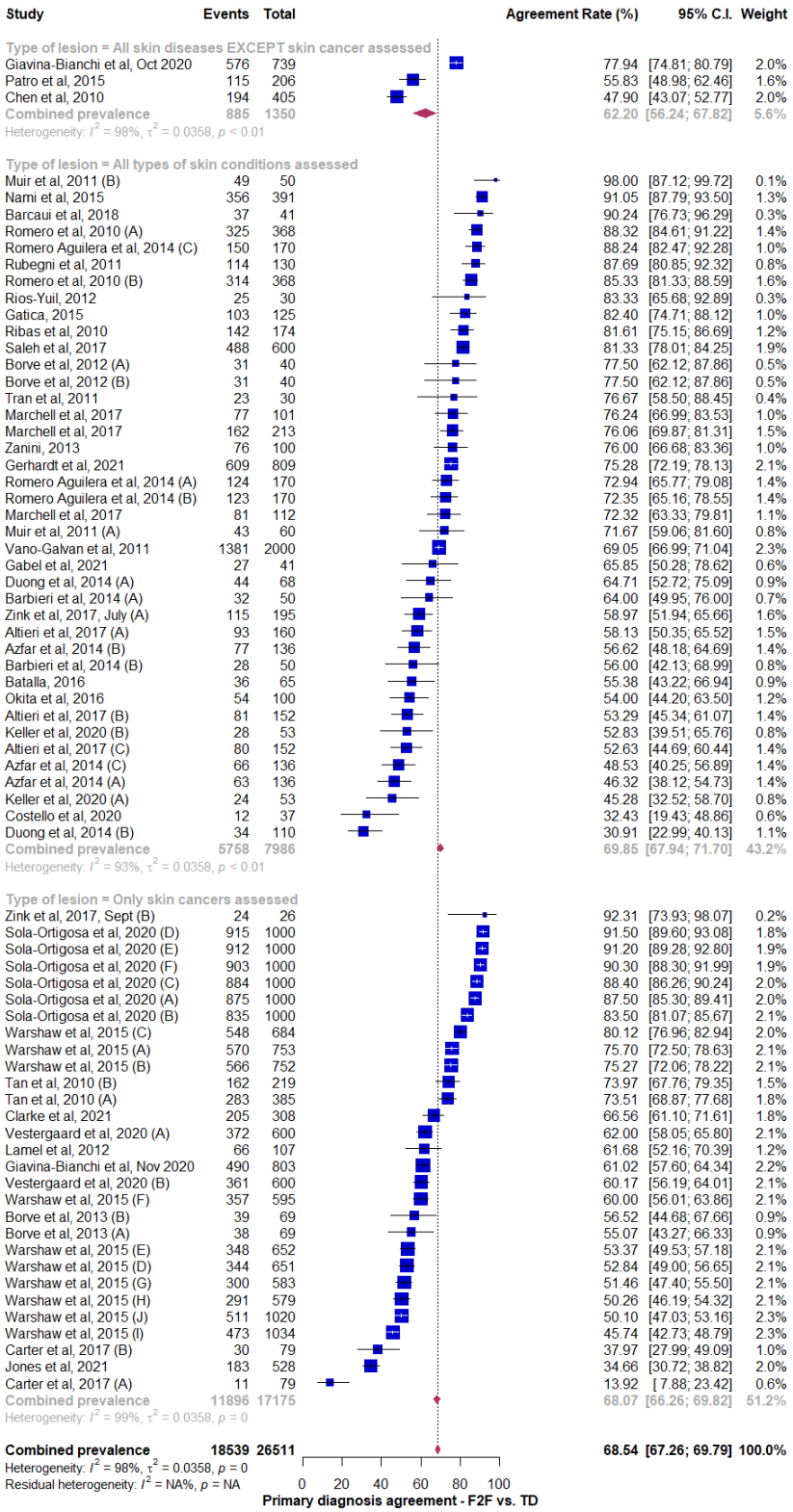

Study Events Total Agreement Rate (%) 95% C.I. Weight
Teledermoscopy = No/Not Mentioned
Muir et al, 2011 (B) 49 50 98.00 [87.12; 99.72] 0.1%
Nami et al, 2015 356 391 91.05 [87.79; 93.50] 1.3%
Sola-Ortigosa et al, 2020 (C) 884 1000 88.40 [86.26; 90.24] 2.0%
Romero et al, 2010 (A) 325 368 88.32 [84.61; 91.22] 1.4%
Romero Aguilera et al, 2014 (C) 150 170 88.24 [82.47; 92.28] 1.0%
Sola-Ortigosa et al, 2020 (A) 875 1000 87.50 [85.30; 89.41] 2.0%
Romero et al, 2010 (B) 314 368 85.33 [81.33; 88.59] 1.6%
Sola-Ortigosa et al, 2020 (B) 835 1000 83.50 [81.07; 85.67] 2.1%
Gatica, 2015 103 125 82.40 [74.71; 88.12] 1.0%
Ribas et al, 2010 142 174 81.61 [75.15; 86.69] 1.2%
Saleh et al, 2017 488 600 81.33 [78.01; 84.25] 1.9%
Giavina-Bianchi et al, Oct 2020 576 739 77.94 [74.81; 80.79] 2.1%
Borve et al, 2012 (A) 31 40 77.50 [62.12; 87.86] 0.5%
Borve et al, 2012 (B) 31 40 77.50 [62.12; 87.86] 0.5%
Tran et al, 2011 23 30 76.67 [58.50; 88.45] 0.4%
Marchell et al, 2017 77 101 76.24 [66.99; 83.53] 1.0%
Marchell et al, 2017 162 213 76.06 [69.87; 81.31] 1.5%
Zanini, 2013 76 100 76.00 [66.68; 83.36] 1.0%
Warshaw et al, 2015 (A) 570 753 75.70 [72.50; 78.63] 2.1%
Gerhardt et al, 2021 609 809 75.28 [72.19; 78.13] 2.1%
Tan et al, 2010 (B) 162 219 73.97 [67.76; 79.35] 1.5%
Tan et al, 2010 (A) 283 385 73.51 [68.87; 77.68] 1.8%
Romero Aguilera et al, 2014 (A) 124 170 72.94 [65.77; 79.08] 1.4%
Romero Aguilera et al, 2014 (B) 123 170 72.35 [65.16; 78.55] 1.4%
Marchell et al, 2017 81 112 72.32 [63.33; 79.81] 1.1%
Muir et al, 2011 (A) 43 60 71.67 [59.06; 81.60] 0.8%
Vano-Galvan et al, 2011 1381 2000 69.05 [66.99; 71.04] 2.4%
Clarke et al, 2021 205 308 66.56 [61.10; 71.61] 1.8%
Gabel et al, 2021 27 41 65.85 [50.28; 78.62] 0.6%
Duong et al, 2014 (A) 44 68 64.71 [52.72; 75.09] 0.9%
Barbieri et al, 2014 (A) 32 50 64.00 [49.95; 76.00] 0.7%
Lamel et al, 2012 66 107 61.68 [52.16; 70.39] 1.2%
Giavina-Bianchi et al, Nov 2020 490 803 61.02 [57.60; 64.34] 2.2%
Zink et al, 2017, July (A) 115 195 58.97 [51.94; 65.66] 1.6%
Altieri et al, 2017 (A) 93 160 58.13 [50.35; 65.52] 1.5%
Azfar et al, 2014 (B) 77 136 56.62 [48.18; 64.69] 1.4%
Barbieri et al, 2014 (B) 28 50 56.00 [42.13; 68.99] 0.8%
Patro et al, 2015 115 206 55.83 [48.98; 62.46] 1.6%
Batalla, 2016 36 65 55.38 [43.22; 66.94] 0.9%
Okita et al, 2016 54 100 54.00 [44.20; 63.50] 1.2%
Altieri et al, 2017 (B) 81 152 53.29 [45.34; 61.07] 1.4%
Warshaw et al, 2015 (D) 344 651 52.84 [49.00; 56.65] 2.1%
Keller et al, 2020 (B) 28 53 52.83 [39.51; 65.76] 0.8%
Altieri et al, 2017 (C) 80 152 52.63 [44.69; 60.44] 1.4%
Warshaw et al, 2015 (G) 300 583 51.46 [47.40; 55.50] 2.1%
Azfar et al, 2014 (C) 66 136 48.53 [40.25; 56.89] 1.4%
Chen et al, 2010 194 405 47.90 [43.07; 52.77] 2.0%
Azfar et al, 2014 (A) 63 136 46.32 [38.12; 54.73] 1.4%
Warshaw et al, 2015 (I) 473 1034 45.74 [42.73; 48.79] 2.3%
Keller et al, 2020 (A) 24 53 45.28 [32.52; 58.70] 0.8%
Carter et al, 2017 (B) 30 79 37.97 [27.99; 49.09] 1.0%
Duong et al, 2014 (B) 34 110 30.91 [22.99; 40.13] 1.1%
Carter et al, 2017 (A) 11 79 13.92 [7.88; 23.42] 0.6%
Combined prevalence 11983 17099 68.29 [66.78; 69.77] 71.5%
Heterogeneity: I^2 = 97%, τ^2 = 0.0353, p < 0.01
Teledermoscopy = Yes
Zink et al, 2017, Sept (B) 24 26 92.31 [73.93; 98.07] 0.2%
Sola-Ortigosa et al, 2020 (D) 915 1000 91.50 [89.60; 93.08] 1.8%
Sola-Ortigosa et al, 2020 (E) 912 1000 91.20 [89.28; 92.80] 1.9%
Sola-Ortigosa et al, 2020 (F) 903 1000 90.30 [88.30; 91.99] 1.9%
Barcaui et al, 2018 37 41 90.24 [76.73; 96.29] 0.3%
Rubegni et al, 2011 114 130 87.69 [80.85; 92.32] 0.8%
Rios-Yuil, 2012 25 30 83.33 [65.68; 92.89] 0.3%
Warshaw et al, 2015 (C) 548 684 80.12 [76.96; 82.94] 2.0%
Warshaw et al, 2015 (B) 566 752 75.27 [72.06; 78.22] 2.1%
Vestergaard et al, 2020 (A) 372 600 62.00 [58.05; 65.80] 2.1%
Vestergaard et al, 2020 (B) 361 600 60.17 [56.19; 64.01] 2.1%
Warshaw et al, 2015 (F) 357 595 60.00 [56.01; 63.86] 2.1%
Borve et al, 2013 (B) 39 69 56.52 [44.68; 67.66] 0.9%
Borve et al, 2013 (A) 38 69 55.07 [43.27; 66.33] 0.9%
Warshaw et al, 2015 (E) 348 652 53.37 [49.53; 57.18] 2.1%
Warshaw et al, 2015 (H) 291 579 50.26 [46.19; 54.32] 2.1%
Warshaw et al, 2015 (J) 511 1020 50.10 [47.03; 53.16] 2.3%
Jones et al, 2021 183 528 34.66 [30.72; 38.82] 2.0%
Costello et al, 2020 12 37 32.43 [19.43; 48.86] 0.6%
Combined prevalence 6556 9412 69.14 [66.76; 71.42] 28.5%
Heterogeneity: I^2 = 99%, τ^2 = 0.0353, p < 0.01
Combined prevalence 18539 26511 68.54 [67.26; 69.78] 100.0%
Heterogeneity: I^2 = 98%, τ^2 = 0.0353, p = 0
Residual heterogeneity: I^2 = NA%, p = NA
0 20 40 60 80 100
Primary diagnosis agreement - F2F vs. TD

