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Telemedicine and e-Sanjeevani: Transforming Access to Health Care in India

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Abstract: Background: Telemedicine has moved from a peripheral technological innovation to an important component of contemporary health systems. Its rapid expansion during the COVID-19 pandemic demonstrated its capacity to maintain access during service disruption, but also exposed concerns regarding clinical appropriateness, digital exclusion, privacy, fragmented care and patient safety. India's national telemedicine service, e-Sanjeevani, represents one of the largest publicly funded telemedicine programmes globally. **Objective:** This narrative review critically examines the evidence on telemedicine, describes the development and functioning of e-Sanjeevani, and evaluates its public health significance, implementation challenges and future priorities. **Key findings:** Telemedicine can reduce travel, waiting time and indirect costs while expanding access to primary and specialist advice. Comparative evidence suggests that, for appropriately selected conditions, virtual care can achieve outcomes broadly comparable to in-person care. However, the evidence is heterogeneous, largely observational and concentrated in high-income settings. Telemedicine is less suitable where diagnosis depends on physical examination, procedures, investigations or urgent stabilization. By February 2026, e-Sanjeevani had reportedly delivered more than 449 million consultations. Its two principal pathways—provider-to-provider assisted consultation and patient-to-provider outpatient consultation—offer complementary approaches to geographical and workforce barriers. Nevertheless, consultation counts do not establish quality or health impact. Connectivity, digital literacy, specialist availability, interoperability, privacy, referral completion, workload and the risk of inappropriate virtual management remain important concerns. **Conclusion:** Telemedicine should complement rather than replace accessible in-person care. The next phase of e-Sanjeevani should prioritize clinical quality, continuity, equity, patient safety and outcome-based evaluation over consultation volume alone. A hybrid model embedded within comprehensive primary health care offers the most credible route to sustainable impact.

Keywords: Telemedicine; e-Sanjeevani; digital health; primary health care; health equity; India.

INTRODUCTION

Telemedicine refers to the provision of health-care services across distance through information and communication technologies. It includes synchronous video or audio consultation, asynchronous transmission of clinical information, remote monitoring and communication between health professionals. Telehealth is a broader term that may additionally include education, administration, public health surveillance and health-system coordination.

The central value of telemedicine lies not in reproducing every element of a conventional consultation through a screen, but in selectively overcoming barriers of distance, time, mobility and specialist scarcity. It can connect a patient directly with a clinician, enable a primary-care provider to obtain specialist advice, support follow-up of stable chronic disease and facilitate interpretation of remotely transmitted

investigations. Its limitations are equally important: a remote consultation cannot reliably replace palpation, auscultation, neurological examination, emergency assessment or diagnostic procedures.

Although telemedicine predates the internet era, the COVID-19 pandemic accelerated its adoption on an unprecedented scale. Restrictions on movement, fear of infection and disruption of outpatient services made remote care a practical necessity. This emergency expansion demonstrated feasibility but often occurred without mature workflows, standardized outcome measures or adequate evaluation. The post-pandemic question is therefore not whether telemedicine should continue, but how it should be integrated safely, equitably and efficiently into routine health systems.

The World Health Organization emphasizes that telemedicine programmes require needs assessment, governance, financing, workforce preparation, infrastructure, monitoring and integration with existing services.[1] Technology alone does not improve health care. Its effect depends on who can use it, which clinical problems are addressed, how virtual encounters connect with investigations and treatment, and whether patients can obtain in-person care when required.

Models and Clinical Applications of Telemedicine

Telemedicine can be classified according to participants, timing and mode of communication. Patient-to-provider consultation allows an individual to communicate directly with a registered medical practitioner. Provider-to-provider telemedicine connects a frontline worker or primary-care clinician with a specialist. The latter model may be particularly valuable in rural and remote settings because the local provider can obtain clinical history, measure vital signs, conduct a physical examination and facilitate treatment.

