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**ABSTRACT**

The study and practice of dermatology care using interactive audio, visual, and data communications from a distance is called teledermatology. A teledermatology practice (TP) provides teleconsultation as well tele-education. Initially, dermatologists used videoconference. Convenience, cost-effectiveness and easy application of the practice made “store and forward” to emerge as a basic teledermatology tool. The advent of newer technologies like third generation (3G) and fourth generation (4G) mobile teledermatology (MT) and dermatologists’ interest to adopt tertiary TP to pool expert (second) opinion to address difficult-to-manage cases (DMCs) has resulted in a rapid change in TP. Online discussion groups (ODGs), author-based second opinion teledermatology (AST), or a combination of both are the types of tertiary TP. This article analyzes the feasibility studies and provides latest insight into TP with a revised classification to plan and allocate budget and apply appropriate technology. Using the acronym CAP-HAT, which represents five important factors like case, approach, purpose, health care professionals, and technology, one can frame a TP. Store-and-forward teledermatology (SAFT) is used to address routine cases (spotters). Chronic cases need frequent follow-up care. Leg ulcer and localized vitiligo need MT while psoriasis and leprosy require SAFT. Pigmented skin lesions require MT for triage and combination of teledermoscopy, telepathology, and teledermatology for diagnosis. A self-practising dermatologist and national health care system dermatologist use SAFT for routine cases and a combination of AST with an ODG to address a DMC. A TP alone or in combination with face-to-face consultation delivers quality care.

**Key words:** Author-based second opinion teledermatology, Mobile teledermatology, difficult-to-manage cases, hybrid teledermatology, National Health Care System, online discussion group, store-and-forward teledermatology, teledermatology practice, videoconference

**INTRODUCTION**

The study and practice of dermatology using interactive audio, visual, and data communications from a distance is teledermatology.<sup>[1]</sup> A teledermatology tool refers to the technology or modality used to deliver dermatology care. The application of teledermatology

tool (technology) to deliver dermatology care is called teledermatology practice<sup>[2]</sup> (TP). The aim of TP is to reach the unreached for dermatology care in remote geographic regions. It involves good general practitioner (GP) and dermatologist interaction. In recent times, with the advent of tertiary TP for difficult-to-manage cases (DMC), the scope of TP has widened. There is a specialist-to-specialist interaction for second opinion and continuing medical education that updates a dermatologist.

**HISTORY OF TELEDERMATOLOGY**

In 1906, Wilhelm Einthoven discovered telecardiogram<sup>[3]</sup> and was successful in the

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transmission of electrocardiogram using a telephone network. The Nebraska Project,<sup>[4]</sup> USA, in 1959, used videoconference (VC) for psychiatry patients which was conducted between two hospitals within a distance of 150 kilometers. Between 1960 and 1970, research to monitor astronauts' heart rate, blood pressure and electrocardiogram was conducted.<sup>[5]</sup> The term teledermatology was introduced by Prednia and Brown.<sup>[1]</sup> Teledermatology in a nursing home setting was first demonstrated by Zelickson and Homan.<sup>[6]</sup>

The advent of Medline and online reprint request, teledermoscopy, mobile teledermoscopy, telepathology, revolution and advancement in 3G and 4G mobile teledermatology (MT), and tertiary teledermatology like online discussion group (ODG) and author-based second opinion teledermatology (AST) has revolutionized TP.

TP is performed everywhere including as far as South Pole,<sup>[7]</sup> as remote as Faroe Islands,<sup>[8]</sup> rural India,<sup>[9]</sup> USA,<sup>[10]</sup> Africa,<sup>[11]</sup> in austere environments,<sup>[12]</sup> and nursing home settings.<sup>[13]</sup> A double-blind randomized control trial provides evidence for a therapeutic response of a drug. Similarly, the feasibility studies provide evidence regarding the application of teledermatology tools and play a key role to determine the TP.

TP reduces frequent visits, travel, and waiting period and minimizes the treatment cost.<sup>[14]</sup> It is important in elderly who suffer from chronic conditions like psoriasis and leg ulcer that call for frequent follow-up care. TP can be used in national health programs<sup>[2]</sup> to screen for leprosy and melanoma. TP helps in counseling and in initial examination prior to dermatosurgery.<sup>[15]</sup> TP facilitates to pool expert opinions and helps in continuing medical education.<sup>[16]</sup>

Poor net connectivity, poor image quality, and lack of referral proforma data can limit TP.<sup>[17]</sup> Legal issues, absence of in-person examination, varied treatment protocols between countries, doubts regarding the technology to offer second opinion can interfere with tertiary TP.<sup>[18]</sup> Time constraints, unavailability of the patient and doctor at the same time or the longer time taken to opine on still images, and patient discomfort in front of the camera, especially so for private part lesions, may limit TP.<sup>[14]</sup>

