World Health Organization
Regional Office for South-East Asia

intelehealth

Telemedicine In Action: Transforming healthcare in LMICs

About the Webinar Series

Intelehealth is proud to collaborate with the WHO SEARO office to drive the future of telemedicine and transform healthcare equity in low- and middle-income countries. Together, we are launching a groundbreaking webinar series that will empower governments with the knowledge and tools needed to build sustainable, standards-compliant telemedicine programs.

Total Webinars: 13, will take place online on **Zoom**

Goal: By the end of the series, health system leaders will learn to integrate telemedicine into public health systems. We will also develop videos and literature to be published after each webinar or at the series' conclusion.

Target Audience:
Healthcare policymakers, healthcare professionals, public health leaders, digital health enthusiasts, and decision-makers in the South East Asia region and Globally.

- Ministry personnel
- Private sector organizations - NGOs & Hospitals
- Healthcare professionals - nurses, midwives, community health workers, doctors, pharmacists
- Donors & aid agencies

Webinar Agenda

S.No	Time	Details	Speaker/Moderator
1	02.00 PM- 02.05 PM	Introductory Remarks	Dr. Neha Verma
2	02.05 PM- 02.20 PM	Why evaluate Telemedicine?	Dr. Neha Verma
3	02.20 PM- 02.35 PM	Evidence on Evaluating telemedicine interventions: Evidence so far, and Methodologies	Dr. Diwakar Mohan
4	02.35 PM- 02.50 PM	Evidence on Evaluating telemedicine interventions: Evidence so far, and Methodologies	Dr. Saif Khairat
5	02.50 PM- 03.00 PM	Wrap Up	Dr. Neha Verma
6	03.00 PM- 03.25PM	Q&A	Dr. Neha Verma
7	03.25PM – 03.30PM	Closing Remarks	Dr. Neha Verma

Webinar Faculty

Dr. Saif Khairat is the Beerstecher-Blackwell Distinguished Professor at UNC-Chapel Hill, and the principal investigator of the NIH-funded Center for Virtual Care Value and Equity (ViVE). Dr. Khairat is an expert in digital health who has authored over 100 publications, secured $7.5M in funding, and is a digital health advisor to the WHO. He holds a PhD in Health Informatics and master's degrees in Computer Science and Public Health.

Dr. Saif Khairat

Neha is the Co-founder and CEO of Intelehealth, a telemedicine technology non-profit that delivers health services where there is no doctor. She is an entrepreneur and medical information engineer. She earned an MS in Applied Health Sciences and a PhD in Health Informatics from the Johns Hopkins University School of Medicine. Neha is also an active contributor for Women@Forbes, writing about women in tech, product development, organizational strategy, social impact and nonprofits.

Dr. Neha Verma

Dr. Diwakar Mohan is a public health physician and health systems epidemiologist working in LMIC settings since 2003. He completed his MPH and DrPH from the Department of International Health at the Johns Hopkins Bloomberg School of Public Health. As an expert in health systems epidemiology and evaluation methods.

Dr. Diwakar Mohan

Webinar Topics and Dates

Sno	Date	Topic
1	06 March 2025	What is Telemedicine and How Are Health Systems Using It Globally? A Primer for Health System Leaders
2	10 April, 2025	Brick-and-mortar to Brick-and-click - Designing & Implementing Quality, Effective, and Impactful Telemedicine Programs
3	08 May, 2025	Evaluating telemedicine interventions: Evidence so far, and Methodologies
4	5 June, 2025	Creating a Telemedicine-Ready Healthcare Workforce: Training for Healthcare Providers
5	10 July, 2025	Telemedicine Policy: How Telemedicine is Regulated in Asia
6	7 August, 2025	Choosing a Telemedicine Software: The case for standards-compliant, interoperable & open-source Digital Public Goods (DPGs)
7	11 September, 2025	Ensuring Quality of Care & Patient safety in Telemedicine
8	9 October, 2025	Telemedicine Adoption by Communities – How Might We Drive Uptake of Telemedicine (TM) by Citizens?
9	6 November, 2025	Artificial Intelligence and Machine Learning in Telemedicine
10	4 December, 2025	Financing Telemedicine and ROI – The Business Case for Telemedicine
11	8 January, 2026	Telemedicine use cases to advance the SDGs - Part 1 Applications for Non-Communicable Diseases (Diabetes, Hypertension, Cardiovascular disease, Cancer and Mental Health)
12	5 February, 2026	Telemedicine uses to advance the SDGs - Part 2 Applications for Communicable Diseases (Tuberculosis, HIV)
13	12 March, 2026	Telemedicine use cases to advance the SDGs - Part 3 Applications for Primary Healthcare

Evaluating telemedicine interventions: Evidence so far, and Methodologies

Objectives and Outcomes

Objectives:

This webinar aims to provide participants with a foundational understanding of how telemedicine interventions have been evaluated in low- and middle-income countries. It will offer insights into the global and regional evidence base on the effectiveness of telemedicine, introduce participants to key evaluation frameworks and methodologies suited for digital health interventions, and share real-world experiences from implementation settings. By equipping participants with practical tools and approaches, the session seeks to support more rigorous, context-appropriate evaluations that can inform decision-making, scale-up, and sustainability of telemedicine programs.

Expected Outcomes:

By the end of the session, participants will:

- Be familiar with the current evidence base on telemedicine effectiveness in LMICs
- Understand key evaluation frameworks relevant to digital health and telemedicine
- Be informed about context-appropriate study designs and methodologies for evaluation
- Recognize common challenges in evaluation and strategies to overcome them
- Access tools and resources to support ongoing and future evaluation efforts

Case Study I

Evaluating Telemedicine Interventions

Evidence so far and

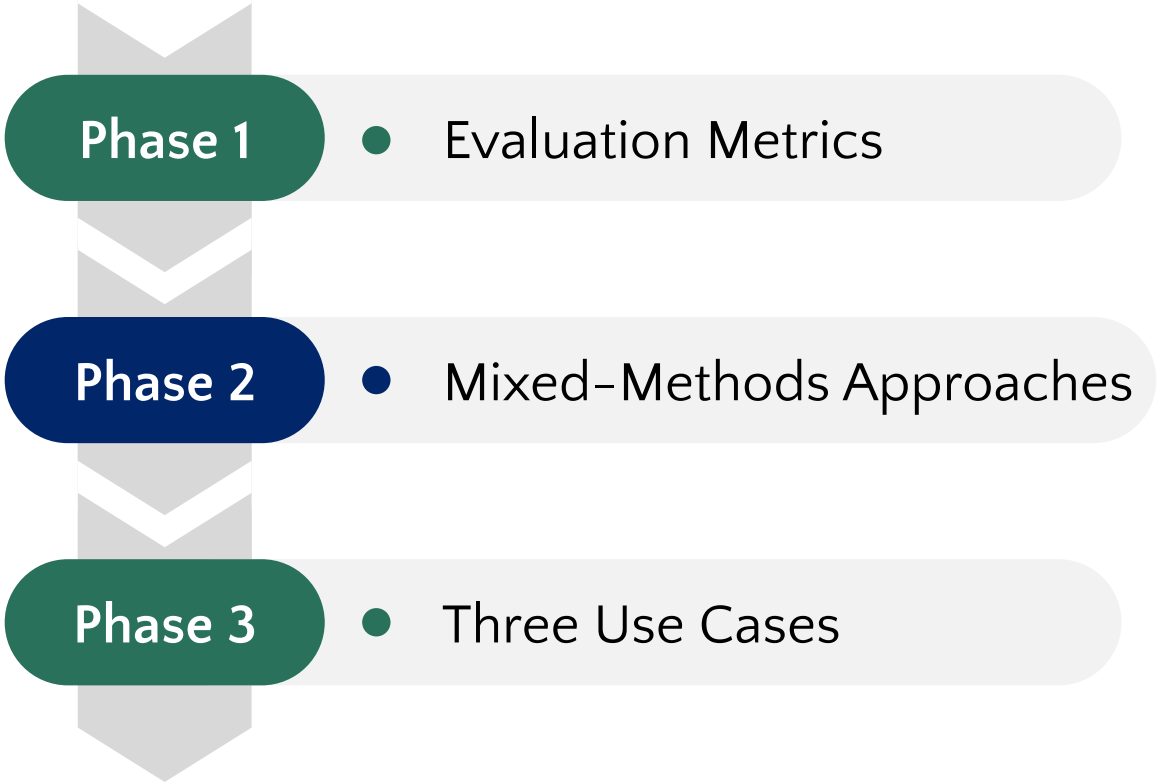
Methodologies

Saif Khairat, PhD, MPH

University of North Carolina at Chapel Hill

Center for Virtual Care Value and Excellence (ViVE)

Presentation Overview



Evaluation Metrics in Telemedicine

Objective

Based on facts, unbiased.

Subjective

Influenced by personal feelings or opinions.