B

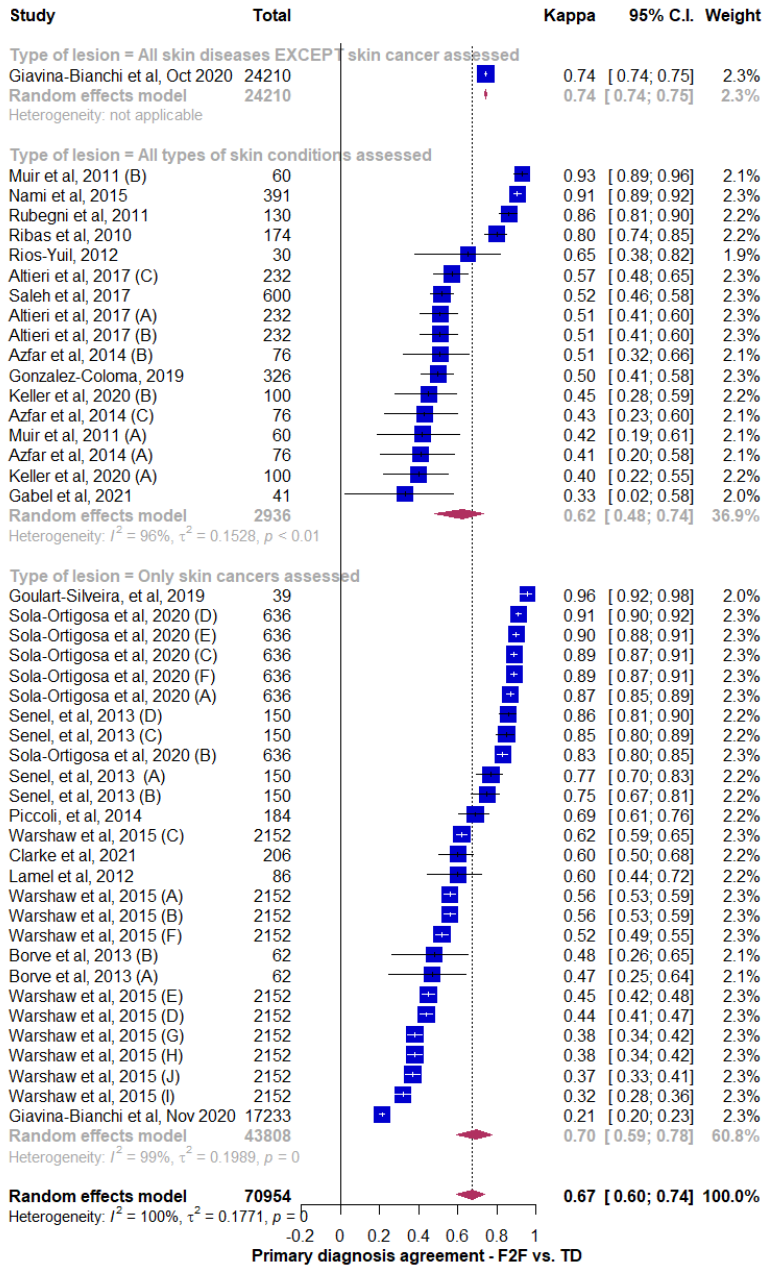


eFigure 4. Forest plot representing F2F and teledermatology primary diagnostic agreement by utilization of teledermoscopy. Studies were sorted into two groups, i) Did not use or did not report the use of teledermoscopy; ii) Used teledermoscopy. (A) Forest plot representing percentage agreement and 95% C.I. for overall concordance across 12 studies with a total of 22 unique number of comparisons, N of events and total included participants. (B) Forest plot representing kappa concordance and 95% C.I. for overall concordance across seven studies with a total of 16 unique number of comparisons, N of total included participants. Abbreviations: F2F (Face-to-Face), PCP (Primary Care Provider), TD (Teledermatology or Teledermatologist).

