Reimagining India's National Telemedicine Service to improve access to care

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Summary

India's free-to-use National Telemedicine Service, eSanjeevani, has provided over 276 million consultations and shown promise to reduce systemic inequalities in access to care. However, recent reports of dropping footfall have raised questions about the potential of eSanjeevani to bridge service provision gaps in India. We reveal important problems linked to the design and practice of triage and tele-referral nationally within eSanjeevani, corroborated by the experience of one of the co-authors' practice of Obstetrics and Gynaecology on the platform since 2022. Some of these factors include sub-optimal integration of general practitioners within the tele-referral pathway; inadequate training of health-workers leading to inappropriate and ineffective consultations; outdated or absent technological support; the absence of mechanisms for re-referrals; and lack of feedback loops. We propose measures to re-imagine eSanjeevani to become a more effective tool towards improving public health outcomes and achieving universal health coverage in India.

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Introduction

India, like most countries in the WHO South-east Asia region, experiences low government health spending, poor doctor-to-population ratios, inadequate physical infrastructure, and restricted access to healthcare for large sections of the population.[1] Key bottlenecks in service delivery (particularly in rural areas) include inadequate capacities in Primary Health Centres (PHCs) and Health Sub-Centres (HSCs); high burden on district hospitals and tertiary care facilities due to non-availability of services at the primary level; lack of health record creation; poor continuity of care; and challenges with prescribing and dispensing drugs locally.[2]

The COVID-19 pandemic and ensuing lockdowns resulted in significant task-shifting in healthcare provision, with in-person visits decreasing to 32% and online consultations increasing by 300%.[3] This trend revealed the potential of telehealth in bridging service provision gaps,[4] particularly in the context of growing internet connectivity with over 0·75 billion active internet users (as of January 2024) and some of the lowest data costs worldwide.[5]

Globally, telemedicine has shown promise to be equivalent to or more clinically effective than conventional care in some settings.[6–9] Although telemedicine use in India has been limited and sporadic, several recent policy and infrastructural measures have prepared a suitable landscape to scale its use.[4,10] These include the publication of the Telemedicine Practice Guidelines in March 2020, the launch of the Ayushman Bharat Digital Mission (ABDM) in 2021 to provide digital health infrastructure, and the accelerated nationwide rollout of eSanjeevani—India's national, free-to-use telemedicine service.

Based on a Hub-and-Spoke model, eSanjeevani is supported by over 154,000 Ayushman Bharat—Health and Wellness Centres (AB–HWCs).[11] AB–HWCs

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(Spokes) are PHCs and HSCs upgraded and equipped with requisite IT infrastructure. PHCs are meant to be headed by generalist registered medical practitioners (RMPs)—commonly known as general practitioners (GPs) and referred to as medical officers (MOs) in eSanjeevani.[2] HSCs are headed by community health officers (CHOs) and mid-level health practitioners (MLHPs) who lead a team of Accredited Social Health Activists (ASHAs) and multi-purpose workers (henceforth, collectively called 'health-workers').[12] 'Hubs' (select state, district, or sub-district hospitals equipped with telemedicine infrastructure) are staffed by GPs and (sub)specialist physicians employed in different government hospitals who attend telemedicine sessions according to institutionally prepared and centrally coordinated monthly duty rosters.

AB–HWCs serve as the first point of contact between eSanjeevani and patients. GPs or health-workers provide an initial consultation, and if further expertise is deemed necessary, the patient is placed on a free tele-consult via a web-based video or audio call to a Hub clinician to facilitate a real-time referral-to-prescription loop.[4] Written requests for advice can be made in case of audio/video disruptions. During the pandemic, a parallel self-referral pathway, Ayushman Bharat—Out-Patient Department (AB–OPD), was launched to enable patients with internet access to consult specialists directly from their homes (although this pathway is not covered here).

In purely statistical terms, eSanjeevani seems to be a resounding success, having provided over 276 million consultations so far, with almost 300,000 consultations daily.[13] However, vast sections of India's population still lack access to care, meaning that these numbers represent only the tip of the iceberg relative to the denominator of need in India. Moreover, sharp reductions have been reported in eSanjeevani usage numbers since the initial surge during the COVID-19 pandemic, with reports of some administrative authorities creating daily 'referral targets' for health-workers at the Spokes.[14] Given precedents with target-driven healthcare delivery,[15] we speculate that this could result in hurried and possibly sub-optimal referrals (as experienced by one of the co-authors and elaborated in the next section).

