Melissa Richard **5/16/26**

PA Portfolio 1: Mini-CAT #1

<u>Clinical Scenario:</u> 22-year-old male presents to primary care clinic complaining of a body-wide rash for 2 weeks. He endorses mild itching of the lesions. Patient says rash first appeared on the groin and has spread to the trunk and upper extremities. Patient says something like this has never happened before. Denies pain, drainage history of asthma or atopy, new skin care products.

<u>PICO Question</u>: In adults presenting with undiagnosed skin conditions, does telemedicine compared to in-person evaluation result in similar diagnostic accuracy and treatment outcomes?

Identify the PICO elements – this should be a revision of whichever PICO you have already begun in a previous week

P	I	C	O
Skin condition	Telemedicine	Face-to-face	Diagnostic accuracy
Dermatologic concern	Tele-dermatology	In person	Diagnostic Concordance
Dermatitis	Telehealth	F2F	Diagnosis
Acute skin concern	TD	In office	Agreement

<u>Search Strategy</u>:

Pubmed: ("teledermatology" OR "telemedicine" OR "telehealth") AND ("skin" OR "dermatitis" OR "skin disease") AND ("diagnostic accuracy" OR "concordance") AND ("in-person" OR "face-to-face")

Google Scholar adults AND acute AND (dermatitis OR skin OR "skin condition") AND (telehealth OR telemedicine OR telemed OR teledermatology) AND (diagnosis OR concordance OR accurate OR accuracy) AND (systematic review OR meta-analysis)

Cochrane: adult AND skin AND (telemedicine OR telehealth OR "teledermatology")

Filters applied and Number of Results

Pubmed: 10 years, Free full text, full text, meta-analysis, RCT, Systematic Review; 10 results

Google Scholar: 2016-2026; 17400 results

Cochrane: 2016-2026; 3 reviews

For my article selection, I prioritized high evidence level articles such as systematic reviews and/or meta-analyses. I did this to ensure that the quality of data was optimized to answer the PICO question. I also included articles that examined dermatologic skin conditions, such as forms of dermatitis, and skin cancers. I also made sure that studies were conducted recently, ideally within the last 10 years, as tele dermatology saw the most prominent rise and applicability around and during the 2020 COVID-19 pandemic. This included omitting high level studies that included outdated RCTs even if the articles themselves were recently published. Since meta-analyses and systematic reviews often include studies conducted internationally, I made sure that at least 2 of the included studies were conducted in the United States to ensure cultural applicability. I also felt that inclusion of countries such as the UK, which have similar cultural and medico-legal infrastructure to the United States, were acceptable. Studies conducted solely outside of the United States and/or the UK were not included. However, studies besides the US and the UK included in systematic reviews and meta-analyses were acceptable because it further supported the widespread applicability of diagnostic technology. Furthermore, studies examining tele dermatology in the diagnosis of specific conditions such as skin cancer specifically were included, as within my PICO question.

I scoured literature across 4 different databases, including PubMed, Cochrane Database, TRIP Database and Google Scholar. Although Google Scholar yielded a broader array of results as opposed to PubMed and Cochrane, I was able to obtain high-quality literature from it. I could not find anything on TRIP database.

Articles Chosen

1) Martyin K, Meznerics FA, Bokor LA, Szabó B, Hegyi P, Kiss N and Bánvölgyi A (2026) Diagnostic accuracy of teledermatology for skin diseases: a systematic review and meta-analysis. Front. Med. 13:1739592. doi: 10.3389/fmed.2026.1739592

Background: Skin diseases affect nearly one-third of the global population, yet limited access to dermatological care remains an unmet challenge. Teledermatology offers a promising solution, however, concerns about technological and workforce demands have limited its broader adoption. Furthermore, its diagnostic reliability across communication platforms and types, and different skin conditions remain unclear.

Objectives: We aimed to evaluate the diagnostic accuracy of teledermatology compared to in-person consultations.

Methods: We searched PubMed, Embase, and CENTRAL on November 19, 2023, for observational and experimental studies, without date or language restrictions. Primary outcomes included diagnostic concordance, Cohen's kappa, sensitivity, specificity, and predictive values; secondary outcomes were diagnostic time, teledermatology provider and patient satisfaction and interrater agreement. A random intercept logistic regression model was used to pool outcomes. Subgroup analyses were conducted by disease category, communication platform (store-and-forward, real-time, hybrid), type (indirect, direct), dermoscopy use, photography device, and training.