## IMPORTANCE AND NEED OF THE TELEDERMATOLOGY PRACTICE CLASSIFICATION

A systematic classification is required to conduct study

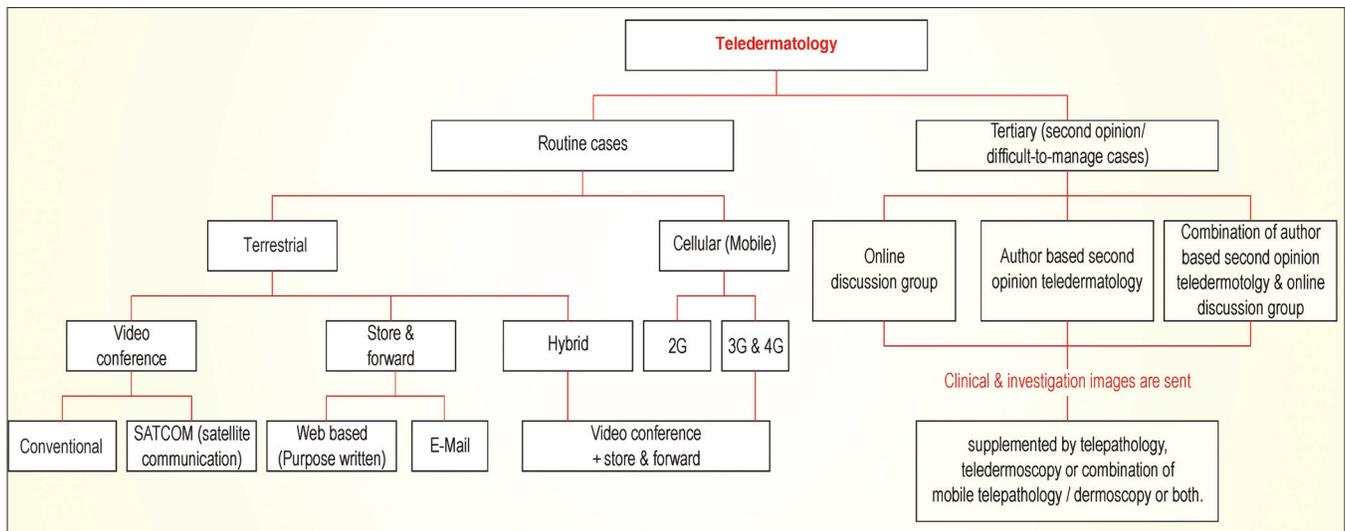
and research, and plan and allocate budget.<sup>[2]</sup> TP tools are broadly categorized<sup>[14,16]</sup> as data sent as 1) motion images, VC; (2) static images, store-and-forward teledermatology (SAFT); (3) and a combination of both static and motion images, hybrid teledermatology (HT). The above tools are called stationary TP tools.<sup>[16]</sup> Later in 2004, Braun<sup>[19]</sup> from Sweden introduced MT for the management of leg ulcer. In 2008, the classification of TP was proposed.<sup>[2]</sup> It is based on technology, health care professionals involved in teleconsultation, and special area of teledermatology application like teledermoscopy and telepathology.<sup>[2]</sup> Recent advances in tertiary teledermatology and 3G/4G MT which were not in the earlier classification<sup>[2]</sup> are now incorporated in the proposed revised classification [Figure 1]. TP tools are broadly divided into (a) basic TP to address the regular dermatology cases and (b) tertiary TP for DMCs to seek second opinion. Special areas of application include teledermoscopy, mobile teledermoscopy, telepathology, or their combination, placed in tertiary teledermatology, as it requires special expertise in the field to diagnose or offer second opinion.

## BASIC/ROUTINE TP TOOL

### Stationary TP tools

#### *Store-and-forward teledermatology*

Static images of clinical and histopathological data are accessed anytime and anywhere. They are transferred from a GP to a specialist to deliver the management. A diagnosis agreement of 68%,<sup>[20]</sup> 89%,<sup>[21]</sup> 58%,<sup>[22]</sup> and 48%<sup>[17]</sup> has been documented. Recently, various feasibility studies have confirmed a good diagnostic accuracy when SAFT is compared to face-to-face consultation,<sup>[23]</sup> skin neoplasms,<sup>[24]</sup> and pediatric dermatology.<sup>[25]</sup> Dermatology cases that can be diagnosed by face-to-face examinations (spotters) have a good diagnostic accuracy by SAFT. Good quality images are taken by the GP in a short time.<sup>[26]</sup> The comparison between the clinical dermatologist and teledermatologist reveals that there is a small difference in the interobserver accuracy of SAFT for diagnostic accuracy, histopathological analysis (gold standard), and management plan for skin neoplasms.<sup>[24]</sup> A diagnostic agreement and management plan is good and teledermatology benefits remote geographic regions.<sup>[27]</sup> SAFT has a good diagnostic concordance for fever with rash in children.<sup>[28]</sup> SAFT is cheap, and easy to set up and practice. It is the commonest teledermatology tool as most of the cases are dealt and often regarded as a basic model for a TP.<sup>[2]</sup>