A


Study Events Total Agreement Rate (%) 95% C.I. Weight
Type of lesion = All skin diseases EXCEPT skin cancer assessed
Giavina-Bianchi et al, Oct 2020 576 739 77.94 [74.81; 80.79] 2.0%
Patro et al, 2015 115 206 55.83 [48.98; 62.46] 1.6%
Chen et al, 2010 194 405 47.90 [43.07; 52.77] 2.0%
Combined prevalence 885 1350 62.20 [56.24; 67.82] 5.6%
Heterogeneity: I^2 = 98%, τ^2 = 0.0358, p < 0.01
Type of lesion = All types of skin conditions assessed
Muir et al, 2011 (B) 49 50 98.00 [87.12; 99.72] 0.1%
Nami et al, 2015 356 391 91.05 [87.79; 93.50] 1.3%
Barcaui et al, 2018 37 41 90.24 [76.73; 96.29] 0.3%
Romero et al, 2010 (A) 325 368 88.32 [84.61; 91.22] 1.4%
Romero Aguilera et al, 2014 (C) 150 170 88.24 [82.47; 92.28] 1.0%
Rubegni et al, 2011 114 130 87.69 [80.85; 92.32] 0.8%
Romero et al, 2010 (B) 314 368 85.33 [81.33; 88.59] 1.6%
Rios-Yuil, 2012 25 30 83.33 [65.68; 92.89] 0.3%
Gatica, 2015 103 125 82.40 [74.71; 88.12] 1.0%
Ribas et al, 2010 142 174 81.61 [75.15; 86.69] 1.2%
Saleh et al, 2017 488 600 81.33 [78.01; 84.25] 1.9%
Borve et al, 2012 (A) 31 40 77.50 [62.12; 87.86] 0.5%
Borve et al, 2012 (B) 31 40 77.50 [62.12; 87.86] 0.5%
Tran et al, 2011 23 30 76.67 [58.50; 88.45] 0.4%
Marchell et al, 2017 77 101 76.24 [66.99; 83.53] 1.0%
Marchell et al, 2017 162 213 76.06 [69.87; 81.31] 1.5%
Zanini, 2013 76 100 76.00 [66.68; 83.36] 1.0%
Gerhardt et al, 2021 609 809 75.28 [72.19; 78.13] 2.1%
Romero Aguilera et al, 2014 (A) 124 170 72.94 [65.77; 79.08] 1.4%
Romero Aguilera et al, 2014 (B) 123 170 72.35 [65.16; 78.55] 1.4%
Marchell et al, 2017 81 112 72.32 [63.33; 79.81] 1.1%
Muir et al, 2011 (A) 43 60 71.67 [59.06; 81.60] 0.8%
Vano-Galvan et al, 2011 1381 2000 69.05 [66.99; 71.04] 2.3%
Gabel et al, 2021 27 41 65.85 [50.28; 78.62] 0.6%
Duong et al, 2014 (A) 44 68 64.71 [52.72; 75.09] 0.9%
Barbieri et al, 2014 (A) 32 50 64.00 [49.95; 76.00] 0.7%
Zink et al, 2017, July (A) 115 195 58.97 [51.94; 65.66] 1.6%
Altieri et al, 2017 (A) 93 160 58.13 [50.35; 65.52] 1.5%
Azfar et al, 2014 (B) 77 136 56.62 [48.18; 64.69] 1.4%
Barbieri et al, 2014 (B) 28 50 56.00 [42.13; 68.99] 0.8%
Batalla, 2016 36 65 55.38 [43.22; 66.94] 0.9%
Okita et al, 2016 54 100 54.00 [44.20; 63.50] 1.2%
Altieri et al, 2017 (B) 81 152 53.29 [45.34; 61.07] 1.4%
Keller et al, 2020 (B) 28 53 52.83 [39.51; 65.76] 0.8%
Altieri et al, 2017 (C) 80 152 52.63 [44.69; 60.44] 1.4%
Azfar et al, 2014 (C) 66 136 48.53 [40.25; 56.89] 1.4%
Azfar et al, 2014 (A) 63 136 46.32 [38.12; 54.73] 1.4%
Keller et al, 2020 (A) 24 53 45.28 [32.52; 58.70] 0.8%
Costello et al, 2020 12 37 32.43 [19.43; 48.86] 0.6%
Duong et al, 2014 (B) 34 110 30.91 [22.99; 40.13] 1.1%
Combined prevalence 5758 7986 69.85 [67.94; 71.70] 43.2%
Heterogeneity: I^2 = 93%, τ^2 = 0.0358, p < 0.01
Type of lesion = Only skin cancers assessed
Zink et al, 2017, Sept (B) 24 26 92.31 [73.93; 98.07] 0.2%
Sola-Ortigosa et al, 2020 (D) 915 1000 91.50 [89.60; 93.08] 1.8%
Sola-Ortigosa et al, 2020 (E) 912 1000 91.20 [89.28; 92.80] 1.9%
Sola-Ortigosa et al, 2020 (F) 903 1000 90.30 [88.30; 91.99] 1.9%
Sola-Ortigosa et al, 2020 (C) 884 1000 88.40 [86.26; 90.24] 2.0%
Sola-Ortigosa et al, 2020 (A) 875 1000 87.50 [85.30; 89.41] 2.0%
Sola-Ortigosa et al, 2020 (B) 835 1000 83.50 [81.07; 85.67] 2.1%
Warshaw et al, 2015 (C) 548 684 80.12 [76.96; 82.94] 2.0%
Warshaw et al, 2015 (A) 570 753 75.70 [72.50; 78.63] 2.1%
Warshaw et al, 2015 (B) 566 752 75.27 [72.06; 78.22] 2.1%
Tan et al, 2010 (B) 162 219 73.97 [67.76; 79.35] 1.5%
Tan et al, 2010 (A) 283 385 73.51 [68.87; 77.68] 1.8%
Clarke et al, 2021 205 308 66.56 [61.10; 71.61] 1.8%
Vestergaard et al, 2020 (A) 372 600 62.00 [58.05; 65.80] 2.1%
Lamel et al, 2012 66 107 61.68 [52.16; 70.39] 1.2%
Giavina-Bianchi et al, Nov 2020 490 803 61.02 [57.60; 64.34] 2.2%
Vestergaard et al, 2020 (B) 361 600 60.17 [56.19; 64.01] 2.1%
Warshaw et al, 2015 (F) 357 595 60.00 [56.01; 63.86] 2.1%
Borve et al, 2013 (B) 39 69 56.52 [44.68; 67.66] 0.9%
Borve et al, 2013 (A) 38 69 55.07 [43.27; 66.33] 0.9%
Warshaw et al, 2015 (E) 348 652 53.37 [49.53; 57.18] 2.1%
Warshaw et al, 2015 (D) 344 651 52.84 [49.00; 56.65] 2.1%
Warshaw et al, 2015 (G) 300 583 51.46 [47.40; 55.50] 2.1%
Warshaw et al, 2015 (H) 291 579 50.26 [46.19; 54.32] 2.1%
Warshaw et al, 2015 (J) 511 1020 50.10 [47.03; 53.16] 2.3%
Warshaw et al, 2015 (I) 473 1034 45.74 [42.73; 48.79] 2.3%
Carter et al, 2017 (B) 30 79 37.97 [27.99; 49.09] 1.0%
Jones et al, 2021 183 528 34.66 [30.72; 38.82] 2.0%
Carter et al, 2017 (A) 11 79 13.92 [7.88; 23.42] 0.6%
Combined prevalence 11896 17175 68.07 [66.26; 69.82] 51.2%
Heterogeneity: I^2 = 99%, τ^2 = 0.0358, p = 0
Combined prevalence 18539 26511 68.54 [67.26; 69.79] 100.0%
Heterogeneity: I^2 = 98%, τ^2 = 0.0358, p = 0
Residual heterogeneity: I^2 = NA%, p = NA
0 20 40 60 80 100
Primary diagnosis agreement - F2F vs. TD

B



eFigure 5. Forest plot representing F2F and teledermatology primary diagnostic agreement by skin lesion category. Studies were sorted into three groups according to the type of lesions included, i) All skin conditions except likely malignant lesions; ii) All skin conditions; iii) Likely malignant lesions only. (A) Forest plot representing percentage agreement and 95% C.I. for overall concordance across 26 studies with a total of 39 unique number of comparisons, N of events and total included participants. (B) Forest plot representing kappa concordance and 95% C.I. for overall concordance across ten studies with a total of 27 unique number of comparisons, N of total included participants. Abbreviations: F2F (Face-to-Face), PCP (Primary Care Provider), TD (Teledermatology or Teledermatologist).

Supplementary eTables

Author, Year	Study design	Country	Funding reported	Intervention	*Outcome	Patients (n)	Female (%)	Mean Age (y)	Lesions (N)	
TD vs F2F Dermatologist										
Altieri, et al, 2017	Prospective Cohort	USA	Y	TD and F2F dermatologists via clinical images taken by digital photography	Diagnostic agreement rate, Concordance	232	N/A	NA	232	All lesions
Azfar, et al, 2014	Prospective Cohort	USA, Botswana	N	TD and F2F dermatologists via smartphone images	Diagnostic agreement rate, Concordance	76	57	39	159	
Barbieri, et al, 2014	Prospective Cohort	USA	N	TD and F2F dermatologists via smartphone images using the AccessDerm smartphone platform	Diagnostic agreement rate	50	64	55.2	50	
Barcaui, et al, 2018	Prospective Cohort	Brazil	N	TD and F2F consult by the same dermatologist via digital photography and dermoscopy images stored in WhatsApp	Diagnostic agreement rate	31	71	56.5	41	
Batalla, 2015	Retrospective Cohort	Spain	N	TD and F2F dermatologists by via clinical images	Diagnostic agreement rate	183	66	9	65	
Borve, et al, 2012	Prospective Cohort	Sweden	Y	TD and F2F consults by the same dermatologist via smartphone images stored in Tele-Dermis	Diagnostic agreement rate	40	57.5	49	40	
Gabel, et al, 2021	Prospective Cohort	USA	Y	TD and F2F dermatologists via clinical images taken by digital photography and tablets	Diagnostic agreement rate, Concordance	41	N/A	N/A	41	
Gatica, et al, 2015	Prospective Cohort	Chile	N	TD and F2F dermatologists via clinical images taken by digital photography	Diagnostic agreement rate	125	57.6	37.7	125	
Gerhardt, et al, 2021	Retrospective Cohort	USA	Y	TD and F2F dermatologists via clinical images	Diagnostic agreement rate	809	N/A	N/A	809	
Keller, et al, 2020	Prospective Cohort	USA	Y	TD and F2F dermatologists or hospitalists on clinical images taken by smartphones and tablets	Diagnostic agreement rate, Concordance	100	43.2	N/A	100	
Marchell, et al., 2017	Quasi RCT	USA	Y	TD and F2F dermatologists via digital photography, compressed and uncompressed video	Diagnostic agreement rate (SFTD, video)	216	N/A	N/A	216	
Muir, et al, 2011	Prospective Cohort	Australia	N	TD and F2F emergency derms and non-specialists via clinical images taken by digital photography	Diagnostic agreement rate, Concordance	50	65	47	50	
Nami, et al, 2015	Prospective Cohort	Italy and Austria	Y	TD and F2F dermatologists via smartphone images stored in MugDerma	Diagnostic agreement rate, Concordance	391	52.2	54	391	
Okita, et al, 2016	Prospective Cohort	Brazil	N	TD and F2F dermatologists via smartphone images	Diagnostic agreement rate	100	N/A	N/A	100	
Ribas, et al, 2010	Prospective Cohort	Brazil	Y	TD and F2F dermatologists via digital photography	Diagnostic agreement rate, Concordance	174	53.4	34.7	174	
Rios-Yuil, 2011	RCT	Panama	N	TD and F2F dermatologists via clinical images taken by digital photography for case conferences	Diagnostic agreement rate, Concordance	30	63.3	N/A	30	
Romero Aguilera, et al, 2014	Prospective Cohort	Spain	Y	TD and F2F dermatologists via clinical images taken by digital photography stored in DERMARED.Some patients were seen by the same derm for F2F and TD.	Diagnostic agreement rate	457	56%	36	170	
Romero, et al, 2010	RCT	Spain	Y	TD and F2F consults by the same dermatologist via digital photography and videoconferences via DERMARED software	Diagnostic agreement rate	328	56%	36	510	
Rubegni, et al, 2011	Prospective Cohort	Italy	N	TD and F2F dermatologists via digital photography and dermoscopy images stored in Dermo-image.	Diagnostic agreement rate, Concordance	130	53.9	80.6	130	
Saleh, et al, 2017	Prospective Cohort	Egypt	Y	TD and F2F dermatologists via clinical images taken by digital photography stored in Dropbox	Diagnostic agreement rate, Concordance	600	50.7	N/A	600	
Tran, et al, 2011	Prospective Cohort	Egypt	Y	TD and F2F dermatologists via smartphone images stored in ClickDoc	Diagnostic agreement rate	30	N/A	N/A	30	
Vano-Galvan, et al, 2010	Retrospective, Cross-sectional	Spain	N	TD and F2F dermatologists via clinical images taken by digital photography for case conferences	Diagnostic agreement rate, 100 patients each analyzed by 20 observers	100	N/A	N/A	100	
Zanini, 2013	Prospective Cohort	Brazil	N	TD and F2F dermatologists via clinical images taken by digital photography	Diagnostic agreement rate	100	N/A	N/A	100	
Zink, et al, 2017, July	Prospective Cohort	Germany	Y	TD and F2F dermatologists via smartphone images stored in the KLARA app	Diagnostic agreement rate	195	20.5	N/A	195	