Results: Out of 30,412 records, 155 studies were included, with 139 analyzed quantitatively. Diagnostic concordance was 76% in all skin conditions (95%-CI: 73-79%), 73% in skin cancers (95%-CI: 67-79%) and 76% in pigmented lesions (95%-CI: 67-83%). Use of dermoscopy significantly improved diagnostic concordance from 67% (95%-CI: 58-74%) to 80% (95%-CI, 73-85%) in skin cancers. No significant differences were found by communication type, platform, or photography device. The mean diagnostic time was 1.05 min per case (95%-CI, 0.98-1.12). Patient satisfaction was high (82%, 95%-CI: 76-87%).

Conclusion: Teledermatology demonstrates high diagnostic accuracy, supporting its use as a reliable alternative to in-person care for diagnosing general skin conditions and screening for skin cancer. Given its broad applicability, teledermatology stands out as a potential tool to improve access to dermatological care.

2) Ijaz M, Mizori R, Al Omran Y. Effectiveness of Teledermatology on Clinical, Patient-Reported, and Operational Outcomes: A Systematic Review. Dermatol Pract Concept. 2026;16(1):6055. DOI: https://doi.org/10.5826/dpc.1601a6055.

Introduction: Teledermatology (TD), the remote diagnosis and management of skin conditions using digital platforms, has rapidly evolved since its initial adoption in 1995. With the onset of the COVID-19 pandemic, the utilization of TD expanded significantly, offering a viable alternative to face-to-face (F2F) consultations, particularly in settings where access to dermatologists are limited.

Objectives: This systematic review aimed to evaluate the effectiveness of TD across three key domains: clinical outcomes, patient satisfaction, and cost-effectiveness.

Methods: A systematic search was conducted across MEDLINE, Embase, and Web of Science for studies published between 2010 and July 2024. Studies comparing TD with in-person consultations in terms of diagnostic accuracy, patient satisfaction, and cost-effectiveness were included. The quality of the included studies were as assessed using the Newcastle-Ottawa Scale (NOS).

Results: From 2,768 articles, 23 studies met the inclusion criteria. Clinical outcomes indicated moderate agreement between TD and F2F consultations, with a mean kappa coefficient of 0.57, reflecting diagnostic concordance. Patient satisfaction varied widely, with 26.57% of patients willing to replace F2F consultations with TD. TD was associated with significant cost savings, averaging US$81.31 per patient, with percentage savings ranging from 6.27% to 45.33%, depending on the healthcare system.

Conclusions: TD provides moderate diagnostic accuracy, substantial cost savings, and varying degrees of patient acceptance. However, successful implementation requires high-

quality imaging, clinician training, and robust technical infrastructure. Further research is needed to optimize TD's role in dermatology, particularly in balancing virtual and F2F care.

3) Bourkas AN, Barone N, Bourkas MEC, et alDiagnostic reliability in teledermatology: a systematic review and a meta-analysisBMJ Open 2023;13:e068207. doi: 10.1136/bmjopen-2022-068207

Objectives To compare teledermatology and face-to-face (F2F) agreement in primary diagnoses of dermatological conditions.

Design Systematic review and meta-analysis

Methods MEDLINE, Embase, Cochrane Library (Wiley), CINAHL and medRxiv were searched between January 2010 and May 2022. Observational studies and randomised clinical trials that reported percentage agreement or kappa concordance for primary diagnoses between teledermatology and F2F physicians were included. Titles, abstracts and full-text articles were screened in duplicate. From 7173 citations, 44 articles were included. A random-effects meta-analysis was conducted to estimate pooled estimates. Primary outcome measures were mean percentage and kappa concordance for assessing diagnostic matches between teledermatology and F2F physicians. Secondary outcome measures included the agreement between teledermatologists, F2F dermatologists, and teledermatology and histopathology results.

Results 44 studies were extracted and reviewed. The pooled agreement rate was 68.9%, and kappa concordance was 0.67. When dermatologists conducted F2F and teledermatology consults, the overall diagnostic agreement was significantly higher at 71% compared with 44% for non-specialists. Kappa concordance was 0.69 for teledermatologist versus specialist and 0.52 for non-specialists. Higher diagnostic agreements were also noted with image acquisition training and digital photography. The agreement rate was 76.4% between teledermatologists, 82.4% between F2F physicians and 55.7% between teledermatology and histopathology.

Conclusions and relevance Teledermatology can be an attractive option particularly in resource-poor settings. Future efforts should be placed on incorporating image acquisition training and access to high-quality imaging technologies.

4) Chuchu N, Dinnes J, Takwoingi Y, Matin RN, Bayliss SE, Davenport C, Moreau JF, Bassett O, Godfrey K, O'Sullivan C, Walter FM, Motley R, Deeks JJ, Williams HC. Teledermatology for diagnosing skin cancer in adults. Cochrane Database of Systematic Reviews 2018, Issue 12. Art. No.: CD013193. DOI: 10.1002/14651858.CD013193. Accessed 25 April 2026.