**Figure 1: Classification of teledermatology practice**

### Videoconference

It is a live or interactive teledermatology. GP, patient and specialist interact with one another. Various feasibility studies<sup>[29,30]</sup> have confirmed good diagnostic accuracy when VC is compared to face-to-face consultation. VC needs appropriate equipment and it is very expensive. Motion images are transmitted using satellite communication<sup>[5,31,32]</sup> (SATCOM) from a referral hospital to a remote region. A bus or a van mounted with a satellite communication travels to the camp destination region and establishes the connectivity with a tertiary center to conduct skin camps in rural India. Indian space research organization provides infrastructure.<sup>[31]</sup>

### Hybrid teledermatology

This is a combination of both VC and SAFT to overcome the shortcomings faced when either of them is used individually.<sup>[33]</sup> Intercomparison of VC, SAFT, and HT<sup>[2,24,27,29,34,35]</sup> reveals a face-to-face interaction in VC and HT, that is absent in SAFT. Good patient and physician satisfaction along with good diagnostic accuracy is achieved in all. The simultaneous presence of a health care professional is required in VC and HT and his or her presence may not be required in SAFT. SAFT is the most cost-effective and convenient TP tool compared to VC. The time taken for consultation is least for SAFT and more in VC and HT. Motion images are used in VC, still images are used in SAFT, and both the types of images are used in HT. Intraobserver reliability is very high in teledermatology. A hybrid system with audio is no better than SAFT alone.<sup>[35]</sup> The comparison of in-person examination, with VC

and SAFT, revealed a comparable diagnostic and management agreement plan. Higher dermatologist confidence with in-person examination compared to either SAFT or VC is observed. Dermatologist confidence in SAFT and VC did not differ statistically from each other.<sup>[34]</sup> A randomized prospective outcome study demonstrated SAFT results in an equivalent clinical outcome compared with a conventional clinic-based consultation.<sup>[35]</sup>

### Mobile teledermatology

The term cellular teledermatology is avoided and MT should be used instead as this term represents the transmission of images via mobile phones<sup>[19,36]</sup> as well as through personal digital assistants.<sup>[37]</sup> Motion and still images are transferred using cellular phones. Images of leg ulcers are transferred from a digital camera to a computer system or a cellular phone.<sup>[19]</sup> Patients with a leg ulcer, nurses, or health care workers send periodic images from a remote area to a dermatologist. Treatment is offered and follow-up is performed periodically. Cost, travel, and time are saved. Various feasibility studies<sup>[38,39]</sup> have confirmed a good diagnostic accuracy when MT is compared with face-to-face consultation.

### Teledermatopathology

Transmission of histopathological images of skin using information technology for expert opinion is called teledermatopathology.<sup>[40-45]</sup> Teledermatopathology is achieved by (i) video-image (dynamic) analysis; (ii) store and forward (static); and (iii) web-based virtual slide system.<sup>[46]</sup> A virtual slide system is a recently

developed technology where a robotic microscope is used; any field of the specimen is selected for better digitalization at any required magnification at the discretion of the dermatopathologist.<sup>[43]</sup>

### Teledermoscopy

Pigmented skin lesions and melanoma are analyzed based on the dermoscopic criteria<sup>[47,48]</sup> that depend on characteristic changes in epidermis and dermis. Dermoscopy images<sup>[49-53]</sup> are transmitted for expert opinion using routine TP tools like SAFT or tertiary TP for second opinion. If these images are transferred using mobile technology, it is called mobile teledermoscopy. Pigmentary skin lesions are screened by MT.<sup>[54]</sup>

### Tertiary TP

DMCs need second opinion using information technology from one or more experts to provide dermatology care. It is referred as second opinion or tertiary TP. Expert opinion, resident training, and continuing medical education are the objectives of tertiary TP.<sup>[55]</sup> Previous reviews<sup>[2,55]</sup> suggest SAFT and HT for second opinion TP. Currently, there are three types of tertiary TP: (a) ODG,<sup>[56-62]</sup> (b) AST,<sup>[18]</sup> (c) and the combination of ODG and AST<sup>[63]</sup> [Figure 1].

### Online discussion groups

DMCs are a challenge to the health care system. An ODG is formed with a group of dermatologists who share constructive suggestions<sup>[56-58]</sup> for a submitted case. Feasibility studies have confirmed 81% concordance with face-to-face consultation.<sup>[58]</sup> Members of academic societies like Indian Association of Dermatologists, Venereologists and Leprologists have formed an ODG at ACAD\_IADVL@yahoo.com (an e-mail group) and participate in regular academic discussions. Telederm.org,<sup>[56]</sup> Rxderm,<sup>[57]</sup> Virtual Grand Rounds in Dermatology,<sup>[59]</sup> and Black Skin Dermatology Online<sup>[60]</sup> are the examples of ODGs. Experts may be unavailable for an instant case, or dermatologists and allied research workers who might have carried out research involving a DMC may not have registered at the site and at times consensus may not be reached for a case without these experts. These limitations of ODG are overcome by AST.<sup>[18]</sup> Online blogs are another form of ODGs.