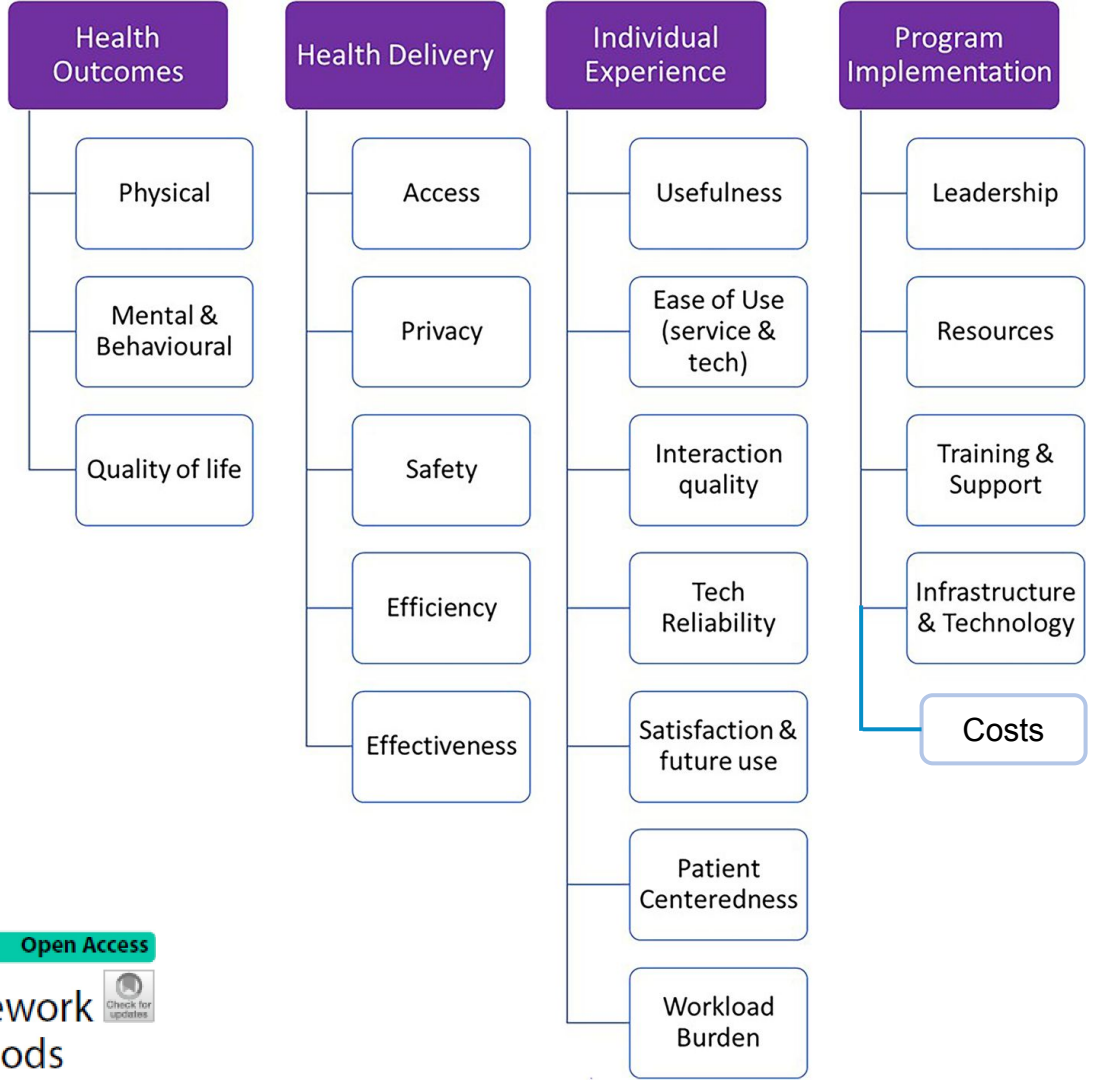
Quantitative

Relating to numbers and measurable data.

Qualitative

Relating to descriptions and characteristics.

Evaluation Framework



RESEARCH ARTICLE Open Access

A pediatric virtual care evaluation framework and its evolution using consensus methods

Example evaluation questions	Potential measures	Data sources	Collection strategy	Basis of comparison
Health Outcomes				
Physical health outcomes (*i.e., measures of physiological function, signs and symptoms, laboratory relating to the function of major organ systems)*				
What is the impact of virtual care on individual clinical measures of health?	Diabetes patient's Hemoglobin A1C (e.g., value, % within target), BMI	Patient charts	Quantitative, surveys	Data registries, literature
Health Delivery				
Privacy				
To what extent do patients feel comfortable sharing openly with their provider during virtual visits?	Patient and provider perception	Patient/provider surveys	Post-visit questionnaire	Literature review, other virtual care programs (e.g., mental health), in-person surveys
Individual Experience (patient, caregiver, provider, support staff)				
Ease of use				
To what extent is the process for booking virtual care services easy to use?	% of participants who felt booking virtual care was easy to use	Post-encounter questionnaires/ patient/provider/ clerk experience surveys, support calls	Qualitative & quantitative	Satisfaction with in-person booking process
Program Implementation				
To what extent has cybersecurity been reviewed and considered?	# of access issues, adherence to cybersecurity standards, # of threats	Cyber-review by 3rd party	Quantitative	Applicable regional or national security guidance or directives
To what extent does the technology support virtual care service delivery?	% of planned/unplanned downtime	HelpDesk tickets/IT reports	Quantitative	Other similar programs

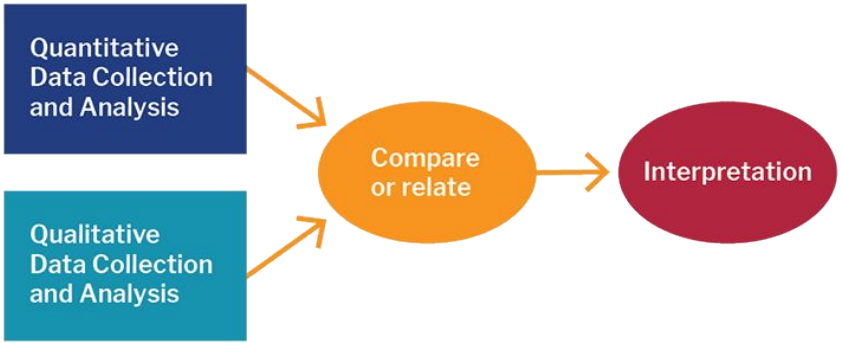
RESEARCH ARTICLE Open Access

A pediatric virtual care evaluation framework and its evolution using consensus methods

BASIC MIXED METHODS RESEARCH DESIGNS

Creswell, J. W. (2014). A concise introduction to mixed methods research.

Convergent Parallel Design



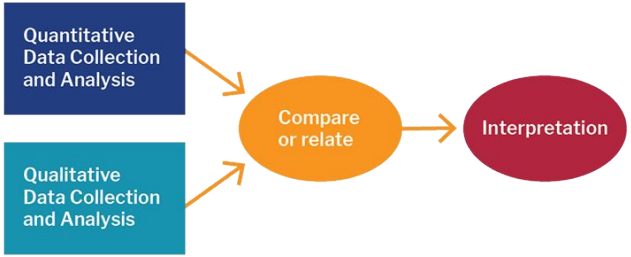
Discuss areas of convergence or divergence between the quantitative & qualitative results

Explanatory Sequential Design

Determine what quantitative results need further explanation

Exploratory Sequential Design

Use qualitative results to develop a new instrument or taxonomy for quantitative strand



Convergent Parallel Design

Time is limited

Simultaneous data collection saves time.

Equal importance

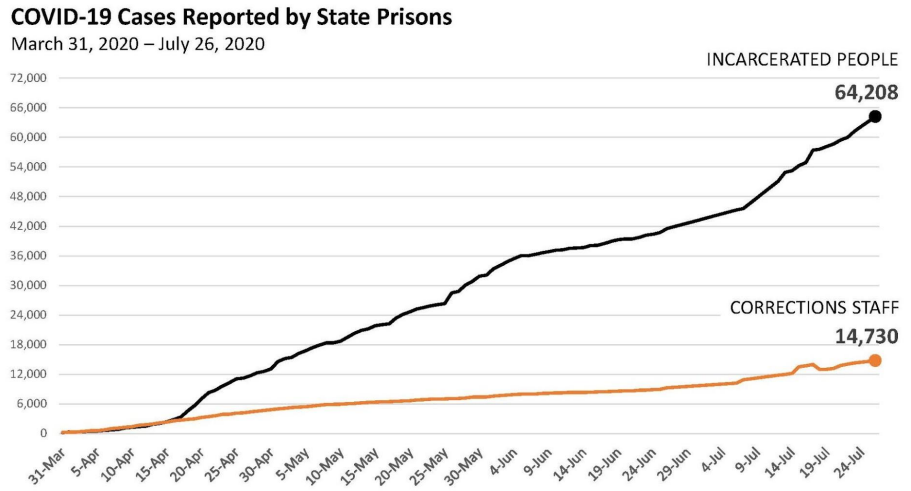
Quantitative and qualitative data are equally valuable for the study

Triangulation

Researchers aim to compare and contrast data for validation

Case Study 1

- **Time**: 2020-2022
- **Problem**: Exponential growth of COVID-19 virus in prison facilities
  - Providers unwilling to see patients at prison hospital
  - Difficulty transporting incarcerated individuals to medical center
- **Solution**: Use of telemedicine to provide timely care
- **Challenge**: Lack of evidence around the implementation of telemedicine in prison facilities



Evaluation

- Collect and analyze quantitative and qualitative data simultaneously:
  - Cost savings
  - Time savings
  - User experience
  - Adoption
  - Utilization of services

FINDINGS

User Experience:

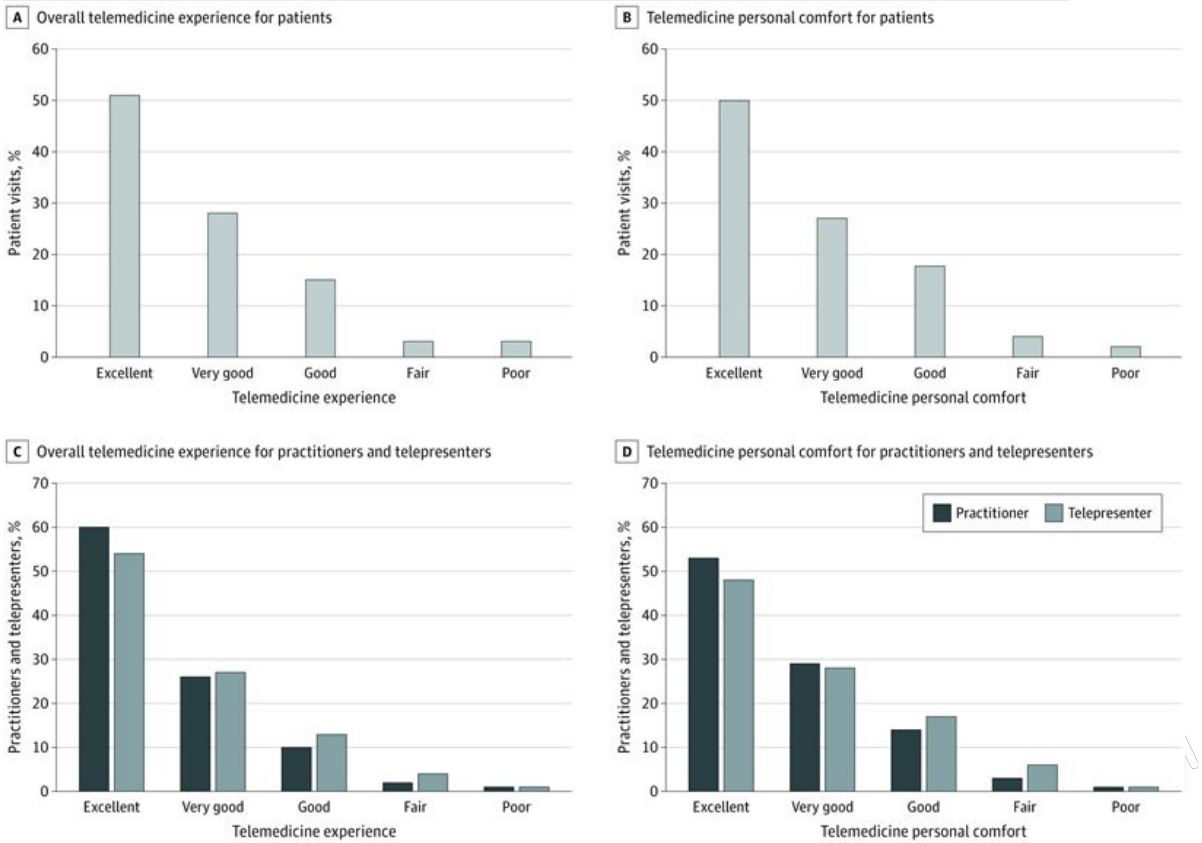
- Telemedicine was well received by patients, nursing staff, and practitioners.

JAMA Network Open

Research Letter | Health Informatics

Implementation and Evaluation of a Telemedicine Program for Specialty Care in North Carolina Correctional Facilities

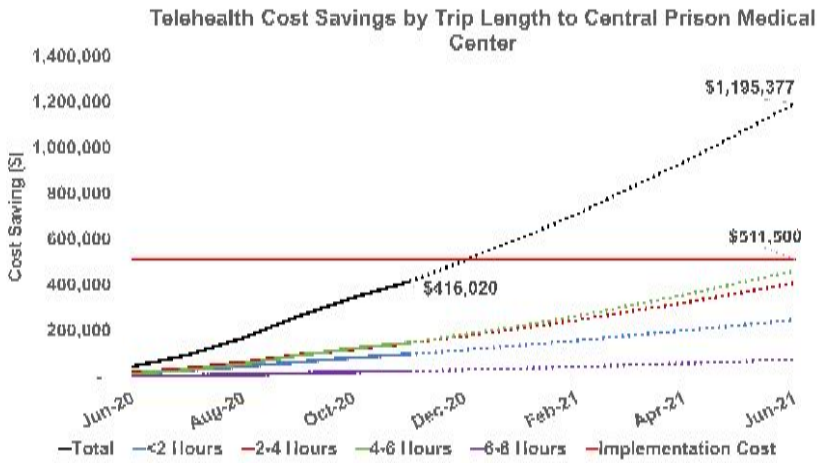
Saif Khairat, PhD, MPH; Aaron Bohlmann, PharmD, PSM; Erin Wallace, PSM; Adnan Lakdawala, MBBS, PSM; Barbara S. Edson, RN, MBA, MHA; Terri L. Catlett, PA, MHA; Spencer D. Dorn, MD, MPH, MHA

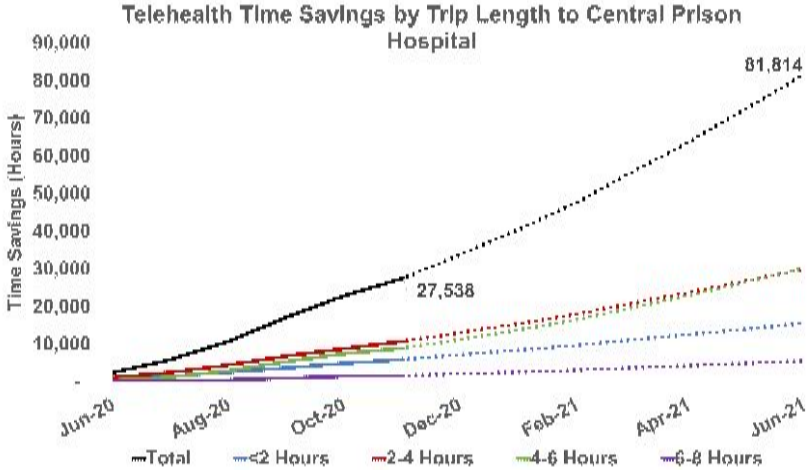


FINDINGS

Cost and Time

Significant Cost and Time savings





$413,000

In Cost Savings in six months

27,000 hours

saved in attending in-person appointments

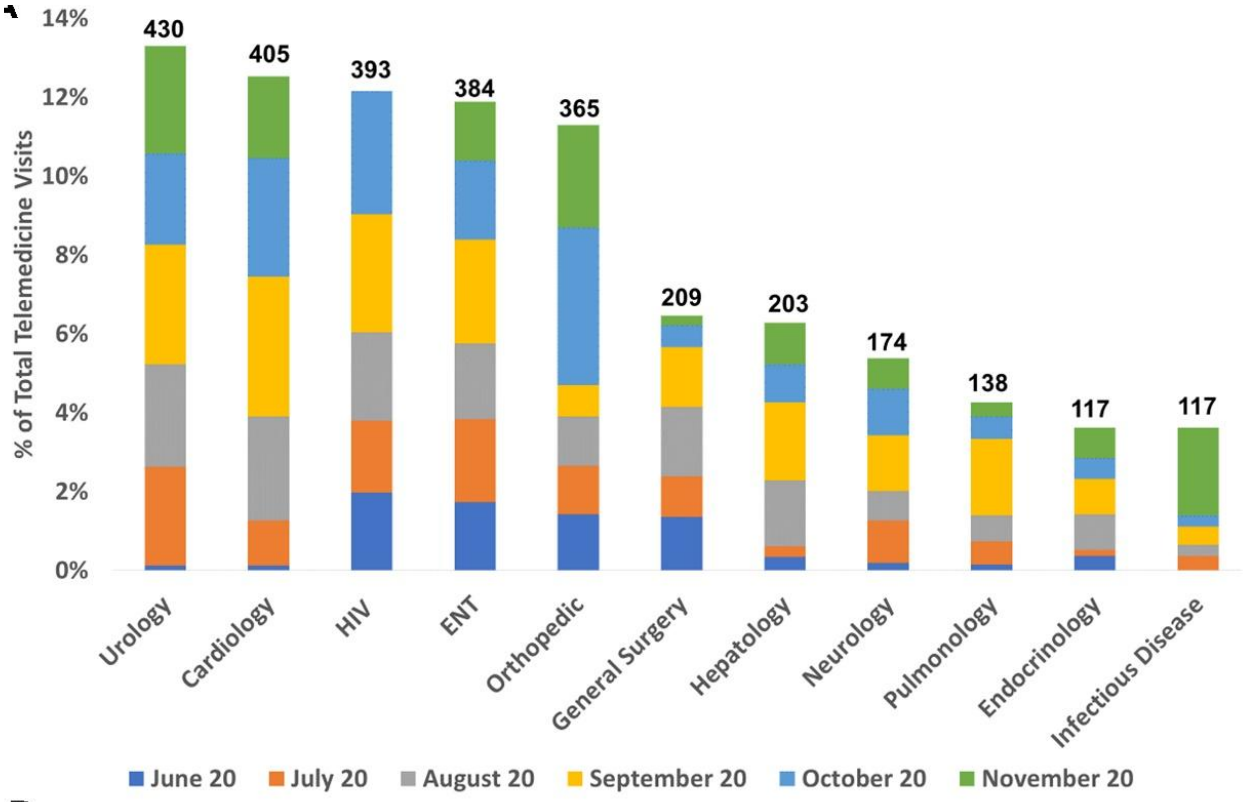
FINDINGS

Adoption – Patient and Provider Interviews

- “Ability to attend to several HIV+ patients and adjust their antiretroviral therapies” (Infectious diseases provider)
- “No COVID-19 risks. No transportation needed.” (Telepresenter)
- “I like the time saved by not having to be in a car or van for 2 hours” (56, male, patient)
- “Loud, broadcasting, no privacy. I will not be using telehealth again I did not like it.” (34, male, patient)

FINDINGS

From 17 Specialty types to > 30



Explanatory Sequential Design

Unexpected Results

Quantitative data reveals surprising or unclear results that need further exploration

Detailed Insights

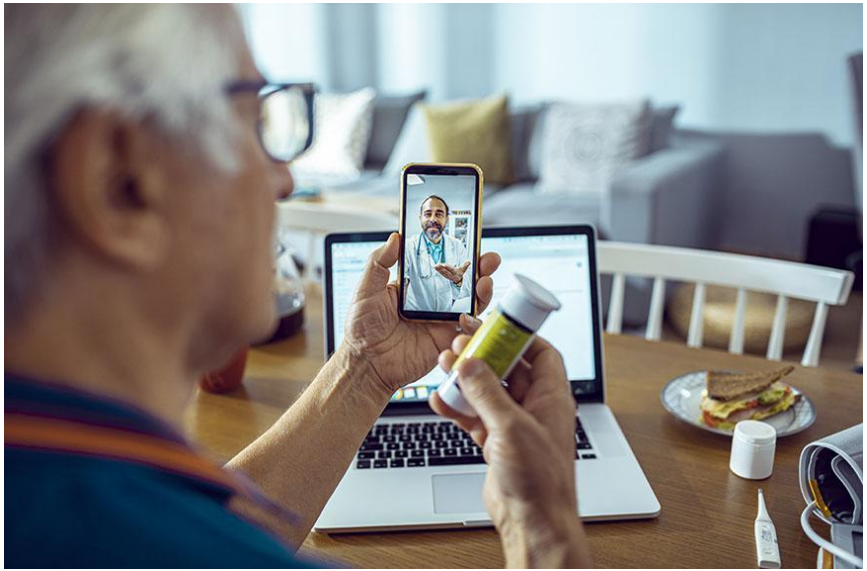
Need qualitative data to provide deeper understanding of quantitative trends