Background

Early accurate detection of all skin cancer types is essential to guide appropriate management and to improve morbidity and survival. Melanoma and squamous cell carcinoma (SCC) are high-risk skin cancers which have the potential to metastasize and ultimately lead to death, whereas basal cell carcinoma (BCC) is usually localized with potential to infiltrate and damage surrounding tissue. Anxiety around missing early curable cases needs to be balanced against inappropriate referral and unnecessary excision of benign lesions. Teledermatology provides a way for generalist clinicians to access the opinion of a specialist dermatologist for skin lesions that they consider to be suspicious without referring the patients through the normal referral pathway. Teledermatology consultations can be 'store-and-forward' with electronic digital images of a lesion sent to a dermatologist for review at a later time or can be live and interactive consultations using videoconferencing to connect the patient, referrer and dermatologist in real time.

Objectives

To determine the diagnostic accuracy of teledermatology for the detection of any skin cancer (melanoma, BCC or cutaneous squamous cell carcinoma (cSCC)) in adults, and to compare its accuracy with that of in-person diagnosis.

Search methods

We undertook a comprehensive search of the following databases from inception up to August 2016: Cochrane Central Register of Controlled Trials, MEDLINE, Embase, CINAHL, CPCI, Zetoc, Science Citation Index, US National Institutes of Health Ongoing Trials Register, NIHR Clinical Research Network Portfolio Database and the World Health

Organization International Clinical Trials Registry Platform. We studied reference lists and published systematic review articles.

Selection criteria

Studies evaluating skin cancer diagnosis for teledermatology alone, or in comparison with face-to-face diagnosis by a specialist clinician, compared with a reference standard of histological confirmation or clinical follow-up and expert opinion. We also included studies evaluating the referral accuracy of teledermatology compared with a reference standard of face-to-face diagnosis by a specialist clinician.

Data collection and analysis

Two review authors independently extracted all data using a standardised data extraction and quality assessment form (based on QUADAS-2). We contacted authors of included studies where there were information related to the target condition of any skin cancer missing. Data permitting, we estimated summary sensitivities and specificities using the bivariate hierarchical model. Due to the scarcity of data, we undertook no covariate investigations for this review. For illustrative purposes, we plotted estimates of sensitivity and specificity on coupled forest plots for diagnostic threshold and target condition under consideration.

Main results

The review included 22 studies reporting diagnostic accuracy data for 4057 lesions and 879 malignant cases (16 studies) and referral accuracy data for reported data for 1449 lesions and 270 'positive' cases as determined by the reference standard face-to-face decision (six studies). Methodological quality was variable with poor reporting hindering assessment. The overall risk of bias was high or unclear for participant selection, reference standard, and participant flow and timing in at least half of all studies; the majority were at low risk of bias for the index test. The applicability of study findings were of high or unclear concern for most studies in all domains assessed due to the recruitment of participants from secondary care settings or specialist clinics rather than from primary or community-based settings in which teledermatology is more likely to be used and due to the acquisition of lesion images by dermatologists or in specialist imaging units rather than by primary care clinicians.

Seven studies provided data for the primary target condition of any skin cancer (1588 lesions and 638 malignancies). For the correct diagnosis of lesions as malignant using photographic images, summary sensitivity was 94.9% (95% confidence interval (CI) 90.1% to 97.4%) and summary specificity was 84.3% (95% CI 48.5% to 96.8%) (from four studies). Individual study estimates using dermoscopic images or a combination of photographic and dermoscopic images generally suggested similarly high sensitivities with highly variable specificities. Limited comparative data suggested similar diagnostic accuracy between teledermatology assessment and in-person diagnosis by a dermatologist; however, data were too scarce to draw firm conclusions. For the detection of invasive melanoma or atypical intraepidermal melanocytic variants both sensitivities and specificities were more variable. Sensitivities ranged from 59% (95% CI 42% to 74%) to 100% (95% CI 48% to 100%) and specificities from 30% (95% CI 22% to 40%) to 100% (95% CI 93% to 100%), with reported diagnostic thresholds including the correct diagnosis of melanoma, classification of lesions as 'atypical' or 'typical, and the decision to refer or to excise a lesion.