### Author-based second opinion teledermatology

Experts who have previously worked and published may offer valuable suggestions for a DMC. A dermatologist performs a PubMed survey, notes author's e-mail, obtains the literature, reads, analyzes,

and obtains constructive suggestions for both the case and related literature from the author. This process updates the physician and delivers quality health care.

Steps involved in AST are summarized in Figure 2. A recent online author survey<sup>[18]</sup> observed that the author who has previously worked and published on the instant case offers constructive suggestions; quality of opinion is excellent as opinions are pooled from experts who have done original work. Evidence-based medical practice is followed.<sup>[18]</sup>

The limitations of ODGs are overcome by enrolling the experts. In special situations, the moderator apart from offering suggestions invites second opinion from the author who has published the relevant work on an instant case and the moderator can pool and summarize collective opinions and offer constructive suggestions based on the literature. Evidence-based medicine is thereby practised. Time taken in an ODG to answer the requests were rapid: 80 (60%) of the requests of the ODG group were answered within 1 day.<sup>[61]</sup> The exact time needed for AST has not been reported yet; however, reprint requests sent to dermatology authors have been responded (63%) to positively and rapidly in <2 days.<sup>[64]</sup>

### Implementation of TP (applied teledermatology)

There are five important factors that determine the appropriate teledermatology tools to be used in TP. The acronym "CAP-HAT" represents these factors – case, approach, purpose, health care professionals, and teledermatology tool<sup>[63]</sup> (technology). The letters used in the acronym and the five important factors that determine TP are shown in Figure 3. It is important to assess the utility before an acronym is introduced.<sup>[65]</sup> The application and utility of the acronym CAP-HAT in TP is summarized in Figure 4. The sequence of letters "A" and "P" in the acronym "CAP-HAT" is interchanged for convenience.

Certain dermatological conditions may be chronic with periodic remissions and exacerbations. They need a longer and frequent follow-up care using SAFT.<sup>[66,67]</sup> Diagnosis<sup>[68-70]</sup> and follow-up care<sup>[71-73]</sup> are provided by initial face-to-face consultation followed by TP. Hansen's disease,<sup>[68]</sup> leg ulcer,<sup>[69-71]</sup> psoriasis,<sup>[72]</sup> and acne<sup>[73]</sup> diagnosis and follow-up care are monitored using MT or SAFT [Figure 4b]. These studies have confirmed that delivering follow-up care via SAFT produces clinical outcomes equivalent to face-to-face

Step	Procedure
1	To obtain reprints from the author* addressing the difficult to-manage case using the various steps of online reprint request protocol** (PubMed survey).
2	Read, analyze and discuss the obtained literature (receive answers from the authors for the queries)
3	Send the clinical data on the instant difficult-to-manage case encountered and obtain the second opinion or constructive suggestions.

\* One or more authors who have worked on the instant difficult-to-manage case encountered can be selected using PubMed survey. Requestor can send clinical data and obtain constructive suggestions or second opinion using author e-mail (store and forward teledermatology).

\*\*Step 1 Online reprint request to corresponding author's latest e-mail, (Step 1 to be followed when corresponding author e-mail is available)

Step 2 Online reprint request to co-author or corresponding author's affiliated institution and Step 3 Postal reprint request providing requestor's e-mail address (steps 2 and 3 are followed in situation of e-mail decay;

Step 3 is followed in cases of failure of steps 1 and 2 or when corresponding author's e-mail is not provided in PubMed or on the journal home page. In step-3 author receives postal reprint request and responds positively by sending electronic copy, thus saving time.

Figure 2: The steps involved in author-based second opinion teledermatology

Cardinal factors for teledermatology practice:
(Acronym - CAP means HAT)
C - What case in teledermatology?
A - How to approach?
P - What purpose?
H - Who is the professional involved in sending the data to the expert?
And
T - What type of technology is used to address the case?

Figure 3: The acronym “CAP-HAT” represents as cardinal factors to design a teledermatology practice. The two words in the acronym “CAP” and “HAT” are related as thesaurus and therefore the acronym is represented as “CAP-HAT.” and it is easy to remember and reproduce. The repeated letter “A” in the acronym does not refer to any factor; it is a conjunction (“and”). that links the fifth factor “technology”

consultation [Figure 4b].