Purposeful Sampling

Quantitative results guide the selection of participants for the qualitative phase

Case Study 2

- **Time**: 2018-2023
- **Problem**: Need to offer virtual urgent care
  - Increasing patient demand
  - Crowded emergency departments
- **Solution**: On-demand telemedicine urgent care services
- **Challenge**: No evidence around utilization patterns, patient needs, perceptions

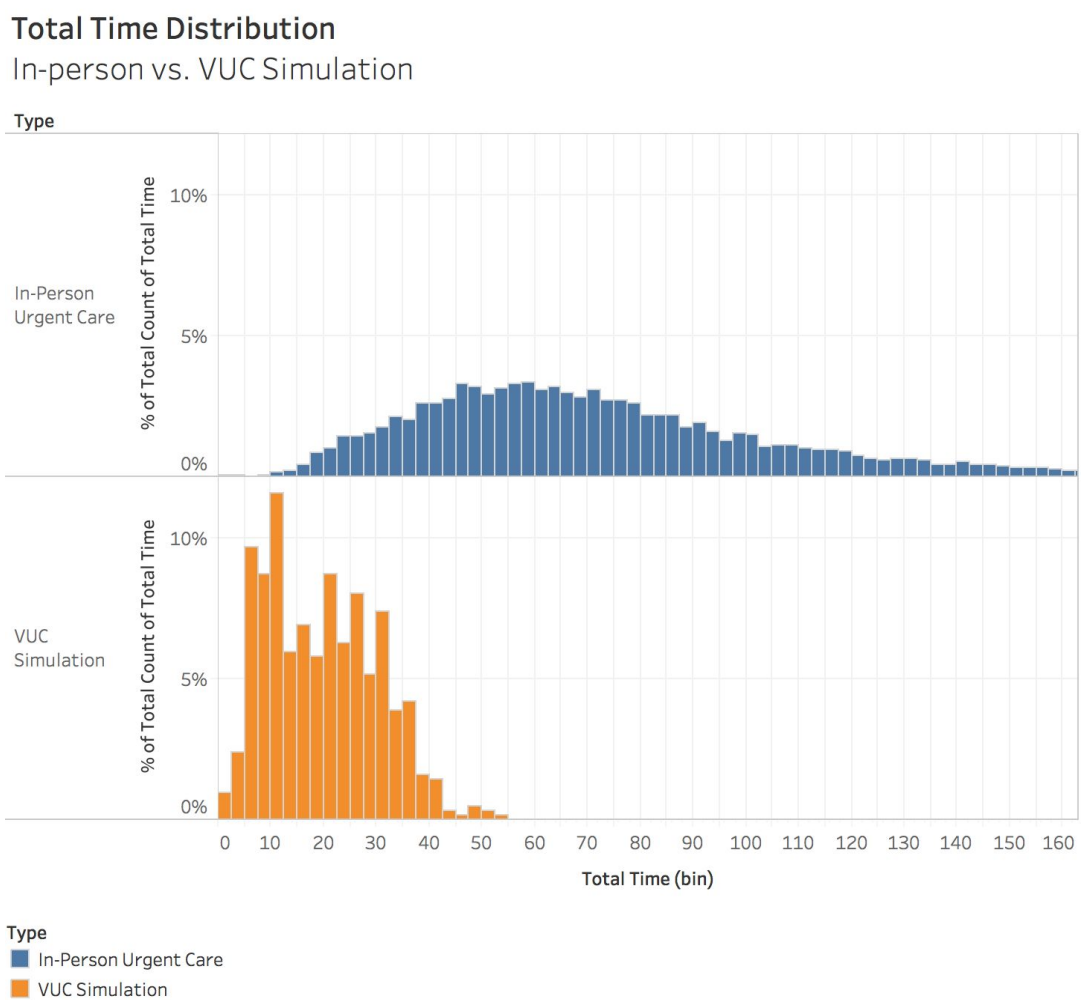


https://chghealthcare.com/blog/telehealth-physicians-virtual-care

Evaluation

- First- Assess the quantitative data:
  - Time
  - Utilization
- Second – Explain these using qualitative data:
  - User Experience
  - Perceptions

Time Savings

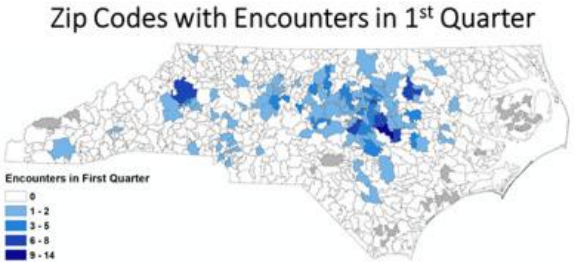


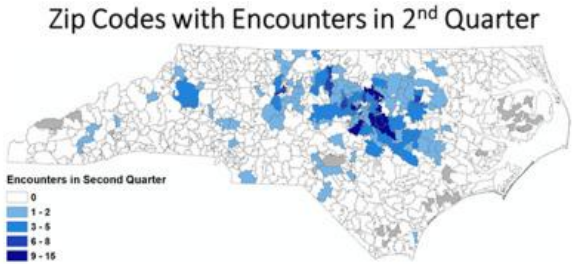
Evaluation of Patient Experience During Virtual and In-Person Urgent Care Visits: Time and Cost Analysis

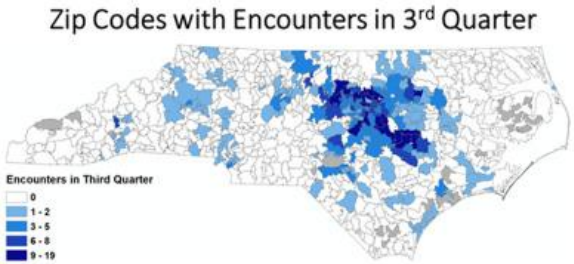
Journal of Patient Experience
Volume 8: 1-9

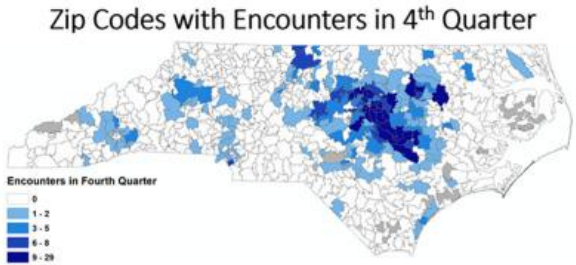
DOI: 10.1177/23743735209814 87
journals.sagepub.com/home/jpx
SAGE

Utilization overtime









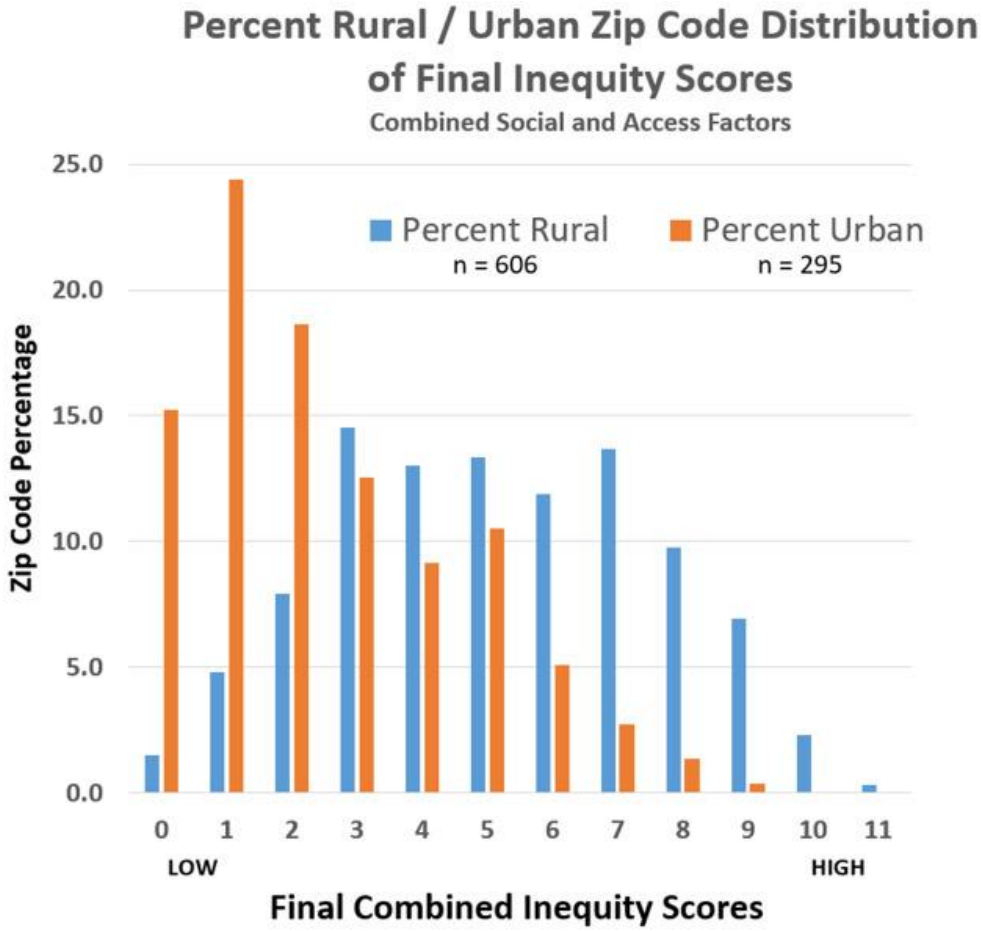
Journal of the American Medical Informatics Association, 26(8-9), 2019, 796–805
doi: 10.1093/jamia/ocz108
Advance Access Publication Date: 24 July 2019
Research and Applications