Borve, et al, 2013	Prospective Cohort	Sweden	Y	TD and F2F consults by the same dermatologist via smartphone and dermoscopy images stored in iDoc 24 app	Diagnostic agreement rate, Concordance	62	38.7	64	69	Skin cancers only
Carter, et al, 2017	Ambispective Cohort	USA	Y	TD and F2F dermatologists, as well as F2F PCP via clinical images stored using Epic EHR software	Diagnostic agreement rate	79	74	47	79	
Clarke, et al, 2021	Prospective Cohort	USA	Y	TD and F2F dermatologists via clinical images taken by digital photography stored in Research Electronic Data Capture	Diagnostic agreement rate, Concordance	206	49.5	56.9	308	
Giavina-Bianchi, et al, 2020 Nov	Retrospective Cohort	Brazil	N	TD and F2F dermatologists via smartphone images	Diagnostic agreement rate, Concordance	17,233	71.4	N/A	803	
Goulart-Silveira et al, 2019	Prospective Cohort	Brazil	N	TD and F2F dermatologists via smartphone images acquired and stored via Telederma app	Concordance	39	69	68	39	
Lamel, et al, 2012	Prospective Cohort	USA	N	TD and F2F dermatologists via smartphone images stored in ClickDerm	Diagnostic agreement rate, Concordance	86	58.1	45.2	107	
Senel, et al, 2013	Prospective Cohort	Turkey	N	TD and F2F dermatologists via digital photography and dermoscopy images	Concordance with and without dermoscopy	150	49	55	150	
Sola-Ortigosa, et al, 2020	Prospective Cohort	Spain	N	TD and F2F consults by the same dermatologist via dermoscopy and clinical images taken by digital photography and tablets	Diagnostic agreement rate, Concordance	636	43.2	72.8	1,000	
Tan, et al, 2010	Prospective Cohort	New Zealand	Y	TD and F2F consults by the same dermatologist via digital photography	Diagnostic agreement rate	200	63	N/A	491	
Vestergaard, et al, 2020	Prospective Cohort	Denmark	N	TD and F2F dermatologists via smartphone and dermoscopy images using FotoFinder Systems	Diagnostic agreement rate, Concordance	519	57	55	600	
Warshaw, et al, 2015	Prospective, Cross-sectional	USA	N	TD and F2F dermatologists via digital photography and dermoscopy images	Diagnostic agreement rate, Concordance	2,152	3.2	68	3,021	
Zink, et al, 2017, Sept	Prospective Cohort	Germany	Y	TD and F2F dermatologists via smartphone and dermoscopy images using Handyfotos	Diagnostic agreement rate	26	N/A	N/A	26	
Giavina-Bianchi, et al, 2020 Oct	Retrospective Cohort	Brazil	N	TD and F2F dermatologists via smartphone images	Diagnostic agreement rate, Concordance	24,210	70	N/A	739	B.

Author, Year	Study design	Country	Funding reported	Intervention	*Outcome	Patients (n)	Female (%)	Mean Age (y)	Lesions (N)	
TD vs F2F Non-specialist										
Costello, et al, 2019	Prospective, Cross-sectional	USA	Y	TD and F2F PCP via smartphone and dermoscopy images using the Photo Exam app	Diagnostic agreement rate	37	65	47.9	37	All skin lesions
Duong, et al, 2014	Prospective, Observational	France	Y	TD and F2F emergency physicians via smartphone images and videoconferences	Diagnostic agreement rate (SFTD, video)	194	N/A	N/A	178	
Gonzalez-Coloma, et al, 2019	Prospective, Cross-sectional	Chile	N	TD and F2F PCP via clinical images	Diagnostic concordance	326	59	35.8	326	
Keller, et al, 2020	Prospective Cohort	USA	Y	TD and F2F dermatologists or hospitalists on clinical images taken by smartphones and tablets	Diagnostic agreement rate, Concordance	100	43.2	N/A	100	
Muir, et al, 2011	Prospective Cohort	Australia	N	TD and F2F emergency physicians via clinical images taken by digital photography	Diagnostic agreement rate, Concordance	60	65	47	60	
Carter, et al, 2017	Ambispective Cohort	USA	Y	TD and F2F dermatologists, as well as F2F PCP via clinical images stored using Epic EHR software	Diagnostic agreement rate	79	74	47	79	Skin cancers only
Jones, et al, 2021	Retrospective Cohort	New Zealand	Y	TD and F2F PCP via digital photography and dermoscopy images	SSC matched for age, sex, and ethnicity. Diagnostic agreement rate	481	64	N/A	528	
Piccoli, et al, 2015	Retrospective, Cross-sectional	Brazil	Y	TD and F2F PCP via digital photography and dermoscopy images	Diagnostic concordance	184	73.4	54.7	184	
Chen, et al, 2010	Retrospective Cohort	USA	Y	TD and F2F PCP via clinical images stored in Second Opinion Software	Diagnostic agreement rate	405	50.6	5.9	405	B.
Patro, et al 2015	Prospective Cohort	India	Y	TD and F2F PCP via digital photography	Diagnostic agreement rate	206	58.7	N/A	206	

eTable 1. Study and patient characteristics for all included studies. The table is divided into two sections: one comparing teledermatology with Face-to-Face (F2F) dermatologists, and another comparing teledermatologists with F2F non-specialists. The studies are listed alphabetically and grouped by lesion type. *See supplementary **eTable 4** for agreement rates and concordance values. Abbreviations used in the table include B (Benign lesions only), ED (Emergency Department), EHR (Electronic Health Record), F2F (Face-to-Face), Histo

(Histopathology), ICD10 (International Classification of Diseases, 10th Edition), N (No), N/A (Not available), PCP (Primary Care Provider), PLD (Polarized Light Dermoscopy), RCT (Randomized Controlled Trial), SFTD (Store-and-Forward Teledermatology), SSC (Specialized Skin Clinic), TD (Teledermatology or Teledermatologist), and Y (Yes). Patient characteristics for all 44 included studies are also provided, grouped by lesion type, with a column describing special inclusion and exclusion criteria.

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Inclusion criteria	Exclusion criteria
Primary articles assessing diagnostic agreement where store-and-forward technology or live video conference consults were compared with a control group who attend in-person visits.	Survey articles, feasibility studies, studies regarding other forms of telemedicine unrelated to dermatology, cost-effectiveness studies, editorials, and review articles.
Primarily comparing teledermatology to F2F, sometimes using histopathology as the reference standard.	Studies that clearly stated they used telermatologists as the gold- or reference standard.
	Studies that only compared dermatoscopic images in the absence of clinical images.
	Studies where patients captured their own photographs.

407 **eTable 2. Inclusion and exclusion criteria for screening of literature search results.**
408 F2F: Face-to-Face.
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Study characteristics Author, year, title, study type, objective, country of publication. Patient characteristics: total number of participants included declaration of funding source, number of participants per study, mean age +/- SD, age range, gender, mean BMI and range, race/ethnicity, type of lesions evaluated, type of patients evaluated.
Methodology - teledermatology and F2F consults Method of correspondence, platform used for the teledermatology consult, training on teledermatology platform, length of teledermatology and F2F consult, experience of the teledermatologist and F2F physician, location of the teledermatologist, number of teledermatologists and F2F physicians who made a diagnosis for each patient, total number of telermatologists and F2F physicians in study, order of visits, wait time between teledermatology and F2F consult, whether same specialist conducted teledermatology and F2F visit, specialization of the F2F physician, number of reviews; qualifications of the individual who acquired the clinical photographs and whether they received additional training on taking clinical photographs.
Metrics and results Technology used for image acquisition and for viewing images with, distance between camera and lesion, number of images taken, use of teledermoscopy & dermoscopy, brand of dermatoscope, use of histopathology, referral content provided to teledermatologist, primary and differential diagnoses agreement and concordance rates, diagnostic accuracy values (if available) such as sensitivity, specificity, PPV and NPV.

412 **eTable 3. Data extraction form with details of domains record.**
413 F2F: Face-to-Face, PPV: Positive Predictive Value, NPV: Negative Predictive Value.