Synchronous consultation occurs in real time through video, audio or text interaction. Video provides visual information and may support examination of visible lesions, movement, breathing pattern or general condition. Audio consultation is more accessible where bandwidth is poor but provides fewer clinical cues. Asynchronous, or store-and-forward, telemedicine involves the transmission of photographs, radiological images, laboratory results or clinical summaries for later review.

Common applications include follow-up of stable hypertension, diabetes, thyroid disease and other chronic conditions; mental-health consultation; dermatology; review of investigation reports; medication counselling; rehabilitation; palliative-care support; antenatal counselling; and specialist advice to primary-care teams. Remote monitoring can supplement consultation through home blood-pressure devices, glucometers, pulse oximeters, wearable sensors or connected diagnostic equipment.

Clinical appropriateness must remain the primary determinant of modality. Telemedicine is unsuitable as the sole response to severe chest pain, acute breathlessness, stroke symptoms, major trauma, obstetric emergencies, altered consciousness or other conditions requiring immediate examination and intervention. It is also limited when the diagnosis depends on abdominal palpation, fundus examination, otoscopy, detailed neurological assessment or collection of biological specimens.

Evidence on Effectiveness and Safety

The effectiveness of telemedicine varies by condition, intervention design and outcome. A 2024 systematic review comparing synchronous telehealth with in-person care included 77 studies conducted during the COVID-19 period. Differences in clinical and utilization outcomes were generally small or not clinically meaningful, suggesting that telehealth can be comparable for selected services. However, 61% of the studies had a serious or high risk of bias, most were observational and outcome measurement was inconsistent.[3]

The same review found that telehealth could reduce missed visits and improve adherence to medication or therapy in some settings. Conversely, patients initially seen remotely were sometimes less likely to receive up-to-date laboratory, imaging or other paraclinical assessments.[3] This finding illustrates a central concern: a successful video connection is not equivalent to complete clinical care.

Evidence is stronger for some defined applications than for undifferentiated general care. Telemonitoring combined with clinical feedback can improve blood-pressure or glycaemic control in selected patients. Telepsychiatry can improve access where privacy, language and emergency escalation are addressed. Teledermatology and teleradiology are suitable for store-and-forward models because images can be reviewed by specialists. Virtual rehabilitation can support adherence, although patients with severe disability may require direct supervision.

Patient satisfaction is commonly high because telemedicine reduces travel, waiting and time away from work. Satisfaction, however, is affected by technical reliability, continuity with a known clinician,

communication quality and the perceived seriousness of the illness. Patients may value telemedicine for routine follow-up but prefer in-person care when symptoms are new, complex or emotionally sensitive.
Safety evidence remains less mature than evidence on convenience. Potential harms include delayed recognition of serious illness, incomplete examination, communication errors, inappropriate prescribing and failure to arrange necessary investigations. A clinician may also be falsely reassured by a patient's appearance on video, while poor image quality can conceal pallor, cyanosis, respiratory effort or skin findings.
Telemedicine should therefore include explicit safety-netting: patients must know which warning signs require urgent in-person assessment, where to seek care and how quickly follow-up should occur. Virtual pathways should permit seamless conversion to physical consultation rather than forcing the patient to restart the care process.