Recent reports have also identified several technical and user experience-based challenges and suggested widespread improvements are needed for the sustained development of telemedicine in India.[16,17] Indeed, we have not been able to identify any rigorous value-based evaluation of eSanjeevani's performance in terms of its impact on health outcomes and patient experiences beyond simply counting number of consultations completed. Furthermore, these issues pose essential questions on variation and inequalities with how eSanjeevani might be used within/between different states and population subgroups in India.

In this viewpoint, we discuss measures to reimagine India's National Telemedicine Service through a learning health systems lens that would use better technology and feedback loops to optimise current triage and tele-referral practises, optimally leverage available resources through better training and deployment, and re-design the flow of the tele-referral pathway from the health-worker at the AB–HWC to the (sub)specialist at the Hub. This article is based on insights from the use of telemedicine at the international and India-based levels as well as the first-hand experience of one of the co-authors who has been serving as an obstetrician, gynaecologist, and reproductive medicine specialist at an eSanjeevani Hub since May 2022.

To treat or not to treat?—sub-optimal outcomes resulting from faulty triage and tele-referral

The benefits of good triage and appropriate referral include reduced wait times, optimal resource utilisation, improved patient outcomes, cost reduction, and improved doctor and patient experience. This is particularly true in resource-poor settings with low doctor-to-population ratios, where consultation time is a significantly limited, valuable, and often expensive resource.[18] The same findings hold for tele-triage,[19] which has been found to help clinicians make faster and more informed decisions, reduce avoidable care, improve communication with patients and within care teams, and reduce administrative burdens.[20] Furthermore, the use of tele-triage to evaluate if specialist care is needed has been shown to cut costs by reducing the number of hospital visits[21] and unnecessary specialist outpatient appointments.[22]

Effective tele-triage requires well-designed training in evidence-based protocols.[23] A tele-provider performing triage without a standard operating protocol (SOP) or not being trained in using one can lead to significant practice variation and limit service effectiveness.[24] Poor referral systems that lack feedback loops, typically to the person originating the referral, have been a major problem reported in resource-poor settings.[25] This was highlighted as early as 2013 in India for the State Telemedicine Project implemented in Karnataka, where it was noted that the service was predominantly underutilised due to impediments such as lack of adequate training, inherent limitations in technology, and improper use of human resources.[26]

Analysis of data from over 60 million eSanjeevani consultations revealed numerous problems, such as a lack of screening tools, incorrect OPD recommendations, limited application of standard treatment protocols, inaccurate and unstandardised recording of patient symptoms and use of free-text fields in referrals.[27] Another study reported high prevalence of referrals to wrong specialities and/or accompanied by inadequate details.[28] A recent analysis of eSanjeevani use in Jharkhand[29] pointed out that despite being a useful, affordable, and accessible service, there

remained numerous challenges to its widespread adoption. These included over-referrals, lack of community demand, inadequately skilled telemedicine staff, and inadequate digital infrastructure in rural settings.[29]

To date, the authors found no publicly-available SOPs that describe the training provided to eSanjeevani workers, although the eSanjeevani guidance[2] and Telemedicine Practice Guidelines 2020[30] mention a requirement for training programmes for health-workers. Furthermore, we found no governance mechanism to ensure training completion or competency certification before operating the system.

Experiences from the front line—a Hub specialist on the receiving end

These national and state-level findings are corroborated by the lead author's personal frontline experience. Analysing his tele-referral patterns from 01/05/2023 to 31/10/2023, 65·6% of all consultation requests were unrelated to his speciality (including 21·6% of calls on behalf of male patients). Moreover, over 90% of consultation requests were written requests, which do not allow the doctor to make the little examination a telemedicine platform allows. Of these, 13·5% of requests comprised only a few words of text, such as *"pain"* or *"contraception"* (verbatim), from which it is challenging to reach any diagnosis and almost impossible to safely prescribe medications or provide other advice, bearing in mind the medico-legal and ethical obligations of safe medical practice.[30] During this period, only 20·9% of consultation requests were speciality appropriate *and* accompanied by audio-visual support/adequate written details.