Nurse or health care workers can send in periodic images using MT.<sup>[74]</sup> GP can send images to the dermatologist and use SAFT<sup>[74]</sup> [Figure 4b]. A nurse or a patient send images, and psoriasis severity can be evaluated using MT.<sup>[32,72]</sup> Patient empowerments in teledermatology to deliver follow-up care in chronic dermatology cases like psoriasis,<sup>[72]</sup> acne,<sup>[73]</sup> and leg ulcer<sup>[71]</sup> are documented. A compliance management system using MT for the periodic assessment of psoriasis is proposed.<sup>[75]</sup> MT text messages are innovative, low cost, and a reminder tool to improve

adherence to treatment.<sup>[76]</sup> A National Health Care System (NHS) should implement text messages addressing adherence to treatment, education, and awareness especially for diseases like leprosy covered by national health programs. This process provides education and builds confidence in patients. Medical treatment and/or dermatosurgical counseling or follow-up care for vitiligo is delivered.<sup>[15]</sup>

Diagnosis and management of melanoma and pigmented skin lesions are challenging and require initial face-to-face examination followed by TP with more than one teledermatology tool.<sup>[58,77]</sup> SAFT with

Factors & Acronym Letters	a	b	c	d	e	f	g	h
Presenting Case (C)	Routine case *	Chronic case**	Special case***	Pigmented skin lesions / Melanoma	Occupational dermatitis	HIV / AIDS / Genodermatoses	Contact dermatitis	Difficult-to-manage case****
	↓	↓	↓	↓	↓	↓	↓	↓
Purpose (P)	Diagnosis	follow-up	Diagnosis	Triage	Mass/Community Screening	Counseling & Screening	Diagnosis & health education	Diagnosis
	↓	↓	↓	↓	↓	↓	↓	↓
Approach (A)	TP	FF followed by TP	FF followed by TP	TP followed by FF & investigations	TP followed by FF & investigations	TP	Patch Testing & TP	FF examination followed by TP
	↓	↓ ↓	↓	↓ ↓	↓ ↓	↓	↓	↓ ↓
Health care Professional (H)	GP	Nurse GP	Dermatologist / GP	Nurse GP	Nurse GP	Professional counseling or GP	GP	Self practicing Dermatologist NHS Dermatologist
	↓	↓ ↓	↓	↓ ↓	↓ ↓	↓	↓	↓ ↓
Technology (Teledermatology Tool) (T)	SAFT	CT SAFT	SAFT, ODG & AST alone or combination of Teledermoscopy & telepathology	CT SAFT	CT SAFT	VC or HT	SAFT	ODG & AST Combination of ODG & AST

TP - teledermatology practice  
 SAFT - Store forward teledermatology  
 AST - Author based second opinion teledermatology  
 VC - Video conference  
 GP - General Practitioner  
 FF - face-to-face examination  
 ODG - online discussion Group  
 CT - Cellular teledermatology  
 HT - Hybrid teledermatology

Routine case\* - cases that are easily diagnosed by spot examination and do not require frequent follow-up (spotters)  
 Chronic case\*\* - case that need frequent follow-up after treatment  
 Special case\*\*\* - cases needs more than one teledermatology approach as well second opinion from an expert  
 Difficult-to-manage cases\*\*\*\* - case that require second opinion from one or more experts.

**Figure 4: The feasibility studies in teledermatology practice. This table is derived by analyzing the feasibility studies with respect to the five cardinal factors, represented as an acronym CAP-HAT. The sequence of letters “A” and “P” in the acronym “CAP-HAT” are interchanged for convenience. The references for feasibility studies are shown in the parentheses: (a) regular cases (23–25), (b) chronic disease: diagnosis and follow-up care (68–73, 75–76), (c) special case (cutaneous neoplasm) diagnosis (77, 78), (d) triage (80–87), (e) screening or mass survey or occupational dermatitis (89–91), (f) education and counseling (63, 85–88, 92–95), (g) investigation (89–91), (h) difficult-to-manage cases (56–63)**