Evolution and Structure of e-Sanjeevani

e-Sanjeevani is India's national telemedicine service developed by the Centre for Development of Advanced Computing under the Ministry of Health and Family Welfare. It emerged from earlier Indian telemedicine initiatives and expanded rapidly during the pandemic.
The programme has operated through two complementary models. The assisted provider-to-provider pathway was designed primarily around Health and Wellness Centres, now Ayushman Arogya Mandirs. A Community Health Officer, medical officer or other frontline provider at the spoke connects with a doctor or specialist at a hub. The local provider assists with history, examination, measurements, documentation and implementation of advice.
The patient-to-provider outpatient model enables citizens to seek remote consultation directly from home through a smartphone or computer. It supports registration, queue management, video consultation, electronic prescription and access to state or institution-specific outpatient services.
This distinction is important. Direct-to-patient telemedicine improves convenience for digitally connected individuals, whereas assisted consultation can reduce digital and clinical barriers for rural, older, less literate or otherwise disadvantaged patients. In the assisted model, telemedicine strengthens rather than bypasses primary care.
The programme's scale has been remarkable. An official government statement in February 2026 reported more than 449 million teleconsultations.[9] e-Sanjeevani has also incorporated structured clinical documentation and an artificial-intelligence-supported Clinical Decision Support System. Government data indicate that 282 million consultations received such standardized decision support between its introduction in April 2023 and November 2025.[10]
Large aggregate figures require cautious interpretation. One patient may generate multiple consultations, and the number of completed encounters does not reveal diagnostic accuracy, clinical resolution, treatment adherence, referral completion or avoidance of complications. Utilization may also vary substantially across states, districts, facilities and population groups.
A national analysis of programme data from November 2019 to September 2023 found rapid adoption but marked geographical variation. The assisted consultation model accounted for most utilization, underscoring the central role of public primary-care facilities and frontline health workers.[5] This is an important policy lesson: in settings with unequal digital access, facilitated telemedicine may be more equitable than an exclusively app-based model.

Public Health Significance

India's distribution of specialists is uneven, and remote, tribal, mountainous and island populations often face substantial travel and opportunity costs. Telemedicine can reduce delays in obtaining professional advice and can support primary-care teams managing chronic diseases, mental illness, dermatological conditions and follow-up after specialist consultation.
The public health benefit is broader than individual convenience. Provider-to-provider consultation can strengthen clinical capacity at peripheral facilities, reduce unnecessary referral, support standardization of care and improve continuity. It may also allow specialists to guide several primary-care teams without requiring permanent physical deployment at every site.
For patients, reduced travel can mean lower expenditure on transport, accommodation and lost wages. The 2025 National Health Systems Resource Centre evaluation reported that users commonly valued e-Sanjeevani for saving money and time. In its six-state sample, 92.4% of surveyed users described the application as user-friendly, although awareness and previous use varied widely between states.[6]

Telemedicine may also support resilience during outbreaks, disasters, extreme weather and temporary service disruption. In Himalayan or flood-prone areas, continuity of care can be maintained when road access is interrupted. However, the same emergencies may disrupt electricity and telecommunications; telemedicine cannot be the sole contingency plan.

Table 1. Telemedicine Modalities, Applications, Benefits, Risks and System Requirements

Model or application	Appropriate uses	Principal benefits	Major risks or limitations	Essential safeguards
Direct patient-to-doctor video consultation	Minor acute complaints, report review, counselling and stable follow-up	Convenience, reduced travel and rapid access	Limited examination, digital exclusion, fragmented care and missed severity	Triage protocols, verified identity, documentation, safety-netting and in-person referral
Assisted provider-to-provider consultation	Rural primary care, chronic disease, specialist advice and diagnostic support	Combines local examination with remote expertise; strengthens frontline care	Dependence on trained facilitator, hub availability and equipment	Defined hub-spoke roles, clinical protocols, training and referral tracking
Audio consultation	Follow-up, counselling and areas with weak bandwidth	Broad accessibility and low data requirement	No visual examination, identity and communication limitations	Restrict to suitable cases, document limitations and escalate when uncertain
Asynchronous store-and-forward	Dermatology, radiology, ophthalmology and pathology support	Flexible specialist review and efficient use of time	Poor image quality, incomplete clinical context and delayed response	Standard image protocols, metadata, secure transfer and defined turnaround time
Remote monitoring	Hypertension, diabetes, cardiac disease and selected respiratory conditions	Longitudinal data, early detection and self-management support	Device inaccuracy, data overload, false alerts and unequal access	Validated devices, thresholds, responsibility for review and escalation protocols
Telepsychiatry	Follow-up, counselling and specialist access	Privacy, continuity and reduced stigma for some patients	Difficulty managing crises, confidentiality concerns and reduced non-verbal information	Suicide-risk assessment, emergency pathway and private consultation environment
Tele-rehabilitation	Stable stroke, musculoskeletal and postoperative follow-up	Home-based support and improved adherence	Falls, incorrect exercise and limited hands-on assessment	Caregiver involvement, functional screening and supervised progression
AI-supported clinical decision support	Structured history, reminders and guideline-based alerts	Standardization and potential reduction of omission	Automation bias, inaccurate suggestions and unclear accountability	Human oversight, validation, audit trails and monitoring by condition and population