To check whether these patterns persisted, we analysed his most recent teleconsultations during May 2024. Out of 100 referred patients, 58 requests received were inappropriate for his speciality (including 21 men), including complaints such as *"toothache"* and *"knee pain"* (verbatim). All of these were written requests, out of which the specialist returned 55 patients to the Spoke by selecting the *"Wrongly addressed call—this case is not related to my specialisation"* option (which generates a blank prescription that provides no benefit to the patient) and referred three patients for in-person care where need for emergency intervention could not be ruled out. Of the 42 requests which were speciality appropriate, 22 comprised just a few words of text. Of these, in 11 cases, the consultant was compelled to generate a blank prescription by choosing the *'Inadequate case details'* option and asking the health-worker to call back with more information or an audio-visual call, effectively rendering the consultation useless. Whenever a possible emergency condition could not be ruled out (11 cases), the patient was referred for an in-person visit.

In summary, out of 100 referrals, only 20 were speciality-appropriate referrals of female patients accompanied by audio-visual calls or the bare minimum required written case details, resulting in useful and medico-legally safe prescriptions.[30] The opportunity cost of the time spent consulting on such 'low-benefit' telemedicine sessions deserves consideration in light of the fact that although not separately remunerated for these duties, (sub)specialists would otherwise be spending this time doing in-person consultations or surgeries. To lend perspective, the present wait time for a non-emergency/elective surgery in the author's Ob-Gyn unit is at least 3 months from the first OPD visit.

Ineffective consultations are also detrimental to the morale of the highly trained (sub)specialists who spend time away from in-person consultations and surgeries. Equally, patients gain no benefit for their troubles of visiting an AB–HWC and become disillusioned about the usefulness of telemedicine.

Improved training and technology for more effective triage and specialist referral

Developing a skilled workforce through suitable training has been recommended for the long-term sustainability of telemedicine globally and is undoubtedly needed in India.[17,25,31] Speciality-specific set formats for recording mandatory information under different headings should be developed for use by health-workers before recording medical histories using free text. Robust SOPs covering effective triage and referral strategies must be developed with training provided to health-workers at Spokes, designed with inputs from experienced GPs, public health practitioners, and (sub)specialists from different branches of medicine. These should mandate video/audio consultations in the patient's presence or provide detailed histories when written requests are unavoidable. Referrals should be accompanied by past medical records, results of investigations/imaging, and past prescriptions if they are to result in meaningful advice and ensure continuity of care. Regular audit-and-certification cycles should also be implemented to help optimise outcomes and create feedback loops to promote continuous improvement.

To optimise triage and referral, we further propose developing and integrating a technological upgrade in the form of an algorithmic/AI-based tool within eSanjeevani to help the health-worker select an appropriate (sub)specialist matched to a patient's complaints. Furthermore, since eSanjeevani operates only in English, some health-workers may experience a language barrier to writing appropriate medical histories, as seen in other resource-poor settings.[25] We propose the provision of a technological solution enabling health-workers to type or verbally record histories in vernacular languages, which can be translated/transcribed to English by software and/or AI-driven tools (e.g., ChatGPT or India's AI-led language translation

platform: BHASHINI—"BHASHa INterface for India" initiative[32]) before being sent to the Hub-based GP or (sub)specialist.[17,33] This may help provide more detailed medical histories, facilitating genuinely helpful consultations.

An essential missing link: proposing a 'general' solution

Strategic use of GPs to coordinate and connect delivery of healthcare services is effective in reducing systemic health inequalities.[34] Official records for eSanjeevani indicate that ~230,000 medical (sub)specialists have served on it,[35] but information regarding the number of GPs actively working within this referral chain is unavailable. From the lead author's experience, *all* consultation requests made to him since May 2022 were placed by health-workers. Many of these pertained to relatively simple complaints that should have been addressed by a qualified GP.

Integrating GPs into the referral flow within the eSanjeevani would allow better utilisation of resources at both ends of the referral chain, whether in-person or online, and benefit patients seeking online consultation slots with specialists for genuine and appropriate reasons in addition to saving significant financial resources and time of patients and (sub)specialist consultants. For example, a patient seeking advice for infertility from a specialist could be referred to a (sub)specialist by the health-worker, whereas a pregnant patient seeking advice about a nutritious diet could be referred to a GP.

A recent article reported the consequences of this costly oversight,[14] where patients could not avail of online specialist appointments as the relevant specialist consultants were busy managing overflowing in-person patient queues. For a country with one of the world's poorest doctor-to-population ratios, this is an expensive mistake, given that specialist consultants divide their duty hours between in-person and telemedicine responsibilities. The cost of this is ultimately borne by patients, both in-person and waiting at an AB–HWC for a (tele)consultation.