Research and Applications

Advancing health equity and access using telemedicine: a geospatial assessment

Saif Khairat,[1,4] Timothy Haithcoat,[2] Songzi Liu,[3] Tanzila Zaman,[4] Barbara Edson,[5] Robert Gianforcaro,[5] and Chi-Ren Shyu[2,6]

Digital Divide



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Explanatory Surveys

Overall Experience	Physician Experience	Patient Comments
Excellent	Excellent	"Fast, excellent service. Short wait time for call. Live in rural area and walk-in clnicis usually have 5-6 hour wait times." (Female, 32)
Excellent	Excellent	"My physicians office was closed and I needed a medical consult without having to leave the house. I did not want to risk exposure to Covid-19." (Female, 69)
Good	Good	"The physician I think appropriately treated my compliant, however I could not make eye contact and only saw the top of his forehead and the ceiling." (Female, 58)
Good	Fair	"Still have to go to another doctor for medication and to get tested for covid 19." (Female, 26)
Poor	Fair	"While I understand that wait times are long, it was over 5 hours. There was nowhere to check wait times, not to cancel the call. I asked the doctor if she was able to order covid19 testing." (Female, 47)
Poor	Poor	"Physician rushed me and did not provide clear guidance and direction." (Female, 40)

Evaluating the Telehealth Experience of Patients With COVID-19 Symptoms: Recommendations on Best Practices

Journal of Patient Experience
2020, Vol. 7(5) 665-672

DOI: 10.1177/2374373520952975
journals.sagepub.com/home/jpx
SAGE

Exploratory Sequential Design

Developing Instruments

Need to create and validate new measurement tools based on qualitative insights.

Theory Building

Initial qualitative data helps in forming hypotheses that are then tested quantitatively.

Unknown Variables

When the key variables or constructs are not well-defined

Case Study 3

- **Time**: 2023-2024
- **Problem**: Shortage of nurses
  - Increasing ED patient wait times
  - Low patient satisfaction
- **Solution**: Virtual Nursing (VN)
- **Challenge**: No evidence around evaluation of VN

Evaluation

- First- Build evaluation metrics:
  - Interviews
  - Observation
- Second – Test the evaluation metrics:
  - ED wait times
  - Interruptions
  - Documentation Completeness

COMPUTERS INFORMATICS NURSING
CIN

Needs Assessment of Virtual Nursing Implementation Using the Donabedian Framework

Saif Khairat, PhD, MPH, FAMIA, Jennifer Morelli, MPS, RN, Barbara S. Edson, RN, MBA, MHA, Julia Aucoin, DNS, RN, Cheryl B. Jones, PhD, RN, FAAN

- Examined the requirements for implementing VN
- Used an observational and qualitative evaluation of VN

Table 1. VN Structure, Process, and Contextual Factors

	Virtual Nursing Center	Inpatient Unit
Structure	Size (number of VNs) Equipment (eg, computers, headsets) Center physical layout Telehealth training EHR system Policies and procedures Support resources	Size (number of beds) Equipment (eg, computers, headsets) Ratio of RNs to patients Telehealth training Policies and procedures (eg, patient refusal, triage to VN, communication with VN)
Process	Communication with Staff nurse Use of EHR (chart review, documentation) Patient assignment to virtual nurse admission (eg, assessment, documentation, home medication review)	Communication with VN Staff nurse handoff VN to patient Engage and prepare patients for VN Post-VN session protocols
Contextual factors	Nurse demographic (eg, age, sex, ethnicity, education, experience) No. of admissions, patient demographics	Nurse demographic (eg, age, sex, ethnicity, education, experience) No. of admissions, patient demographics

Effect of Virtual Nursing Implementation on Emergency Department Efficiency and Quality of Care

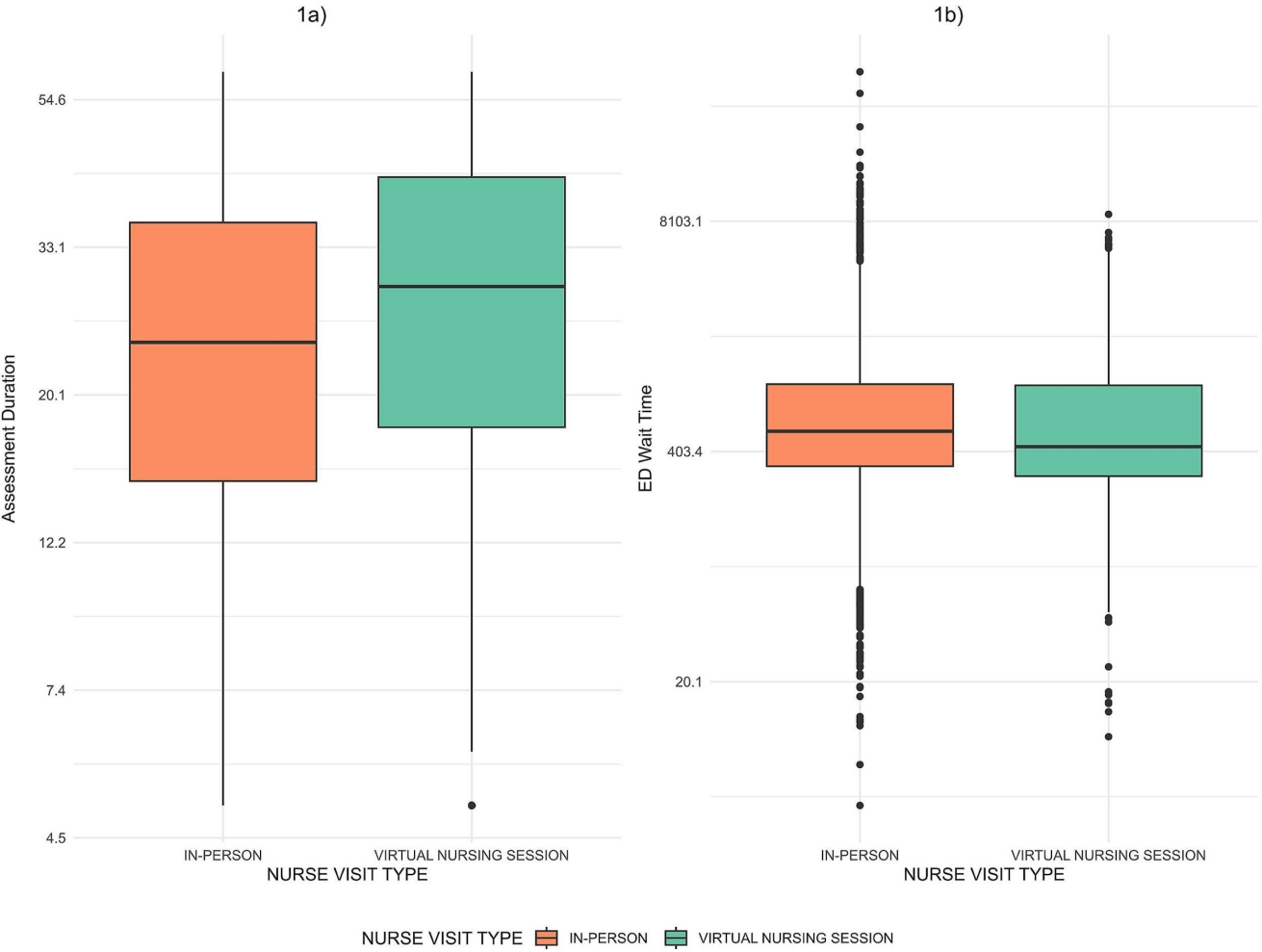
Saif Khairat [a,d,e,*], Jennifer Morelli [a], Qiyao Qin [b], Xiaoyu Wu [b], Randy Fakhreddin [b], Barbara S. Edson [c], Mauri Williams [c]

Setting: 6 hospitals, 3 control, 3 intervention
Adult patients seen in the ED and admitted

Outcomes of interest:

- Total ED wait time
- Admission assessment duration
- Documentation completion during admission assessment
- Number of interruptions during admission assessment

Group	Total Beds	Setting
Control Hospital A	121	Rural
Control Hospital B	137	Urban
Control Hospital C*	932	Urban
Intervention Hospital D	163	Rural
Intervention Hospital E	50	Urban
Intervention Hospital F	660	Urban

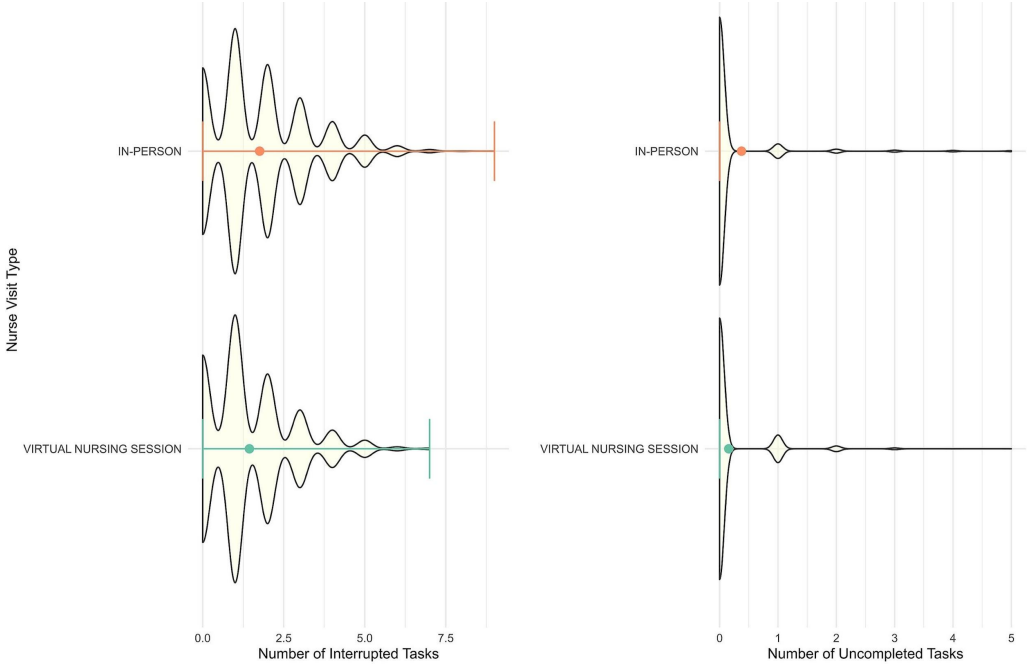


ED Triage to Transfer to Unit (Avg Wait Time)

In-Person: **526** minutes

VN: **430** minutes

96 mins (p-value < 0.001)



Interrupted Tasks
In-Person Avg.: **1.8** (SD: 1.5)
VN Avg.: **1.4** (SD: 1.3)

0.4 interruptions
(p-value < 0.001)

Uncompleted Documentation
In-Person Avg.: **0.4** (SD: 1.5)
VN Avg.: **0.2** (SD: 0.5)

0.2 uncompleted tasks
(p-value < 0.001)

Key Takeaways:

VN Admissions result in:

- *lower ED wait time,*
- *fewer interruptions*
- *Fewer uncompleted documentation*

Monitoring & Evaluation

Question:

What are key performance indicators?