Author and Year	Unique Study Grouping	Participants (n)	Lesions (N)	Primary Diagnosis Agreement F2F vs F2F (%)	Diagnosis Agreement (N) / Total Diagnoses (N)	Primary Diagnosis Agreement TD vs TD (%)	Diagnosis Agreement (N) / Total Diagnoses (N)	Primary Diagnosis Agreement TD vs F2F (%)	Diagnosis Agreement (N) / Total Diagnoses (N)	Primary Diagnosis Agreement TD vs Histo (%)	Diagnosis Agreement (N) / Total Diagnoses (N)	Primary Diagnosis Kappa Value TD vs F2F	Primary Diagnosis Kappa Value TD vs Histo
Altieri et al, 2017 (A)	F2F Derm vs TD1	232	232					58	93/160			0.51	
Altieri et al, 2017 (B)	F2F Derm vs TD2	232	232					53	81/152			0.51	
Altieri et al, 2017 (C)	F2F Derm vs TD3	232	232					53	80/152			0.57	
Azfar et al, 2014 (A)	F2F Derm vs TD1	76	159					47	63/136			0.41	
Azfar et al, 2014 (B)	F2F Derm vs TD2	76	159					57	77/136			0.51	
Azfar et al, 2014 (C)	F2F Derm vs TD3	76	159					49	66/136			0.43	
Barbieri et al, 2014 (A)	F2F Derm vs TD1	50	50			58	29/50	64	32/50				
Barbieri et al, 2014 (B)	F2F Derm vs TD2	50	50					56	28/50				
Barcaui et al, 2018	F2F Derm vs TD	31	41					90	37/41				
Batalla, 2016	F2F Derm vs TD	183	183					55	36/65				
Borve et al, 2012 (A)	F2F Derm vs TD1	40	40	88	35/40	68	27/40	78	31/40				
Borve et al, 2012 (B)	F2F Derm vs TD2	40	40					78	31/40				

Borve et al, 2013 (A)	F2F Derm vs TD1	62	69	58	40/69	55	38/69			0.47	0.51
Borve et al, 2013 (B)	F2F Derm vs TD2	62	69			57	39/69			0.48	
Carter et al, 2017 (A)	F2F nonspecialist vs TD	79	79	38	30/79	14	11/79				
Carter et al, 2017 (B)	F2F Derm vs TD	79	79			38	30/79				
Chen et al, 2010	F2F nonspecialist vs TD	405	405			48	194/405				
Clarke et al, 2021	F2F Derm vs TD	206	308			67	205/308	65	40/62	0.6	
Costello et al, 2020	F2F nonspecialist vs TD	37	37			32	12/37				
Duong et al, 2014 (A)	F2F nonspecialist vs TD (Videoconference)	111	110			65	44/68				
Duong et al, 2014 (B)	F2F nonspecialist vs TD (SFTD)	111	110			31	34/110				
Gabel et al, 2021	F2F Derm vs TD	41	41			67	27/41			0.33	
Gatica, 2015	F2F Derm vs TD	125	125			82	103/125				
Gerhardt et al, 2021	F2F Derm vs TD	809	809			75	609809				
Giavina-Bianchi et al, Nov 2020	F2F Derm vs TD	17233	17233			61	490/803	54	156/289	0.21	0.09
Giavina-Bianchi et al, Oct 2020	F2F Derm vs TD	24210	27519			78	576/739			0.74	
Gonzalez-Coloma, 2019	F2F nonspecialist vs TD	326	326							0.5	
Goulart-Silveira, et al, 2019	F2F Derm vs TD	39	39							0.96	0.56
Jones et al, 2021	F2F nonspecialist vs TD (Suspicious Skin Cancer pathway)	NA	528			35	183/528	53	60/114		
Keller et al, 2020 (A)	F2F nonspecialist vs TD	100	100			45	24/53			0.4	
Keller et al, 2020 (B)	F2F Derm vs TD	100	100			53	28/53			0.45	
Lamel et al, 2012	F2F Derm vs TD	86	107			62	66/107			0.6	

Marchell et al, 2017	F2F Derm vs TD (SFTD)	216	216	91	122/134			76	162/213			
Marchell et al, 2017	F2F Derm vs TD (Uncompressed video)	216	216					76	77/101			
Marchell et al, 2017	F2F Derm vs TD (Compressed video)	216	216					72	81/112			
Muir et al, 2011 (A)	F2F nonspecialist vs TD	60	60					72	43/60			0.42
Muir et al, 2011 (B)	F2F Derm vs TD	60	60					98	49/50			0.93
Nami et al, 2015	F2F Derm vs TD	391	391					91	356/391			0.91
Okita et al, 2016	F2F Derm vs TD	100	100					54	54/100			
Patro et al, 2015	F2F nonspecialist vs TD	206	206					56	115/206			
Piccoli, et al, 2014	F2F nonspecialist vs TD	184	184									0.69
Ribas et al, 2010	F2F Derm vs TD	174	174	83	145/174	81	141/174	82	142/174			0.8
Rios-Yuil, 2012	F2F Derm vs TD	30	30					83	25/30	67		0.65
Romero Aguilera et al, 2014 (A)	F2F Derm vs TD1	457	192			69	118/170	73	124/170			
Romero Aguilera et al, 2014 (B)	F2F Derm vs TD2	457	192			73	124/170	72	123/170			
Romero Aguilera et al, 2014 (C)	F2F Derm vs TD3	457	192			67	114/170	88	150/170			
Romero et al, 2010 (A)	F2F Derm vs TD (SFTD)	457	192					88	325/368			
Romero et al, 2010 (B)	F2F Derm vs TD (SFTD and videoconferencing)	457	176					85	314/368			
Rubegni et al, 2011	F2F Derm vs TD	130	130					88	114/130			0.86
Saleh et al, 2017	F2F Derm vs TD	600	600			88	526/600	81	488/600			0.46-0.52
Senel, et al, 2013	F2F Derm vs TD1 (no dermoscopy)	150	150									0.77
Senel, et al, 2013	F2F Derm vs TD2 (no dermoscopy)	150	150									0.75

Senel, et al, 2013	F2F Derm vs TD1 (dermoscopy)	150	150									0.85
Senel, et al, 2013	F2F Derm vs TD2 (dermoscopy)	150	150									0.86
Sola-Ortigosa et al, 2020 (A)	F2F Derm vs TD1 (no dermoscopy)	636	1000			82	821/1000	88	875/1000			0.87
Sola-Ortigosa et al, 2020 (B)	F2F Derm vs TD2 (no dermoscopy)	636	1000			83	832/1000	84	835/1000			0.83
Sola-Ortigosa et al, 2020 (C)	F2F Derm vs TD3 (no dermoscopy)	636	1000			81	813/1000	88	884/1000			0.89
Sola-Ortigosa et al, 2020 (D)	F2F Derm vs TD1 (dermoscopy)	636	1000			92	915/1000	92	915/1000			0.91
Sola-Ortigosa et al, 2020 (E)	F2F Derm vs TD2 (dermoscopy)	636	1000			90	902100	91	912/1000			0.9
Sola-Ortigosa et al, 2020 (F)	F2F Derm vs TD3 (dermoscopy)	636	1000			90	899/1000	90	903/1000			0.89
Tan et al, 2010 (A)	F2F Derm vs TD1, F2F Derm 1 vs F2F Derm 2	200	491	82	157/191	72	355/491	74	283/385			
Tan et al, 2010 (B)	F2F Derm vs TD2, F2F Derm 2 vs F2F Derm 3	200	491	76	80/106			74	162/219			
Tan et al, 2010 (C)	F2F Derm 1 vs F2F Derm 3	200	491	76	147/194							
Tran et al, 2011	F2F Derm vs TD	30	30					75	23/30			
Vano-Galvan et al, 2011	F2F Derm vs TD	100	100					69	1381/2000			
Vestergaard et al, 2020 (A)	A F2F Derm vs TD1	519	600			62	370/600	62	372/600	58	170/292	
Vestergaard et al, 2020 (B)	F2F Derm vs TD2	519	600					60	361/600	54	157/292	
Warshaw et al, 2015 (A)	F2F Derm vs TD (non biopsied pigmented lesions, Macro)	2152	3021					76	570/753			0.56
Warshaw et al, 2015 (B)	F2F Derm vs TD (non biopsied pigmented lesions, Macro+PLD)	2152	3021					75	566/752			0.56
Warshaw et al, 2015 (C)	F2F Derm vs TD (non biopsied pigmented lesions, Macro+PLD)	2152	3021					80	548/684			0.62

Warshaw et al, 2015 (D)	F2F Derm vs TD (biopsied pigmented lesions, Macro)	2152	3021	53	344/651			0.44
Warshaw et al, 2015 (E)	F2F Derm vs TD (biopsied pigmented lesions, Macro+PLD)	2152	3021	53	348/652			0.45
Warshaw et al, 2015 (F)	F2F Derm vs TD (biopsied pigmented lesions, Macro+PLD)	2152	3021	60	357/595			0.52
Warshaw et al, 2015 (G)	F2F Derm vs TD (NONbiopsied NONpigmented lesions, Macro)	2152	3021	52	300/583			0.38
Warshaw et al, 2015 (H)	F2F Derm vs TD (NONbiopsied NONpigmented lesions, Macro+PLD)	2152	3021	50	291/579			0.38
Warshaw et al, 2015 (I)	F2F Derm vs TD (biopsied NONpigmented lesions, Macro)	2152	3021	46	473/1034			0.32
Warshaw et al, 2015 (J)	F2F Derm vs TD (biopsied NONpigmented lesions, Macro+PLD)	2152	3021	50	511/1020			0.37
Zanini, 2013	F2F Derm vs TD	100	100	76	76/100			
Zink et al, 2017, July (A)	F2F Derm vs TD	195	195	59	115/195	56	108/195	
Zink et al, 2017, Sept (B)	F2F Derm vs TD	26	26	92	24/26	67	17/26	

eTable 4. Included unique study groupings and letter codes for individual agreement rates and kappa concordance values. The abbreviations used in the text are as follows: TD (Teledermatology or Teledermatologist), Derm (Dermatologist), F2F (Face-to-Face), SFTD (Store and Forward Technology), PLD (Polarized Light Dermoscopy), and Macro (Macroscopic clinical images).