Optimising eSanjeevani's tele-referral pathway

To fully leverage eSanjeevani's potential to improve patient outcomes, optimise resource utilisation, and reduce inequalities in care delivery, we propose that the tele-referral pathway be redesigned to be more fit-for-purpose. This could be achieved by including the following within eSanjeevani design—effective integration of GPs, SOP-guided clinical pathways for triage and re-referral, algorithmic and/or AI-based triage support tools, and feedback loops (Fig. 1b).

Currently, once a consultation request is received, consultants can either prescribe appropriate treatment or generate a blank prescription to refer the patient back to the AB–HWC. Consequently, the consultation ends as a single-step, isolated event, and a consultant cannot track the patient's past treatment progression on the portal (Fig. 1a). Moreover, consultants do not have access to patients' past medical records, although eSanjeevani patient data is meant to be integrated with *MyHealthRecord* to enable lifetime archival of health records in a patient's personal health record (PHR) profile, in compliance with electronic health record (EHR) guidelines.[36]

We propose that once a patient is returned to the health-worker at the AB–HWC by a consultant citing inappropriate referral, providing a mechanism for immediate re-referral to the correct speciality as part of the same appointment/ID would ensure a better patient experience. For example, if a patient is referred by a health-worker to a gynaecologist for knee pain, there ought to be a mechanism for the specialist to immediately recommend re-referral of the patient to an orthopaedician or rheumatologist in the same sitting. Moreover, allowing consultants to provide feedback-on-record to the AB–HWC would also ensure continuous training of health-workers and better audit-and-review cycles, leading to an evolving and learning telehealth system. Finally, we propose that the EHR in current use be revamped and integrated with the platform and made available to doctors during consultations so that they may access a patient's past treatment record (bloodwork, imaging, prescriptions, etc.) to ensure continuity of care. The authors acknowledge that EHR integration is not something that can be immediately achieved, and in the interim, a *'Telehealth Maturity Index' (TMI)*, similar in principle to the *Healthcare Information and Management Systems Society (HIMSS)* levels,[36] could be created. The proposed TMI would help highlight the strengths and weaknesses linked to essential factors (e.g., training, presence and adherence to SOPs, technical infrastructure, etc.) necessary for optimal telehealth delivery in India.

Looking ahead

Several policy and regulatory challenges have impeded the widespread adoption of telemedicine as a tool to strengthen public health systems in India[37] and other South-east Asian countries.[7,17] We feel that building on the design as recommended above provides a roadmap that would help optimise eSanjeevani's design and use.

Future work should survey health-workers, GPs, (sub)specialists, and patients using eSanjeevani to reveal factors that influence its optimal use. Insights thus gained can directly inform the design and implementation of eSanjeevani, its SOPs, and its training curriculum, including effective triage and referral. Effective governance mechanisms must also be established to ensure that key eSanjeevani staff have been adequately trained, including updation when necessary.

To support eSanjeevani's transformation into a learning telehealthcare system, dynamic and transparent data collection, processing, and analysis must be