Hybrid care	Chronic disease, specialist follow-up and multimorbidity	Combines convenience with periodic examination and investigations	Poor coordination can duplicate rather than streamline care	Shared records, scheduled physical review and clear responsibility for continuity

Equity and the Digital Divide

Telemedicine is often presented as inherently equitable because it overcomes distance. In practice, it can either reduce or amplify inequity. Smartphone ownership, internet quality, digital literacy, language, disability, age, gender and control over household devices influence access.

Women may have less independent access to phones or private space. Older adults may struggle with registration, passwords, cameras and electronic prescriptions. People with hearing, visual, cognitive or motor impairments require accessible interfaces. Migrant and tribal populations may encounter language barriers, while weak connectivity affects precisely the regions expected to benefit most.

Assisted consultation is therefore a major equity mechanism. Community Health Officers and other frontline staff can facilitate registration, obtain measurements, explain prescriptions and arrange referral. Yet facilitation creates additional workload. Telemedicine duties should be accompanied by training, protected time, reliable equipment and recognition in workforce planning.

Equity assessment should move beyond total consultation numbers. Programmes should report use by age, sex, disability, socioeconomic position, rurality and geography. They should also examine who drops out of queues, who fails to collect medicines, and who cannot complete recommended investigations or referral.

Regulatory, Ethical and Privacy Considerations

India's Telemedicine Practice Guidelines, issued in 2020, clarified that registered medical practitioners may provide teleconsultation using video, audio or text, subject to professional judgement and ethical obligations.[2] The guidelines address identification, consent, evaluation, prescribing, documentation, privacy and situations requiring in-person care.

Consent may be implied when a patient initiates the consultation but should be explicit when another person initiates it on the patient's behalf. The practitioner must verify identity, maintain records and decide whether the available information is sufficient for safe management.

Remote prescribing requires particular caution. Some medicines may be prescribed under defined circumstances, whereas narcotic, psychotropic or other restricted drugs require tighter control. Prescribing should never become a transactional response to a brief online interaction without adequate assessment.

Privacy risks arise when consultations occur in shared homes or crowded health facilities. Sensitive information concerning reproductive health, mental illness, tuberculosis, HIV, substance use or interpersonal violence may be overheard. Platforms must use secure authentication, encryption, role-based access and clear data-retention policies.

Integration with the Ayushman Bharat Digital Mission and the Ayushman Bharat Health Account can support continuity and patient-controlled record linkage. Interoperability should not be confused with unrestricted data sharing. Patients should understand which records are created, who can access them and how consent may be withdrawn.

Recent Advances

The most important recent shift is from stand-alone video consultation towards digitally enabled hybrid care. Telemedicine is increasingly being combined with electronic records, remote diagnostics, home monitoring, electronic prescriptions and decision support.

Artificial intelligence may assist with structured history-taking, guideline reminders, risk stratification and clinical alerts. Its appropriate role is supportive rather than autonomous. Algorithms trained on incomplete or unrepresentative data may perform poorly among minority languages, atypical presentations or resource-constrained populations. Clinicians may also accept incorrect suggestions through automation bias.

Multilingual interfaces and speech translation can make consultation more inclusive, but clinical translation requires high accuracy. Errors involving symptoms, drug doses or duration can cause direct

harm. Language technology should therefore be validated in real consultations and allow confirmation by the patient and clinician.

Connected diagnostic devices—including digital stethoscopes, otoscopes, dermatoscopes and electrocardiography—may expand the range of conditions managed remotely. Their value depends on device validation, operator training, maintenance and availability of a responsible clinician to interpret findings.