Key Considerations:

1. Clinical Outcomes
2. Effectiveness
3. Efficiency and Cost
4. Cost
5. Satisfaction

Tools / Frameworks:

WHO/ Consolidated Telemedicine Implementation Guide

WHO Europe Telehealth Quality of Care Assessment Tool (TQoCAT)

National Quality Forum (NQF)

Thank You!

Contact:

Dr. Saif Khairat
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Speaker II

Assessing Telemedicine Programs

Operational Definitions

- **Telehealth** is the broader application of technologies to distance education and other applications wherein electronic communications and information technologies are used to support health-care services

- **Telemedicine** is the delivery of health-care services involving the exchange of medical information, diagnosis, treatment, and monitoring of patients who are not physically present with the healthcare provider.

Types of Telemedicine

- Telemedicine applications can be classified into four basic types, according to:
  - **Mode of communication** - Mobile App or Web portal via Audio, Video, Text, Email
  - **Timing of the information transmitted** - Synchronous (Real-time) or Asynchronous
  - **Purpose of the consultation** - diagnosis, follow-up, screening, advice, monitoring
  - **Interaction between the individuals involved**: Patient/Care giver to Provider, Provider to Provider (P2P).

Monitoring & Evaluation

Monitoring – Continuous process of tracking how well an intervention is being implemented

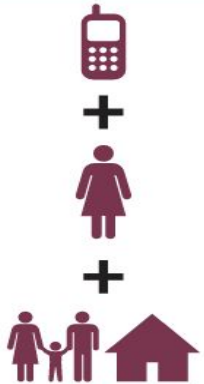
Evaluation – Systematic and objective assessment of an ongoing or completed intervention

Changes attributable to the digital health intervention.

Questions to consider when designing your evaluation

1. What are the priority evaluation questions?
2. What is the program's time frame and the time perspective for the evaluation?
3. How confident do you want to be that results can be attributed to the program?
4. Can a comparison group be defined?
5. How much money is available for the evaluation?

Stage of Maturity

Stage of maturity	1 & 2: Pre-prototype/ prototype	3: Pilot	4: Demonstration	5: Scale-up	6: Integration/ sustainability
					
Monitoring goals	Functionality, stability	Fidelity, quality			
Stages of evaluation	Feasibility/usability	Efficacy	Effectiveness	Implementation science	
Illustrative number of system users	10–100	100–1000	10 000+	100 000+	
Illustrative measurement targets	■ Stability (system uptime/failure rates) ■ Performance consistency ■ Standards adherence (terminology, interoperability, security)	■ User satisfaction ■ Workflow "fit" ■ Learning curve (design) ■ Cognitive performance/ errors ■ Reliability	■ Changes in process (time to X) ■ Changes in outcome (system performance/ health)	■ Changes in process/outcome in less controlled environment ■ Reduction of cost ■ Total cost of implementation ■ Error rates ■ Learning curve of users	■ Improvements in coverage ■ Changes in policy, practices attributable to system ■ Extendability to new use-cases ■ Adaptability to other cadres of users ■ Health impact

Identify your priority evaluation questions

Need to adapt these questions to reflect the program you are evaluating

Q1. Does the program focus on interventions that will have the greatest impact in the program context?

Q2. Is the program being implemented as planned, and at sufficient strength and quality to achieve expected impact?

Q3. Are services being utilized by the target population?

Q4. Do women and children who need interventions actually receive them? (coverage)

Q5. Is the expected impact of the program occurring? Why or why not?

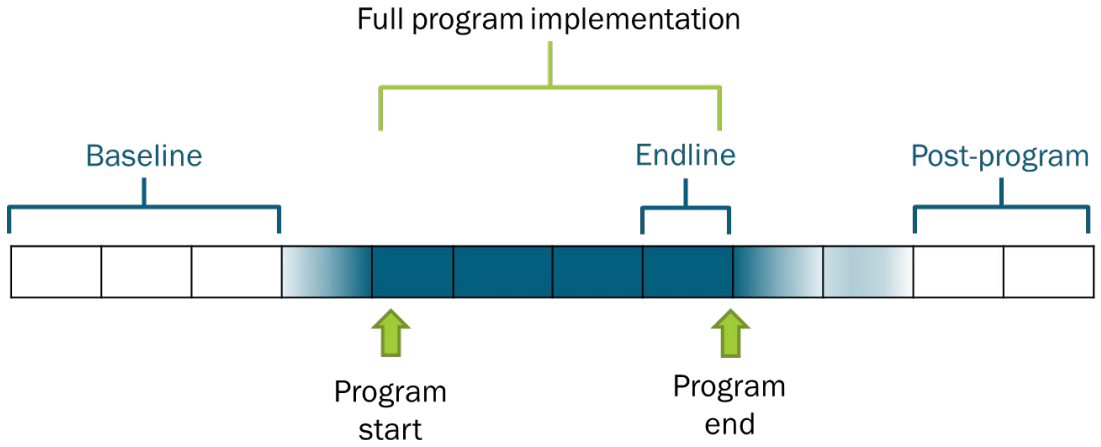
Contextual factors

Q6. Does the program contribute to equity?

Questions to consider when designing your evaluation

1. What are the priority evaluation questions?
2. What is the program's time frame and the time perspective for the evaluation?
3. How confident do you want to be that results can be attributed to the program?
4. Can a comparison group be defined?
5. How much money is available for the evaluation?

What is the time perspective for the evaluation?



Prospective

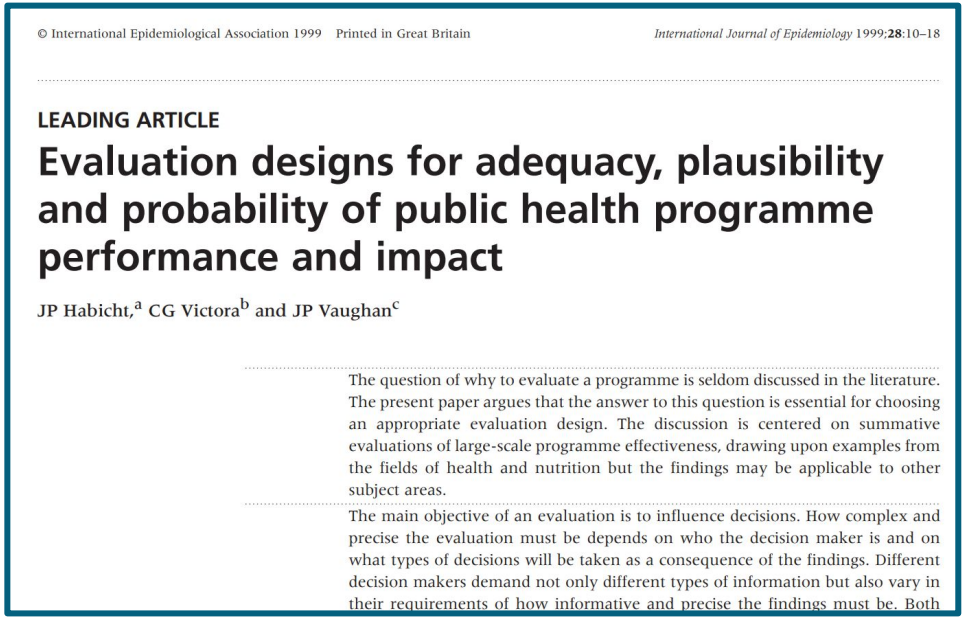
Retrospective

Ambidirectional

Questions to consider when designing your evaluation

1. What are the priority evaluation questions?
2. What is the program's time frame and the time perspective for the evaluation?
3. How confident do you want to be that results can be attributed to the program?
4. Can a comparison group be defined?
5. How much money is available for the evaluation?

Framework for evaluation design based on two axes: evaluation questions and type of inference



International Journal of Epidemiology 1999;**28**:10–18

LEADING ARTICLE

Evaluation designs for adequacy, plausibility and probability of public health programme performance and impact

JP Habicht,[a] CG Victora[b] and JP Vaughan[c]

The question of why to evaluate a programme is seldom discussed in the literature. The present paper argues that the answer to this question is essential for choosing an appropriate evaluation design. The discussion is centered on summative evaluations of large-scale programme effectiveness, drawing upon examples from the fields of health and nutrition but the findings may be applicable to other subject areas.