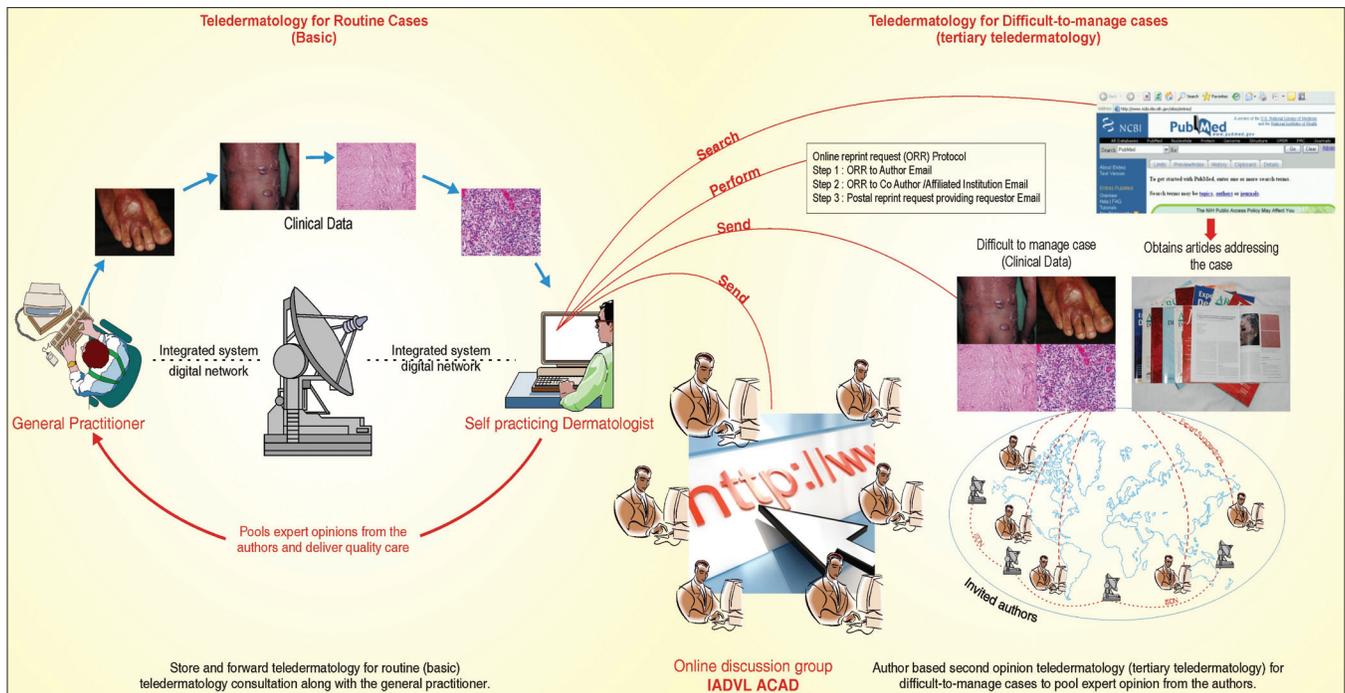
ODGs and AST or in combination with telepathology, teledermoscopy, and or mobile teledermoscopy is of additive value with an improved diagnostic accuracy<sup>[78,79]</sup> compared to face-to-face examination and facilitates second opinion<sup>[63]</sup> [Figure 4c].

Nurses or trained health care workers triage pigmented skin lesions<sup>[77-87]</sup> or survey or mass screen the cases using MT and can send in images directly to the tertiary center for histopathological examination or route the images through a GP [Figure 4d]. Infectious cases are diagnosed by SAFT.<sup>[88]</sup> Screening for occupational eczema is performed using SAFT.<sup>[89]</sup> The evaluation of the scoring system for hand eczema is feasible for SAFT.<sup>[90]</sup> To screen or triage melanoma, pigmented skin lesions, leprosy, and endemic cases like leishmaniasis, one can adapt initial TP followed by face-to-face examination. In routine practice, nurses use MT and GPs use SAFT to triage cases and provide further management in a tertiary center [Figure 4e]. The interpretation of patch testing is performed by

SAFT<sup>[91]</sup> [Figure 4g]. A dermatologist uses VC or HT for dermatology cases like HIV/AIDS and genodermatoses [Figure 4f] that require counseling and health education.<sup>[92-95]</sup>

**The implementation of TP**

The application of TP tools is reviewed here.<sup>[2,96-98]</sup> An ideal TP should address routine cases as well as DMCs. A combination of (a) basic or routine and (b) tertiary TP are required to deliver complete TP.<sup>[63]</sup> Self-practicing dermatologists<sup>[99-102]</sup> and NHS dermatologists<sup>[63,103-105]</sup> use SAFT for routine practice. They use ODGs and AST to address DMCs<sup>[63]</sup> [Figure 4h]. Self-practicing dermatologists organize TP with a group of known GPs from the region. They join the ODG formed by the national academic body, like Indian Association of Dermatologists, Venereologists, and Leprologists (IADVL ACAD), for DMC and offer treatment [Figure 5].



**Figure 5: The organization of teledermatology practice for a self-practicing dermatologist: It comprises a basic model SAFT, where a GP interacts with a dermatologist for regular cases (spotters) along with ODG and AST to obtain a second opinion on difficult-to-manage cases (modified with permission from Kanthraj GR. J Eur Acad Dermatol Venereol. 2010; 24:961-6. Authors' willingness for second opinion teledermatology in difficult to manage cases: 'An online survey'**