Referral accuracy data comparing teledermatology against a face-to-face reference standard suggested good agreement for lesions considered to require some positive action by face-to-face assessment (sensitivities of over 90%). For lesions considered of less concern when assessed face-to-face (e.g. for lesions not recommended for excision or referral), agreement was more variable with teledermatology specificities ranging from 57% (95% CI 39% to 73%) to 100% (95% CI 86% to 100%), suggesting that remote assessment is more likely recommend excision, referral or follow-up compared to in-person decisions.

Authors' conclusions

Studies were generally small and heterogeneous and methodological quality was difficult to judge due to poor reporting. Bearing in mind concerns regarding the applicability of study participants and of lesion image acquisition in specialist settings, our results suggest that teledermatology can correctly identify the majority of malignant lesions. Using a more widely defined threshold to identify 'possibly' malignant cases or lesions that should be considered for excision is likely to appropriately triage those lesions requiring face-to-face assessment by a specialist. Despite the increasing use of teledermatology on an international level, the evidence base to support its ability to accurately diagnose lesions

and to triage lesions from primary to secondary care is lacking and further prospective and pragmatic evaluation is needed.

Summary of the Evidence:

Author (Date)	Level of Evidence	Sample/Setting (# of subjects/ studies, cohort definition etc)	Outcome(s) studied	Key Findings	Limitati Biases
Ijaz M, Mizori R, Al Omran Y (2026)	Systematic Review of observational studies	- 23 studies included from 2,768 initially surveyed articles - 3 databases searched including studies published from 2010-July 2024 comparing teledermatological evaluation (TD) to face-to-face consults (F2F)	- clinical outcomes Aka diagnostic accuracy/concordance between TD and F2F -Patient-reported outcomes regarding patient satisfaction and willingness to replace F2F with TD -Operational outcomes including cost savings of TD	-Clinical outcomes show moderate agreement due to kappa value of 0.57.	-No met analysis perform results quantta synthes across -Numbe include studies relative number databas searche -Older s include start da studies 2024 ar include

					potentia omitting data -0.57 ka value is moderat therefor significa not subs or perfe - Publica bias ma present becaus studies include peer rev in peer- reviewe databas
Martyin K, Meznerics FA, Bokor LA, Szabó B, Hegyi P, Kiss N, Bánvölgyi A (2026)	Systematic Review and meta-analysis of observational studies and experimental studies	--155 studies included from an initial screen of 30,412 records. 3 databases searched including both teledermatology (TD) and in-person consultations 3040. 3142 lesions. Average of 262 lesions	-Primary: Diagnostic concordance, kappa concordance, sensitivity, specificity and predictive values **-Secondary: Diagnostic time, patient and provider satisfaction and interrater agreement**	- Diagnostic concordance 76% (95% CI: 73-79%) for all skin conditions -Skin cancer concordance was 73% (95% CI 67-79%). Pigmented	-Search conduct Novemb which m that stu conduct that tim not inclu -Images particip centers

			between in person and TD providers.	lesions had a concordance of 76% (95% CI: 67-83%) -Dermoscopy improved the concordance of the skin cancers from 67% to 80% with a 95% CI of 58-74% and 73-85%, respectively	primary urgent c emerge departm and con settings teleder is used otherwi instead, use sec care an speciali settings -Publica bias ma present becaus studies include peer rev in peer- reviewe databas
Bourkas AN, Barone N, Bourkas MEC, Mannarino M, Fraser RDJ, Lorincz A, Wang SC, Ramirez-GarciaLuna JL (2023)	Systematic Review and meta-analysis of observational studies and RCTs	-44 articles, 3 different databases searches between January 2010 and May 2022. Reports percentage agreement or kappa concordance for primary diagnoses made via teledermatology (TD) versus face-to-face consultation (F2F)	- Primary: Pooled mean percentage agreement and kappa concordance for diagnostic matches between TD and F2F providers Secondary: Agreement between TD and F2F	- The diagnostic agreement rate was 68.9% with a pooled kappa concordance of 0.67 for specialists and 0.52 for non-	- High heterog across i studies of desig populat imaging modalit dermat conditio examine

			providers and histopathology	specialists; Both values are clinically significant	-Search includ outdat studies those o evidenc hierarch (oldest conduc 2010, s studies observa -Genera may be due to v platform and clin settings
Chuchu N, Dinnes J, Takwoingi Y, Matin RN, Bayliss SE, Davenport C, Moreau JF, Bassett O, Godfrey K, O'Sullivan C, Walter FM, Motley R, Deeks JJ, Williams HC (2018)	Systematic Review	-22 studies included -16 report diagnostic accuracy data for 4,057 lesions (879 malignant cases) -6 report referral accuracy data for 1,449 lesions (270 positive cases) -Conducted across secondary care, specialist clinics, community screening settings -Store and forward teledermatology with	-Primary outcomes: sensitivity and specificity of teledermatology for detecting skin cancer and invasive melanoma -Secondary outcomes: Referral accuracy and diagnostic concordance for TD vs F2F	- Detection of skin cancer: sensitivity 94.9% (95% CI 90.1-97.4%) specificity 84.3% (95% CI 48.5-96.8%) from 4 studies -Detection of melanomas	-High or risk of b terms o particip selectio -Particip were se from sp clinics a seconda -Images particip