Challenges and Limitations

The first challenge is clinical scope. Telemedicine cannot be evaluated as a single intervention because a psychiatric follow-up, dermatology image review and emergency audio call have different risks and expected outcomes. Studies and programmes must define the clinical problem, modality and care pathway precisely.

Second, rapid implementation has generated large administrative datasets but limited outcome evidence. Consultation completion is easier to measure than correct diagnosis, symptom resolution, blood-pressure control, hospitalization avoided or disability prevented. Programme dashboards should include quality and outcome indicators.

Third, connectivity failures, software downtime and audio-video problems interrupt clinical reasoning and reduce confidence. Equipment installed at peripheral facilities may become unusable when cameras, microphones or power backups are not maintained.

Fourth, telemedicine may fragment care if patients repeatedly consult different doctors who cannot access previous records. It may also increase demand by making consultations easier, rather than reducing workload. Whether this represents unnecessary use or previously unmet need requires careful analysis.

Fifth, medico-legal responsibility can become unclear when a facilitator, remote doctor, specialist hub and local facility are all involved. Responsibility for arranging investigations, reviewing results and ensuring referral completion must be explicitly assigned.

Finally, evidence from e-Sanjeevani is still dominated by utilization, satisfaction and implementation studies. These are valuable but cannot establish effectiveness. Comparative studies should examine clinical outcomes, equity, costs, referral patterns and safety.

Future Directions

The future of e-Sanjeevani should be based on a "digital where appropriate, physical where necessary" principle. Clinical triage should determine whether a patient receives virtual care, assisted consultation, scheduled physical review or immediate emergency referral.

A core quality framework should include consultation completeness, waiting time, unresolved technical failure, diagnostic concordance, medication appropriateness, investigation completion, referral completion, adverse events, patient-reported outcomes and continuity with the same care team.

For chronic disease, telemedicine should be linked with reliable measurement of blood pressure, glucose, weight and treatment adherence. Virtual advice without medicines, diagnostics or follow-up offers limited value. Integration with laboratories, pharmacies, primary-care records and referral facilities is therefore essential.

Independent evaluations should use pragmatic trials, interrupted time-series designs and matched comparisons. Studies should assess whether e-Sanjeevani improves disease control, reduces catastrophic expenditure, shortens diagnostic delay or prevents avoidable referral. Economic analyses should include technology, workforce, maintenance, patient costs and the costs of additional downstream care.

Digital inclusion should be treated as a programme component. Assisted access points, multilingual design, disability-friendly interfaces, community digital support and alternatives to video are necessary. No patient should lose access to care because of inability to use an application.

Finally, artificial-intelligence tools should undergo prospective clinical validation, subgroup analysis, transparent performance reporting and continuous safety monitoring. Accountability must remain with qualified professionals and health-system governance structures.

CONCLUSION

Telemedicine has become an enduring component of modern health care, but its value lies in appropriate integration rather than technological expansion alone. Evidence suggests that remote care can produce

outcomes broadly comparable to in-person care for selected conditions, while improving convenience and reducing travel. The overall evidence remains heterogeneous, and virtual consultation may compromise examination, investigations and continuity when used indiscriminately.

e-Sanjeevani represents a major public-sector achievement in digital health. Its exceptional scale demonstrates that a national telemedicine platform can be implemented across diverse health systems and geographies. The assisted hub-and-spoke model is especially relevant because it combines local clinical contact with remote expertise.

The programme's future success should not be judged primarily by the number of consultations. More meaningful questions are whether patients receive correct, timely and continuous care; whether referrals and investigations are completed; whether disadvantaged populations benefit; and whether avoidable illness, expenditure and travel are reduced.

A hybrid, primary-care-led system offers the most appropriate path forward. Telemedicine should extend the reach of health professionals, strengthen peripheral facilities and support continuity, while preserving timely access to examination and treatment in person. Used in this way, e-Sanjeevani can contribute substantially to universal health coverage without allowing digital access to become a substitute for a strong and accountable health system.

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