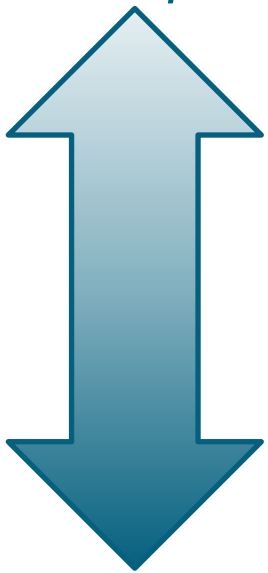
The main objective of an evaluation is to influence decisions. How complex and precise the evaluation must be depends on who the decision maker is and on what types of decisions will be taken as a consequence of the findings. Different decision makers demand not only different types of information but also vary in their requirements of how informative and precise the findings must be. Both

"The main objective of an evaluation is to influence decisions. How complex and precise the evaluation must be, depends on who the decision maker is and on what types of decisions will be taken as a consequence of the findings."

Habicht JP, Victora CG, Vaughan JP. Evaluation designs for adequacy, plausibility and probability of public health programme performance and impact. International journal of epidemiology. 1999 Feb 1;28(1):10-8.

How confident do you want to be that results can be *attributed* to the program?

Not confident



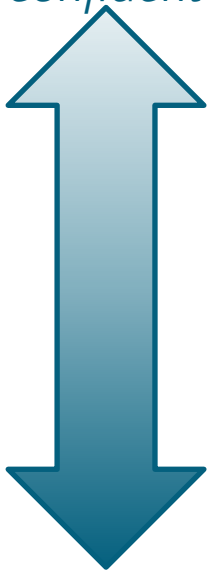
Very confident

Program ***may have contributed*** to outcomes and impact

Program ***caused*** the outcomes and impact

Types of inference: how sure do you want to be?

Not confident



Very confident

- **Adequacy evaluations**: Assess whether changes expected as a result of the program are occurring
  - All evaluations of public health programs need at least an adequacy evaluation
  - Needed to explain why outcomes/impact did or did not happen
- **Plausibility evaluations**: Assess whether observed changes could **plausibly** be attributed to the program (not a causal analysis)
- **Probability evaluations**: Determine whether the program is *causally and statistically significantly associated with impact*

Habicht JP, Victora CG, Vaughan JP. Evaluation designs for adequacy, plausibility and probability of public health programme performance and impact. International journal of epidemiology. 1999 Feb 1;28(1):10-8.

Areas of concern for different stakeholders

Types of evaluation	Provision	Utilization	Coverage	Impact
Adequacy	Health centre manager International agencies		District health manager International agencies	
Plausibility	International agencies			Donor agencies, scientists
Probability	Donor agencies, scientists			

Questions to consider when designing your evaluation

1. What are the priority evaluation questions?
2. What is the program's time frame and the time perspective for the evaluation?
3. How confident do you want to be that results can be attributed to the program?
4. Can a comparison group be defined?
5. How much money is available for the evaluation?

Can a comparison group be defined?

- Answering this question is fundamental to specifying a research design
- An ideal comparison group is the same in all respects as the intervention group – except there is no program
- In large-scale evaluations, comparison groups are often hard to find (or define)

Most common types of comparison groups

- *Geographic*: same point in time, but different geographical areas (randomized or not)
- *Internal*: same area as intervention, but with no (or lower) program exposure
- *Historical*: same area, but different point in time (e.g., before and after a program is introduced)

Randomized designs – not *always* best choice for large-scale evaluations

- Ethical and logistical constraints often preclude randomization
- Widely varying health systems contexts mean that the quality and intensity of program implementation is not constant
- Pathways to impact are long and subject to effect modification
- External validity is threatened because contextual factors vary widely

Victora CG, Habicht JB, Bryce J. Evidence-Based Public Health: Moving Beyond Randomized Trials. American Journal of Public Health 2004; 94(3): 400-405.

Pro/Cons of study designs

- True experimental designs have the strongest ability to demonstrate causation
- Non-experimental designs cannot demonstrate causation, but may provide sufficient information for decision-makers
- The best study design is one that is appropriate for the program:
  - Timeline
  - Feasibility of a comparison group
  - Stakeholder objectives

Campbell DT, Stanley JC. Experimental and Quasi-experimental Designs for Research. Chicago: Rand McNally, 1966. Summary as presented in Fitz-Gibbon CT, Morris LL. How to Design a Program Evaluation. Newbury Park, CA: Sage, 1987.

Validity in program evaluation

Internal validity

Are conclusions about the effects of the program valid?

External validity

Are conclusions about the effects of the program applicable in other settings?

Why are these two concepts important in effectiveness evaluations?

Contextual factors important in impact evaluations

- To support attribution of the findings to a program, and rule out alternative explanations (internal validity)
- To assess the extent to which the evaluation results might be generalizable to other settings (external validity)

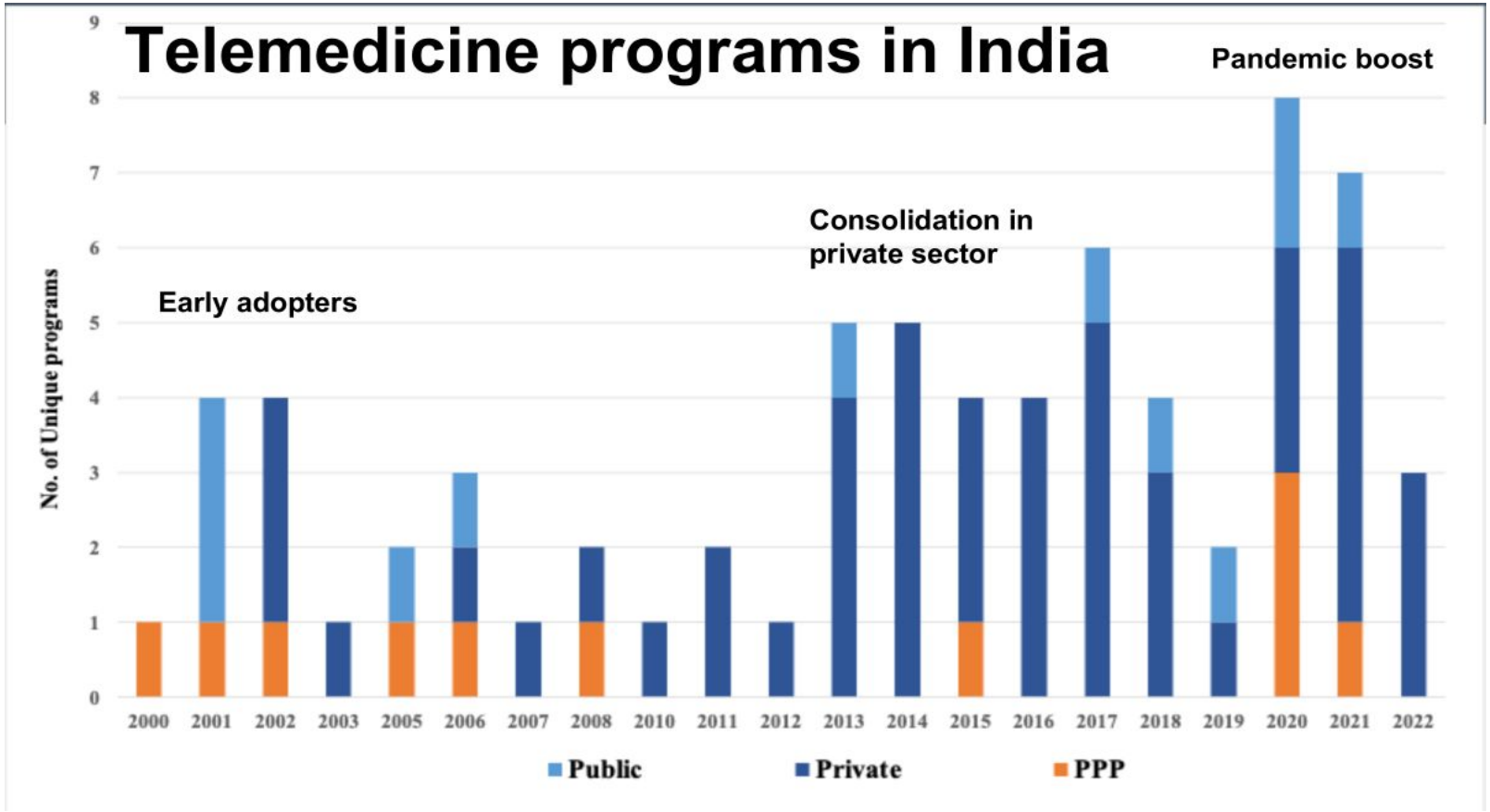
Common types of contextual factors

Issues that could affect the outcome/impact of interest…

- Socio-economic features
- Geographic and environmental features
- Demographic features
- Health care infrastructure and activities
- Other programs or activities targeting similar populations or issues
- Other relevant events (disasters, famines, migration, war etc.)