Study ID	Journal	Reason For Exclusion
NCT03034694, 2016	ClinicalTrials.gov	Wrong study design
Andersson et al, 2017	Lakartidningen	Wrong study design
Romero et al, 2018	Actas dermo-sifiliograficas	Wrong study design
Orruno et al, 2016	Health Technology Assessment Database	Wrong study design
Batalla et al, 2016	Piel	Wrong study design
Kroemer et al, 2011	British Journal of Dermatology	Wrong study design
Ernstberger et al, 2014	Zentralblatt fur Chirurgie	Wrong study design
Totty et al, 2018	Journal of wound care	Wrong study design
Wurm et al, 2013	Journal of Telemedicine and Telecare	Wrong study design
Wang et al, 2017	Telemedicine journal and e-health : the official journal of the American Telemedicine Association	Wrong study design
Singh et al, 2011	Australasian Journal of Dermatology	Wrong study design
Grey et al, 2017	Dermatitis	Wrong study design
Crompton et al, 2010	Journal of Visual Communication in Medicine	Wrong study design
Ali et al, 2021	JMIR formative research	Wrong study design
Boyce et al, 2011	Dermatology	Wrong study design
Berg et al, 2017	Sarcoidosis Vasculitis and Diffuse Lung Diseases	Wrong study design
Shin et al, 2014	Journal of telemedicine and telecare	Wrong study design
Gacto-Sanchez et al, 2020	Burns : journal of the International Society for Burn Injuries	Wrong study design
Tian et al, 2017	Journal of Cosmetic Dermatology	Wrong study design
Thind et al, 2011	Clinical and Experimental Dermatology	Wrong study design
Silveira et al, 2014	BMC Dermatology	Wrong study design
O'Connor et al, 2017	JAMA Dermatology	Wrong study design
Janda et al, 2020	The Lancet. Digital health	Wrong study design
Day et al, 2020	Military medicine	Wrong study design
Karlsson et al, 2015	Acta Dermato-Venereologica	Wrong study design
Seghers et al, 2015	Australasian Journal of Dermatology	Wrong study design
Hazenberg et al, 2010	Journal of Medical Engineering and Technology	Wrong study design
Borve et al, 2015	Acta Dermato-Venereologica	Wrong study design
Boissin et al, 2015	Burns	Wrong study design
Da Silva et al, 2018	Dermatology online journal	Wrong study design
Devrim et al, 2019	BMC pediatrics	Wrong study design
Danielsson et al, 2016	Health Technology Assessment Database	Wrong study design
Berglund et al, 2020	Journal of the European Academy of Dermatology and Venereology : JEADV	Wrong study design
Forsblom et al, 2013	Clinical Infectious Diseases	Wrong study design
G Bianchi et al, 2020	Journal of medical Internet research	Wrong study design
Congalton et al, 2015	Journal of the European Academy of Dermatology and Venereology	Wrong study design
Ferrandiz et al, 2012	Archives of Dermatology	Wrong study design
Ismail et al, 2018	International Journal of Women's Dermatology	Wrong study design
Gamus et al, 2019	International journal of medical informatics	Wrong study design
Paudel et al, 2020	Case reports in dermatological medicine	Wrong study design
Georgesen et al, 2020	Telemedicine journal and e-health : the official journal of the American Telemedicine Association	Wrong study design
Gagnon et al, 2015	Dermatology Times	Wrong study design
Philp et al, 2013	Pediatric Dermatology	Wrong study design
Mooney et al, 2011	Skin Research and Technology	Wrong study design
Do Khac et al, 2021	JMIR mHealth and uHealth	Wrong study design
Chambers et al, 2012	Journal of the American Academy of Dermatology	Wrong study design
Garcia-Romero et al, 2011	Telemedicine journal and e-health : the official journal of the American Telemedicine Association	Wrong study design
Ahmed et al, 2020	Annals of internal medicine	Wrong study design
Marwaha et al, 2019	Journal of the American Academy of Dermatology	Wrong study design
NCT02122432, 2014	ClinicalTrials.gov	Wrong study design
Lowe et al, 2021	Clinical and experimental dermatology	Wrong study design

Bowling et al, 2011	Wound Repair and Regeneration	Wrong study design
Marin-Gomez et al, 2020	Journal of primary care & community health	Wrong study design
Veronese et al, 2021	Diagnostics (Basel, Switzerland)	Wrong study design
Ismail et al, 2018	International journal of dermatology	Wrong study design
NCT02905851, 2016	ClinicalTrials.gov	Wrong study design
Trinidad et al, 2020	Journal of the American Academy of Dermatology	Wrong study design
Tensen et al, 2019	Studies in health technology and informatics	Wrong study design
Karavan et al, 2014	Journal of telemedicine and telecare	Wrong study design
Viola et al, 2011	Archives of Dermatology	Wrong study design
van Netten et al, 2017	Scientific reports	Wrong study design
Cai et al, 2016	Burns : journal of the International Society for Burn Injuries	Wrong study design
Hazenberg et al, 2010	Diabetes Technology and Therapeutics	Wrong study design
Jacoby et al, 2021	Journal of drugs in dermatology : JDD	Wrong study design
Pak et al, 2018	Wound repair and regeneration : official publication of the Wound Healing Society [and] the European Tissue Repair Society	Wrong study design
Kummerow Broman et al, 2019	JAMA surgery	Wrong study design
Munoz-Lopez et al, 2021	Journal of the European Academy of Dermatology and Venereology : JEADV	Wrong study design
Markun et al, 2017	Medicine	Wrong study design
Piette et al, 2017	Journal of telemedicine and telecare	Wrong study design
Tan et al, 2010	British Journal of Dermatology	Wrong study design
Watson et al, 2010	Archives of Dermatology	Wrong study design
Wiseman et al, 2016	Journal of vascular surgery. Venous and lymphatic disorders	Wrong study design
Wolf et al, 2013	JAMA dermatology	Wrong study design
Laggis et al, 2020	The American Journal of dermatopathology	Wrong study design
Kazi et al, 2021	Telemedicine journal and e-health : the official journal of the American Telemedicine Association	Wrong study design
Kanthraj et al, 2013	Indian Journal of Dermatology, Venereology and Leprology	Wrong study design
Shah et al, 2016	Journal of the American Academy of Dermatology	Wrong study design
Kim et al, 2018	Skin research and technology	Wrong study design
Nguyen et al, 2017	Journal of Clinical and Aesthetic Dermatology	Wrong study design
Rizvi et al, 2020	PloS one	Wrong study design
Mehrtens et al, 2019	Clinical and experimental dermatology	Wrong study design
Knudsen et al, 2012	Lakartidningen	Research letter or letter to the editor
Korman et al, 2020	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Mercer et al, 2014	Journal of Cutaneous Medicine and Surgery	Research letter or letter to the editor
Grunig et al, 2015	JAMA Dermatology	Research letter or letter to the editor
Cartron et al, 2020	Dermatologic therapy	Research letter or letter to the editor
McAfee et al, 2020	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Wong et al, 2021	JAMA dermatology	Research letter or letter to the editor
Baranowski et al, 2020	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Micheletti et al, 2014	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Osei-Tutu et al, 2013	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Nair et al, 2015	International Journal of Dermatology	Research letter or letter to the editor
Miller et al, 2021	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Keleshian et al, 2017	Journal of the American Academy of Dermatology	Research letter or letter to the editor
HAYES; Inc et al, 2016	Health Technology Assessment Database	Research letter or letter to the editor
Jacob et al, 2017	Journal of telemedicine and telecare	Research letter or letter to the editor
Perkins et al, 2020	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Halpern et al, 2010	British Journal of Dermatology	Research letter or letter to the editor
Newman et al, 2020	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Hunt et al, 2020	Clinical and experimental dermatology	Research letter or letter to the editor
2018	Nursing	Research letter or letter to the editor
Taneja et al, 2021	Indian journal of dermatology, venereology and leprology	Research letter or letter to the editor
Echeverria-Garcia et al, 2019	Actas dermo-sifiliograficas	Research letter or letter to the editor
Henning et al, 2010	Archives of Dermatology	Research letter or letter to the editor