		photographs or dermascopic images		sensitivity 59%-100% specificity 30%-100% (4 studies) - Detection of melanoma photographic and dermoscopic images Sensitivity: 85.4% (95% CI 68.3-94.1%) Specificity 91.6% (95% CI)	centers primary urgent c emerge departm and con settings telederm is used otherwi

Conclusion(s):

All four reviews consistently demonstrate that teledermatology achieves moderate to good diagnostic concordance with in person evaluation. However, the magnitude to which this benefit exists depends on the specific study. The largest meta-analysis (Martyin et al) reported a 76% concordance for skin conditions across 155 studies. Furthermore, Bourkas et al., (44 studies) found a 68.8% agreement with a kappa of 0.67 and Ijaz et al. reported a lower kappa of 0.57.

More specifically, the Chuchu et al, Cochrane review showed a sensitivity of 94.9% for detecting skin cancer using photos. However, the specificity was variable results of 48.5-96.8%. Therefore, these findings suggest that teledermatology is reasonably accurate but cannot perfectly diagnose conditions as opposed to in-person evaluation.

In terms of accuracy, these studies show that the use of specialists and their tools increase the concordance of diagnoses. For example, Bourkas et al shows that diagnostic agreement reaches 71% when dermatologic specialists evaluate both technologically and in-person. This value reduced to 44% when non-specialists are used (kappa 0.69 versus 0.52). Martyin et al, found that dermoscopy improves concordance significantly for melanoma detection when combined with photos taken clinically (sensitivity 85.4%, specificity of 91.6%

In conclusion, the results of these papers support the notion that telemedicine for dermatologic concerns is diagnostically adequate but inequivalent to in-person consultations. However, there are drawbacks to each of these studies that warrant further research. Generalizability in a wide array of healthcare environments such as primary care may be applicable if it is a multi-specialty clinic or telehealth is consciously utilized.

Clinical Bottom Line:

Studies are weighed based on the rigor of literature analysis, level of evidence and adherence to the PICO question.

Chuchu et al. (2018) is a Cochrane systematic review, making it the strongest study of the 4. However, the study focused solely on skin cancer detection, and it predates current teledermatology tools because of its publication date. However, it is still relevant because it shows that telemedicine is very good at generating positive skin findings (again, sensitivity was 94.9%). However, as previously mentioned, the highly variable specificity shows that telemedicine cannot reliably rule in a specific skin cancer diagnosis.

Magnitude of any effects.

For diagnostic concordance, values ranged from 68.9% to 76% across the studies. Kappa concordance ranged from 0.57-0.67 which lands in moderate-substantial agreement. However, there is still room for discordance because the values are not perfect.

For diagnostic accuracy, again the sensitivity of telemedicine is high, but the specificity is variable pertaining to skin cancer detection. For melanomas, dermoscopy improves sensitivity and specificity dramatically for diagnosis.

Clinical significance (not just statistical significance)

The available literature suggests that more research is warranted for the continued practice of teledermatology and diagnostic concordance. While teledermatology proves to be a great tool for picking up skin concerns and decreasing healthcare costs, it cannot reliably replace in-person examinations. Ultimately, it appears that teledermatology can be used best as a tool for triage. In other words, patients can be referred to for in-person services or started on conservative management. However, because the service has mostly been researched in settings already utilizing specialists, research on the use of teledermatology in other healthcare settings (community clinics, primary care, etc.), and by non-specialist clinicians is warranted.

Any other considerations important in weighing this evidence to guide practice

Skin conditions present differently based on skin tone and image lighting. Many dermatologic concerns have classic “textbook” descriptions that cater to light skin, (for example, erythematous more often presents as “violaceous” or simply “hyperpigmented” in darker skin tones, although this description may traditionally conjure thoughts of different pathophysiology). Considering this nuance when implementing the findings of these papers into practice is important. In practice, I believe providers must consider the image quality, lighting and surroundings during telehealth visits and/or reviews of pictures regarding this caveat. In addition, the evidence points to decreased diagnostic agreement when primary care providers assess images (44%). Therefore, ensuring that a dermatologic specialist assesses these images as well is paramount.