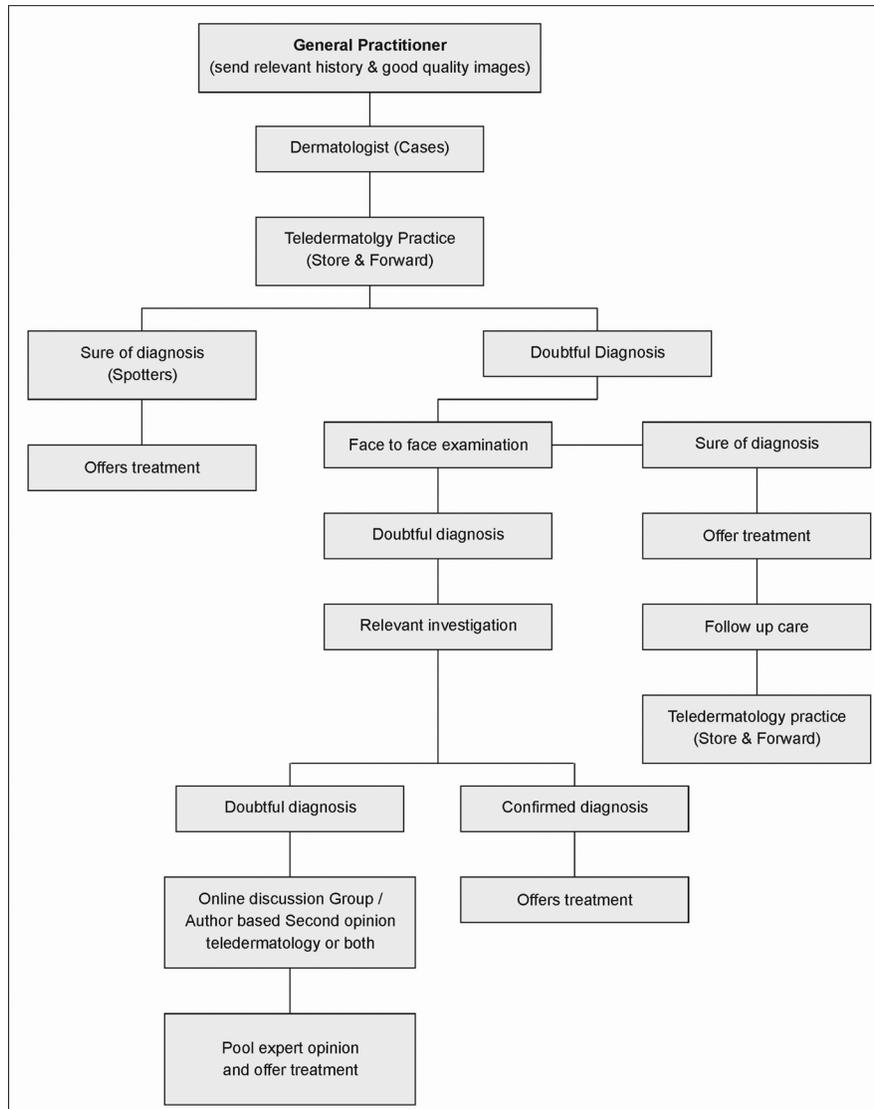
The Netherlands NHS<sup>[104]</sup> has successfully implemented SAFT for TP. Over 185 dermatologists and 2500 GPs performed 33,000 teledermatology consultations with reimbursement by the Dutch healthcare insurance system in a period of 4 years.<sup>[104]</sup> Recently, a TP model for a NHS is proposed.<sup>[63]</sup> In the Indian context, this model<sup>[63]</sup> can be applied in respective state and central government health services. Governments' health service dermatologists form an ODG and among them two or more senior dermatologists are appointed as moderators by the health service. The NHS provides the information technology infrastructure. The moderator identifies DMCs, and offers and pools opinions either from experts within the ODG or AST. A dermatologist can submit or offer opinions for other submissions. This process enables a dermatologist to update recent advances, and earn CME credit and reimbursement. DMCs are not neglected in the community as debated earlier. Epidemiology data are maintained. House surgeons are trained for history taking, photography, and sending images for teleconsultation in rural areas.<sup>[105]</sup>

Cost-effective studies<sup>[106-111]</sup> on implementation of TP have found it to be economical. A study on the

economic evaluation of teledermatology reveals that SAFT is 1.6-fold cheaper when compared with the conventional letter referral system to triage skin cancer patients.<sup>[107]</sup> TP, if implemented appropriately<sup>[63]</sup> can deliver the quality care without any burden on the financial position of a NHS. A recent study from Netherlands<sup>[111]</sup> confirmed that TP is cost effective if the distance to a dermatologist is larger ( $\geq 75$  km) or when more consultations ( $\geq 37\%$ ) are prevented by TP.

**Face to face consultation versus TP**

There is a debate to compare both face-to-face examination and TP.<sup>[112]</sup> Patients still prefer a face-to-face consultation, with one study reporting that 40% felt "something was missing" when the dermatologist was not seen in person.<sup>[112]</sup> A face-to-face examination binds the physician and patient and TP is not a substitute. Legal principles of face-to-face consultation will apply to TP.<sup>[14]</sup> Pooling expert opinions across the globe is a great advantage of a TP, that is difficult to achieve in a face-to-face consultation. Therefore, a combination of both face-to-face consultation and TP in appropriate situations as illustrated in Figure 6 can deliver quality care. This approach minimizes the shortcomings of either face-to-face examination or TP alone.