Demo et al, 2019	Clinical and experimental dermatology	Research letter or letter to the editor
Byamba et al, 2015	British Journal of Dermatology	Research letter or letter to the editor
Gupta et al, 2020	Journal of the American Academy of Dermatology	Research letter or letter to the editor
De Giorgi et al, 2017	Journal of the European Academy of Dermatology and Venereology	Research letter or letter to the editor
Duong et al, 2016	Annales de Dermatologie et de Venereologie	Research letter or letter to the editor
Mortimer et al, 2021	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Gravely et al, 2010	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Choi et al, 2021	International journal of dermatology	Research letter or letter to the editor
Motley et al, 2012	BMJ: British Medical Journal (Clinical Research Edition)	Research letter or letter to the editor
Leavitt et al, 2016	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Cheng et al, 2020	Dermatitis : contact, atopic, occupational, drug	Research letter or letter to the editor
Clark et al, 2021	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Fuesl et al, 2010	MMW-Fortschritte der Medizin	Research letter or letter to the editor
English III et al, 2013	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Cotes et al, 2021	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Abi Rafeh et al, 2021	Journal of cutaneous medicine and surgery	Research letter or letter to the editor
Okeke et al, 2020	The Journal of dermatological treatment	Research letter or letter to the editor
Splete et al, 2014	Emergency Medicine (00136654)	Research letter or letter to the editor
Khosravi et al, 2021	Clinical and experimental dermatology	Research letter or letter to the editor
Sivesind et al, 2021	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Stoecker et al, 2013	JAMA dermatology	Research letter or letter to the editor
Skayem et al, 2020	Journal of the European Academy of Dermatology and Venereology : JEADV	Research letter or letter to the editor
Su et al, 2020	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Massone et al, 2021	Anais brasileiros de dermatologia	Research letter or letter to the editor
Li et al, 2021	The Journal of infection	Research letter or letter to the editor
Afanasiev et al, 2021	Journal of the American Academy of Dermatology	Research letter or letter to the editor
Varma et al, 2011	British Journal of Dermatology	Research letter or letter to the editor
Van Der Heijden et al, 2010	Journal of the European Academy of Dermatology and Venereology	Research letter or letter to the editor
Motley et al, 2012	BMJ (Online)	Research letter or letter to the editor
Villani et al, 2020	Dermatologic therapy	Research letter or letter to the editor
Portnoy et al, 2018	The journal of allergy and clinical immunology. In practice	Research letter or letter to the editor
Tschandl et al, 2018	British Journal of Dermatology	Research letter or letter to the editor
Poolworaluk et al, 2020	Future healthcare journal	Research letter or letter to the editor
Anonymous et al, 2020	Journal of drugs in dermatology : JDD	Research letter or letter to the editor
Tan et al, 2021	Annals of the Academy of Medicine, Singapore	Research letter or letter to the editor
Silva et al, 2021	Anais brasileiros de dermatologia	Research letter or letter to the editor
de Giorgi et al, 2016	International Journal of Dermatology	Wrong outcomes
Senel et al, 2014	Journal of telemedicine and telecare	Wrong outcomes
Goodier et al, 2021	Contact dermatitis	Wrong outcomes
Foolad et al, 2017	International Journal of Dermatology	Wrong outcomes
Wells et al, 2020	The Journal of clinical and aesthetic dermatology	Wrong outcomes
Arzberger et al, 2016	Acta Dermato-Venereologica	Wrong outcomes
Creighton-Smith et al, 2017	International Journal of Dermatology	Wrong outcomes
Marwaha et al, 2019	Journal of the American Academy of Dermatology	Wrong outcomes
Pasquali et al, 2021	Actas dermo-sifiliograficas	Wrong outcomes
Vestergaard et al, 2020	Family practice	Wrong outcomes
Kravets et al, 2018	Acta dermatovenerologica Alpina, Pannonica, et Adriatica	Wrong outcomes
Speiser et al, 2014	American Journal of Dermatopathology	Wrong outcomes
N/A	Journal of the American Academy of Dermatology	Wrong outcomes
Whited et al, 2013	Journal of Telemedicine and Telecare	Wrong outcomes

Abhishek et al, 2021	medRxiv	Wrong outcomes
Villa et al, 2020	Internal and emergency medicine	Wrong outcomes
Lubeek et al, 2016	Tijdschrift voor gerontologie en geriatrie	review
Ndegwa et al, 2016	Health Technology Assessment Database	review
Moreno-Ramirez et al, 2017	Acta dermato-venereologica	review
Moreno-Ramirez et al, 2017	Acta Dermato-Venereologica	review
Van Der Heijden et al, 2010	Huisarts en Wetenschap	review
Walocko et al, 2017	Dermatologic Clinics	review
Roman et al, 2014	Journal of the Dermatology Nurses' Association	review
Hart et al, 2011	Telemedicine journal and e-health : the official journal of the American Telemedicine Association	review
Elsner et al, 2020	Journal der Deutschen Dermatologischen Gesellschaft = Journal of the German Society of Dermatology : JDDG	review
Kaliyadan et al, 2020	Indian journal of dermatology	review
Burch et al,		review
Evans et al, 2017	Pharmazeutische Zeitung	Editorial
Anonymous. et al, 2016	Journal of AHIMA / American Health Information Management Association	Editorial
Luk et al, 2018	Hong Kong Journal of Dermatology and Venereology	Editorial
Queen et al, 2018	International wound journal	Editorial
Anguita et al, 2014	Nurse Prescribing	Editorial
Haworth et al, 2020	Clinical and experimental dermatology	Editorial
Romero-Aguilera et al, 2019	Actas dermo-sifiliograficas	Editorial
Barrio Garde et al, 2016	Piel	Editorial
Morand et al, 2010	Annales de dermatologie et de venereologie	Editorial
N/A	Journal of the American Academy of Dermatology	Abstract
N/A	Journal of the American Academy of Dermatology	Abstract
Bianchi et al, 2020	Journal of the American Academy of Dermatology	Abstract
Creadore et al, 2020	Journal of the American Academy of Dermatology	Abstract
N/A	Journal of the American Academy of Dermatology	Abstract
Tognetti L et al, 2020		Abstract
SPLETE et al, 2014	Emergency Medicine (00136654)	Abstract
N/A	Journal of the American Academy of Dermatology	Abstract
Dahlen Gyllencreutz et al, 2017	Journal of the European Academy of Dermatology and Venereology	Wrong intervention
Tandjung et al, 2015	Journal of Evaluation in Clinical Practice	Wrong intervention
Paradela-De-La-Morena et al, 2015	European Journal of Dermatology	Wrong intervention
Horsham et al, 2015	British Journal of Dermatology	Wrong intervention
Saenz et al, 2018	International Journal of Telemedicine and Applications	Wrong intervention
Kochmann et al, 2016	Telemedicine journal and e-health : the official journal of the American Telemedicine Association	Wrong comparator
Markun et al, 2017	Medicine (United States)	Wrong comparator
Feigenbaum et al, 2017	Pediatric Dermatology	Wrong comparator
Massone et al, 2014	Journal of the European Academy of Dermatology and Venereology	Wrong comparator
MacLellan et al, 2021	Journal of the American Academy of Dermatology	Wrong comparator
Koysombat et al, 2021	Journal of plastic, reconstructive & aesthetic surgery : JPRAS	Corrrespondence
Jakhar et al, 2020	Clinical and experimental dermatology	Corrrespondence
Alkmim et al, 2013	Journal of Telemedicine and Telecare	Corrrespondence
NCT02836665, 2016	ClinicalTrials.gov	Clinical trial - no associated manuscript
JPRN-UMIN000020873 et al, 2016		Clinical trial - no associated manuscript
Fogel et al, 2016	Journal of the American Academy of Dermatology	Commentary
Hoyer et al, 2020	Cutis	Commentary
Pasadyn et al, 2020	Journal of the American Academy of Dermatology	Duplicate

Moreno-Ramirez et al, 2017	American Journal of Clinical Dermatology	Erratum
Trovato et al, 2011	Eplasty	Wrong patient population
Bowns et al, 2016	Health Technology Assessment Database	Wrong publication date
Gemelas et al, 2019	Telemedicine journal and e-health : the official journal of the American Telemedicine Association	Wrong setting

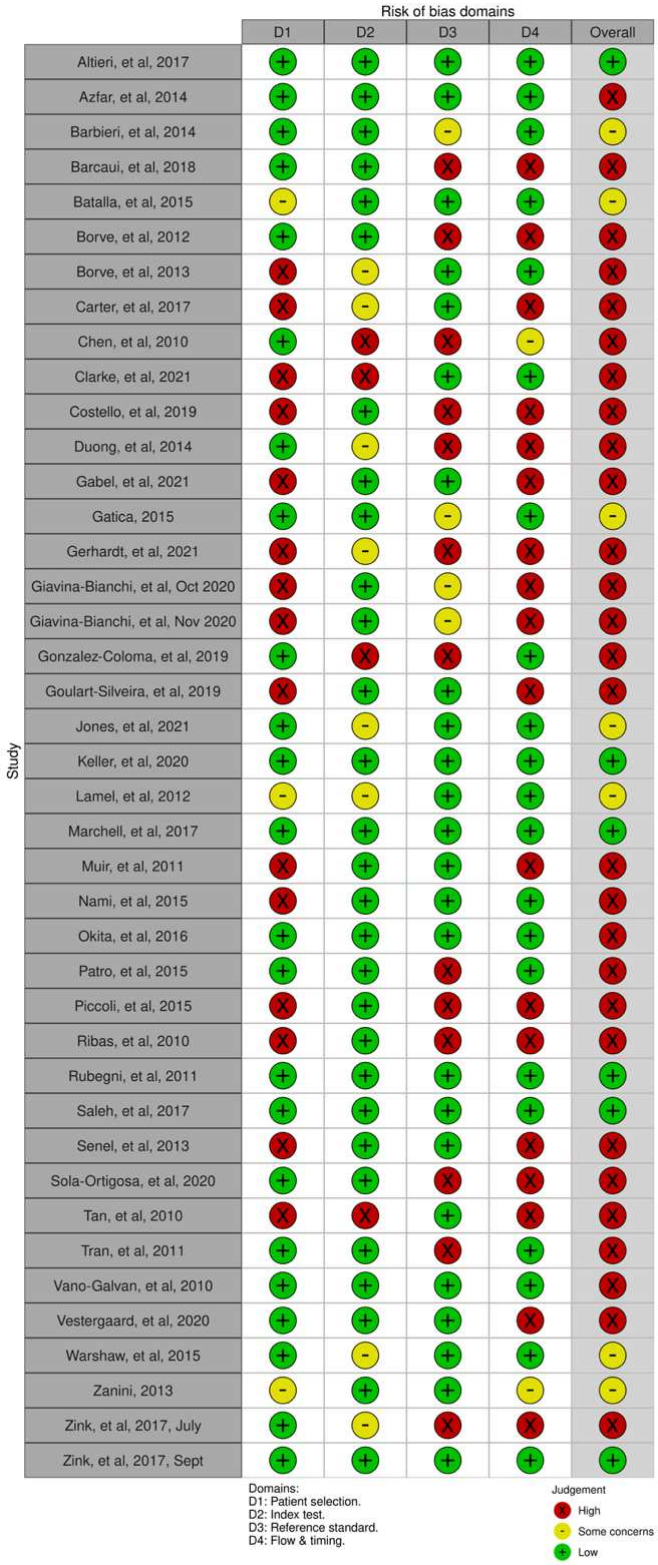
eTable 5. List of studies excluded at the full-text screening stage.