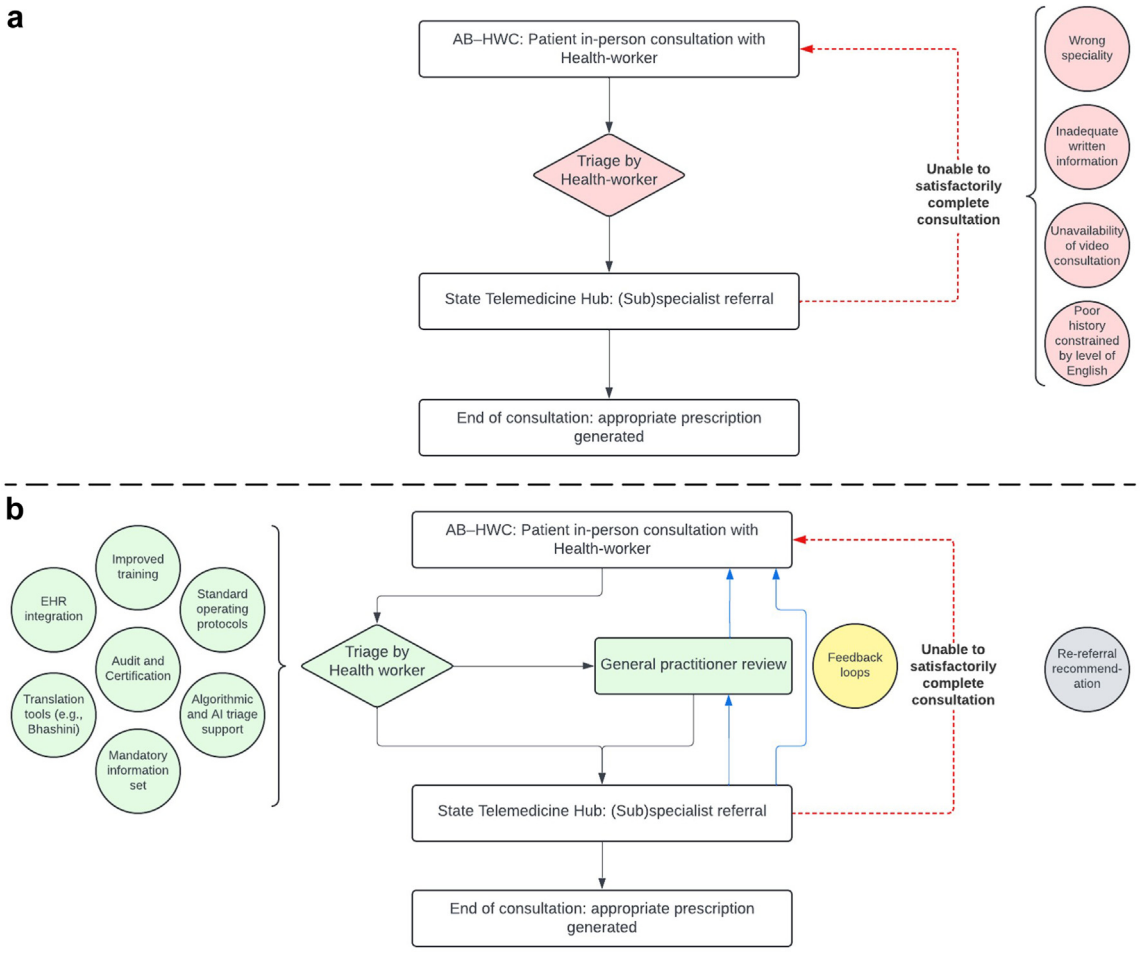

Fig. 1: (a) **Current referral pathway between eSanjeevani AB–HWC and Hub versus (b) Proposed referral pathway; Note: (a) Current**: Health-worker provides initial consultation to a patient at an AB–HWC, performs a triage and refers the patient to any available (sub)specialist at a State Telemedicine Hub resulting in either a successful consultation (leading to a useful prescription) or an unsatisfactory consultation **(red dotted pathway)** which results in the patient being returned to the health-worker at the AB–HWC due to any of the potential reasons **(listed in pink bubbles)**. The consultation ends here, as an isolated step. **(b) Proposed**: Health-worker provides initial consultation to patient at an AB–HWC and performs triage to refer the patient to a (sub)specialist at a State Telemedicine Hub or for a General practitioner review, eventually resulting in a successful consultation leading to a useful prescription; our proposed measures **(in green bubbles)** aid the health-worker in direct and indirect ways to optimise the triage and referral process; in case the Hub (sub)specialist still feels the patient would be best seen by a (sub) specialist of a different speciality, they are able to immediately recommend such a re-referral to the health-worker **(red dotted pathway/grey bubble)**; the Hub (sub)specialist and General practitioner are also able to provide feedback-on-record to the health-worker at the AB–HWC for continued learning and improvement **(Feedback loops depicted in Blue arrows/yellow bubble).**

integrated into eSanjeevani's official dashboard.[2] This would facilitate identifying and addressing unmet needs, variations in practises and adoption within/between India's States, and benchmarking the service with international best practices. This would also facilitate transparent and effective program evaluation beyond merely counting referral numbers as metrics of success.

Lastly, rigorous studies quantifying the persisting lack of access to care at national and sub-national levels and corresponding cost-effectiveness analyses of bridging those gaps, whether by in-person or telemedicine-led care, are required to fully elucidate the potential of telemedicine in universal health coverage (UHC) provision in India.

Improving eSanjeevani also has global implications, particularly due to its addition to IndiaStack[38] (a global digital public infrastructure platform) as part of India's G20 Presidency[39] in 2023. Given this transformational scale and potential, a reimagined eSanjeevani could be a pioneering blueprint for delivering telemedicine-led UHC and strengthening primary healthcare systems in the WHO South-east Asia region and other parts of the world.

Contributors

B.G.D., A.J., S.S., and V.H.N. conceived the article and developed the outline. B.G.D. and V.H.N. prepared the first draft. All authors (B.G.D., A.J., S.S., and V.H.N.) reviewed the complete draft of the article, undertook subsequent revisions, and approved the final version for submission.

Declaration of interests

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