**Figure 6: Application of teledermatology practice and face-to-face consultation in appropriate clinical situation to deliver quality care: A dermatologists approach toward a case with a combination of both face-to-face and teledermatology practice or individually depending on appropriate clinical situations to deliver quality care and minimize the short comings of either face-to-face examination or teledermatology practice alone**

**TELEDERMATOLOGY AND LAW**

Privacy legislation in Australia has made access to the blogs possible, only by invitation.<sup>[85]</sup> No specific regulation exists till date for ODG, blogs, and AST where experts across the globe interact. Uniform international guidelines are required. In general, the practice principles of face-to-face examination apply for a TP.<sup>[14]</sup> The confidentiality and protection of images are important.<sup>[14]</sup>

**FUTURE PERSPECTIVE IN TELEDERMATOLOGY**

The advent of the 3G/4G mobile teledermatology

revolution has advanced to a point where they are as good as small computers. MT is basically changing into another method of SAFT and even VC with video-enabled smart phones [Figure 1]. There are no feasibility studies yet; future studies in this area should expand this information. The widespread introduction of 3G /4G services in India and elsewhere will in all probability spark an increased use of advanced MT-based consultations.

**CONCLUSION**

An ideal TP should have a teledermatology tool that addresses regular cases as well as DMCs. A self-

practicing dermatologist and a NHS dermatologist use SAFT for regular cases and adopt ODG, AST, or both for DMCs guided by moderators. Active survey (house-to-house) screening, pigmented skin lesions (melanoma), and leprosy require MT. Five factors determine the design of a TP. Feasibility studies have demonstrated the role of TP in various situations. TP alone or in combination with face-to-face consultation delivers quality care. Medical graduates, interns, and dermatology residents need encouragement to participate in TP as it updates their knowledge and it should be included in the teaching curriculum.

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## Multiple Choice Questions

1. Which of the following is a basic teledermatology tool?
  - a. Videoconference
  - b. Hybrid teledermatology
  - c. Store-and-forward teledermatology
  - d. Mobile teledermatology
2. A hybrid teledermatology is
  - a. Combination of store-and-forward and mobile teledermatology
  - b. Combination of store-and-forward and video conference
  - c. Combination of online discussion group and author-based second opinion teledermatology
  - d. Combination of online discussion group and video conference
3. Follow-up care for a leg ulcer is well documented with which of the following teledermatology tool?
  - a. Videoconference
  - b. mobile teledermatology
  - c. Store-and-forward teledermatology
  - d. Online discussion group
4. Patient-empowered teledermatology is well documented with which of the following dermatology conditions?
  - a. Acne
  - b. Psoriasis
  - c. Leg ulcer
  - d. All of the above
5. Appropriate teledermatology tools to screen (active survey) a dermatology case of public health importance like leprosy is
  - a. Mobile teledermatology
  - b. Videoconference
  - c. Store-and-forward teledermatology
  - d. Online discussion group
6. Counseling and health education for HIV/AIDS needs which of the following teledermatology tools?
  - a. Videoconference
  - b. Mobile teledermatology
  - c. Store-and-forward teledermatology
  - d. Online discussion group
7. Contact dermatitis and occupational screening require which of the following teledermatology tools?
  - a. Videoconference
  - b. Mobile teledermatology
  - c. Store-and-forward teledermatology
  - d. Author-based second opinion teledermatology
8. Which of the following statement is true regarding the author-based second opinion teledermatology?
  - a. Evidence-based medicine is practiced as a collective opinion of the authors who worked on an instant case
  - b. Applied for difficult-to- manage cases
  - c. Expert opinion and literature is obtained
  - d. All of the above
9. A self-practicing dermatologist needs
  - a. Videoconference
  - b. Mobile teledermatology
  - c. Store-and-forward teledermatology
  - d. A combination of store-and-forward, online discussion group, and author-based second opinion teledermatology
10. Which of the following statements about teledermatology practice is false?
  - a. Face-to-face consultation has an advantage over teledermatology practice; however the latter offers the advantage to manage difficult to-manage cases
  - b. Medicolegal principles of face-to-face consultation may not apply in teledermatology practice
  - c. In the case of doubtful diagnosis while performing teledermatology practice, the patient is called for face-to-face examination
  - d. Face-to-face examination and teledermatology practice have their own limitations; they are used individually or in combination depending on the clinical situation

1.c, 2.b, 3.b, 4.d, 5.a, 6.a, 7.c, 8.d, 9.d, 10.b  
**Answers**

### Announcement

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