A

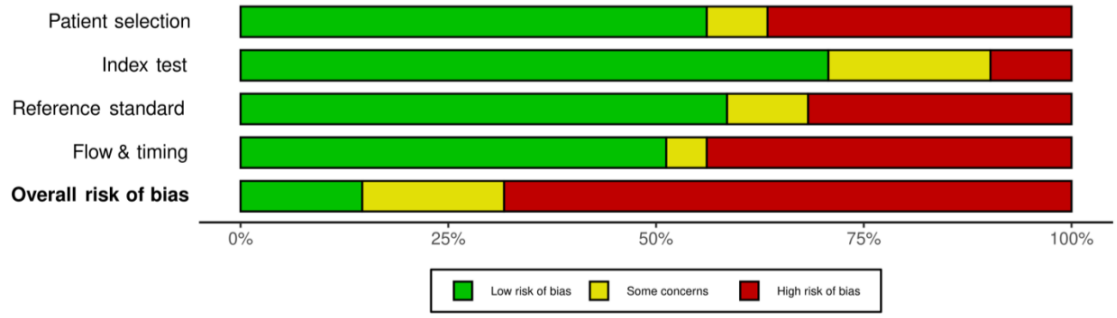
Domain 1: SAMPLE SELECTION		
Signalling Q1	Was a consecutive or random sample of patients enrolled? - In the study by Giavina-Bianchi et al., a consecutive sample of patients was enrolled, introducing less bias. Skewed patient demographics: e.g., over 70% female, select age groups, studies. that do not disclose age range and or sex/gender of the patients. - In the study by Carter et al., over 70% of the patients were female, which may introduce bias and reduce applicability.	Yes/No/Unclear
Signalling Q2	Was a case-control design avoided? - Gabel et al. avoided a case-control design, which reduces the risk of bias.	Yes/No/Unclear
Signalling Q3	Did the study avoid inappropriate exclusions? - In the study by Giavina-Bianchi et al., complex, and severe cases were excluded, which may introduce bias and affect applicability.	Yes/No/Unclear
Risk of bias	**Could the selection of patients have introduced bias?** - For example, Giavina-Bianchi removed the most complex/severe cases and then excluded any non-skin neoplasms, and then they further filtered to only include the 10 most common skin neoplasms.	RISK: LOW/HIGH/ UNCLEAR
Concerns regarding applicability	**Is there concern that the included patients do not match the review question?** - 'High' if the study only looked at a specific lesion category such as skin cancers only, or pigmented lesions only, or if they had a skewed patient demographics (e.g., 70% female, or geriatric population only). Our study is focuses on generalizability of teledermatology in all skin conditions.	RISK: LOW/HIGH/ UNCLEAR
Domain 2: INDEX TEST (Teledermatology consult)		
Signalling Q1	Were the derms/physicians making the index diagnoses unaware of the reference diagnosis? - Same dermatologist doing F2F and teledermatology consuls? Is there blinding of dermatologists to each other's diagnoses? In the study by Tan et al., the same dermatologist performed both the F2F and teledermatology consultations, which may introduce bias if they were not blinded to each other's diagnoses.	Yes/No/Unclear
Signalling Q2	Did the study require physicians to provide a specific primary diagnosis, or were they only required to provide a general grouping, e.g., inflammatory vs. skin neoplasm. Was analysis only performed for categories instead of complete primary diagnoses (such as skin neoplasm vs basal cell carcinoma)? Did physicians use standardized referral/consult sheet with set diagnoses? Did they group similar / synonymous diagnoses (e.g dermatitis / eczema together? Was a non-specialist in charge of comparing diagnoses and deciding if there was agreement? - In the study by Warshaw et al., physicians were required to provide a categorical or pooled diagnosis (e.g., skin neoplasm instead of basal cell carcinoma), which may introduce bias and reduce applicability.	Yes/No/Unclear
Risk of bias	**Could the conduct (technology used for taking images/viewing images) or interpretation (what constituted primary diagnosis/ complete agreement) of the index test have introduced bias?**	RISK: LOW/HIGH/ UNCLEAR
Concerns regarding applicability	Is there concern that the index test, its conduct, or interpretation differ from the review question?	RISK: LOW/HIGH/ UNCLEAR
Domain 3: REFERENCE TEST (F2F, in some cases histopathology)		
Signalling Q1	Describe the reference standard and how it was conducted and interpreted:	Yes/No/Unclear

	What was the order of visits? What was the experience level and specialization of the F2F physician? Did the same dermatologist do both teledermatology and F2F consult?	
Signalling Q2	Is the reference standard likely to correctly classify the target condition?	Yes/No/Unclear
Risk of bias	**Could the reference standard, its conduct, or its interpretation have introduced bias?** - In studies where the reference standard was a consultation with a non-specialist, such as Costello et al., there is a risk of introducing bias.	RISK: LOW/HIGH/ UNCLEAR
Concerns regarding applicability	**Could the reference standard, its conduct, or its interpretation have introduced bias?** - Applicability was impacted by physician specialization.	RISK: LOW/HIGH/ UNCLEAR
Domain 4: FLOW AND TIMING		
Signalling Q1	Was there an appropriate interval between index test(s) and reference standard? - Was the time interval greater than 2 weeks? In studies where the same dermatologist did F2F and teledermatology -> Say 'No' regardless of the time between teledermatology and F2F consult. - In the study by Gerhardt et al., there was a 30-day interval between teledermatology and F2F, which may introduce bias.	Yes/No/Unclear
Signalling Q2	Did all patients receive a reference standard?	
Signalling Q3	Did all patients receive the same reference standard? - In studies like Sola-Ortigosa et al., all patients received a reference standard, either histopathology or F2F consultation. Did a paper use histopathology as the reference standard for cancer lesions but F2F for non-cancer lesions? Were all patients evaluated by physicians with similar level of experience?	Yes/No/Unclear
Signalling Q4	Were all patients included in the analysis? - In studies like Gabel et al., all patients were included in the analysis, reducing the risk of bias.	Yes/No/Unclear
Risk of bias	Could the patient flow have introduced bias?	RISK: LOW/HIGH/UNCLEAR

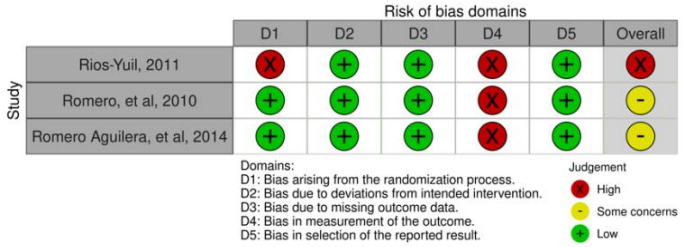
B


Risk of bias domains
D1
D2
D3
D4
Overall
Study
Altieri, et al, 2017
Azfar, et al, 2014
Barbieri, et al, 2014
Barcaui, et al, 2018
Batalla, et al, 2015
Borve, et al, 2012
Borve, et al, 2013
Carter, et al, 2017
Chen, et al, 2010
Clarke, et al, 2021
Costello, et al, 2019
Duong, et al, 2014
Gabel, et al, 2021
Gatica, 2015
Gerhardt, et al, 2021
Giavina-Bianchi, et al, Oct 2020
Giavina-Bianchi, et al, Nov 2020
Gonzalez-Coloma, et al, 2019
Goulart-Silveira, et al, 2019
Jones, et al, 2021
Keller, et al, 2020
Lamel, et al, 2012
Marchell, et al, 2017
Muir, et al, 2011
Nami, et al, 2015
Okita, et al, 2016
Patro, et al, 2015
Piccoli, et al, 2015
Ribas, et al, 2010
Rubegni, et al, 2011
Saleh, et al, 2017
Senel, et al, 2013
Sola-Ortigosa, et al, 2020
Tan, et al, 2010
Tran, et al, 2011
Vano-Galvan, et al, 2010
Vestergaard, et al, 2020
Warshaw, et al, 2015
Zanini, 2013
Zink, et al, 2017, July
Zink, et al, 2017, Sept
Domains:
D1: Patient selection.
D2: Index test.
D3: Reference standard.
D4: Flow & timing.
Judgement
High
Some concerns
Low

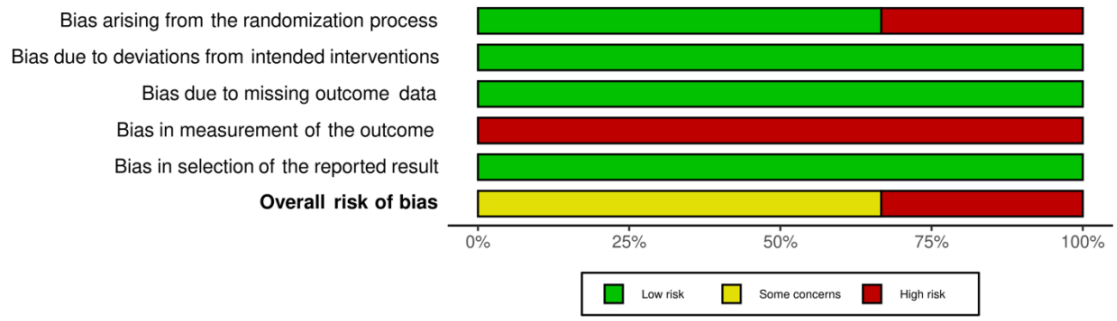
C



D



E



eTable 6. Risk of Bias (ROB) results.
(A) QUADAS-2 summary sheet. **(B,C)** QUADAS-2 RoB analysis of 41 observational studies. **(D,E)** ROB-2 analysis of three randomized controlled trials.

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