Contextual factors can act as confounders or as effect modifiers

Telemedicine Programs in India



Overview of Telemedicine programs in India

49 programs identified in India categorised into three models:

Public/ Private sector telemed programs

- 5 (10%) of programs
- Utilization of existing specialists across India by engaging with pvt
- Established private multispeciality hospitals working as Hub and Govt hospitals as spokes

Public sector telemed programs

- 5 (10%) of programs
- Free of cost
- Implemented across India via public health system
- Both App and Web Portal based is available
- Multi-specialty

Private sector telemed programs

- 39 (80%) of programs
- Paid service
- All are run by in-house program & tech support
- Some of the notable programs are started with help of Govt. E.g: Apollo, Aravind Eye Care

Telemedicine in India

- **Most notable early programs identified include ISRO Telemedicine Network**
  - Launched in 2001 as a public / private network
  - Provided a foundation for other programs to subsequently launch
    - **Apollo Telemedicine:**
      - Apollo Hospital was the initial Hub for the ISRO Telemedicine Network
      - Has since expanded to include it's own telemedicine network
    - **Aravind Eye Care**
      - Partner for Ophthalmology services`
      - Current run Hub/ Spoke model for Ophthalmology through their stand-alone vision centers

Key stakeholders

- Implementing organization
- Clinical providers, patients
- Program support partners
- Technology partners
- MLE partners

Inputs

- **Public / private sectors**
- **Provider cadres and characteristics**
- **Patient characteristics**
- Recruitment of providers
- Training of providers
- Sensitization
- Monitoring
- **Service delivery channel:** hardware and software characteristics
- **Licensing restrictions:** opensource
- Program monitoring, learning and evaluation activities

Model characteristics

Services provided
- Health conditions
- Hours of operation
- Costs to beneficiaries

Scale of implementation
- Geographic areas
- Number of (active) providers

Modality of delivery
- Real-time
- Store and transfer (asynchronous)

Evidence on effectiveness
- Health impact
- Quality of care
- Costs
- Satisfaction
- Other

Characteristics of moderate to large scale telemedicine programs in India

Health delivery sector	Public	14	19%
	Private	48	64%
	Public-Private Partnership (PPP)	13	17%
Model type / WHO classification	Provider to provider	18	24%
	Patient to provider	37	49%
	Both	20	27%
Timing of delivery	Synchronous/real-time	52	69%
	Asynchronous	2	3%
	Both	21	28%
Health domain/ condition	Multi-specialty	52	69%
	Condition specific (e.g., ophthalmology, mental health, etc.)	23	31%

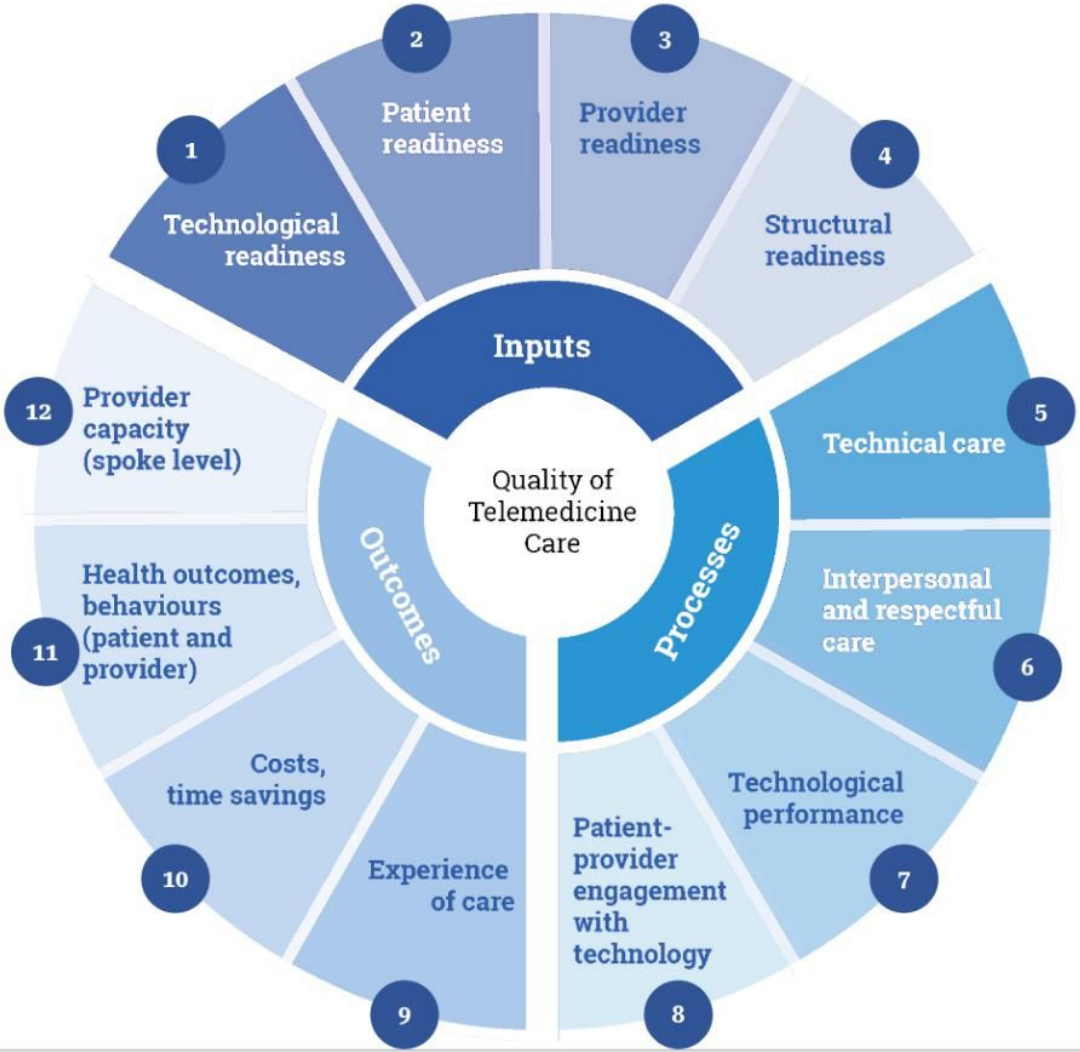
Characteristics by ownership

Health Delivery Sector		Public (n=14)	PPP (n=13)	Private (n=48)
Model type	Provider to provider	2	5	11
	Patient to provider	5	2	30
	Both	7	6	7
Implementing organization	Networks of hospitals			16
	Technology service providers - (B2B)			8
	Technology service providers - (B2C)			24
Clinical & service providers	MBBS doctors or higher-level specialists	14	13	48
	Dentists	0	0	11
	AYUSH practitioner	1	1	7
	Allied health services	4	4	11
Patients (age group)	All age groups	13	13	48
	Specific (Pediatric)	1	0	0

Study designs

Evidence of effectiveness	Large or medium scale (n=75)	
	n	%
Descriptive		
· Cross sectional (prevalence)	21	28%
· Case report	6	8%
· Qualitative	6	8%
Analytic		
· Experimental with randomization	0	0%
· Quasi-experimental	5	7%
· Observational: cohort	6	8%
· Observational: cross sectional	9	12%
· Observational: case-control	1	1%

Assessing service delivery through telemedicine



Evidence on effectiveness – I

Evidence of effectiveness	Large or medium scale (n=75)	
	n	%
Inputs		
· Technological readiness	20	27%
· Patient readiness	6	8%
· Provider readiness	15	20%
· Structural readiness	14	19%
Processes		
· Technical care	14	19%
· Interpersonal and respectful care	11	15%
· Technological performance	9	12%
· Patient–provider engagement with technology	5	7%

Evidence on effectiveness – II

Evidence of effectiveness	Large or medium scale (n=75)	
	n	%
Outcomes		
· Experience of care	17	23%
· Costs, time savings	12	16%
· Health outcomes, behaviors (patient & provider)	24	32%
· Provider capacity (at the spoke level)	3	4%
· Equity	3	4%
· Gender inclusion	2	3%
Economic evaluation		
Cost effectiveness, cost utility	9	12%
Cost outcome (program costing analysis)	3	4%

Types of data collected

Evidence of effectiveness	Large or medium scale (n=75)	
	n	%
System generated data analysis	7	9%
Structured survey (patients and/or providers)	19	25%
Qualitative methods: in-depth interviews, FGDs	6	8%
Medical record review	23	31%
Clinical observation	3	4%
Vignettes	1	1%

Health Outcomes

Some examples

- Pediatric HIV Telemedicine: Better management, lower patient dropout
- Skynet Program – very comprehensive evaluation
  - No improvement in maternal/child health
    - No improvement in quality of care
    - Very poor utilization of sick child / maternal health

Cost Effectiveness - Curative

- AFMC telemedicine : saved ₹146,111 per case
- Telepsychiatry for long term mental health: ~$2.20 vs ~$100 inpatient care
- Tele-follow-up post-surgery saved patients ~$78 and 5.4 workdays

Cost Effectiveness – Preventive and screening

- Rural eye care: Highly cost-effective at $1320 per quality-adjusted life-year gained
- KIDROP: save $108M annually if 10 states scaled up
  - Pediatric hearing screening : cost $34-$35 per child screened

Scale of Implementation: Providers

Among the 11 programs that report number of providers

- 4 report having over 50,000 providers
  - Practo “200,000 doctors listed”, Lybrate 150, 000 doctors, eSanjeevani “185,100 doctors onboarded”, MediBuddy 90,000
- 4 report having between 100 and 49,999 providers
  - Postira 1100+ doctors, JiyyoLife “1000+ doctors”, Dr Galen 537 doctors, Health mate “100+ healthcare professionals”
- 3 report having fewer than 100 providers
  - DocOnline 60 doctors, MFine 50 doctors, Karma Primary Healthcare: 20 doctors

Scale of Implementation: Patients

Among the 21 programs that report number of patients or consultations

- 2 report having over 100 million
  - Practo - 300 million patients, eSanjeevani - 139 million patients served
- 4 report having between 10 to 16 million
  - Apollo - 16.5 million consultations delivered, DocOnline - 15 million lives impacted, MediBuddy - 13 million doctors consultation, Lybrate - 10 million users
- 3 report having between 1 to 5 million
  - iCliniq - 5 million users, 1 MG 3 billion users, Portea - 1 million patients served
- 12 report having fewer than 1 million
  - Among this group Piramal Swasthya with 0.3 million beneficiaries tops the list

Summary

- 49 telemedicine programs that have been implemented in India (medium to large)
    - Among these, the first programs were government-led program beginning as early as 2001
- Private telemedicine programs are available across the country
- Of the public sector programs:
    - ISRO telemedicine network and eSanjeevani were nationally designed but adapted and implemented by state governments
- Apollo - largest private provider with a huge network and covers all kinds of diseases groups
- Aravind Eye Care, Sankara Nethralaya, NIMHANS - disease specific

Thank You

WHO SEARO + Intelehealth webinar series

www.intelehealth.org/webinars

Objectives:

Learn how telemedicine can address challenges and enhance health systems

Expected Outcomes:

By the end of the session, participants will:

- Gain a foundational understanding of telemedicine and its key components.
- Learn from successful case studies of national and sub-national public sector telemedicine implementations.
- Understand key policy and regulatory considerations for integrating telemedicine into national health systems.
- Be equipped with practical insights to explore and implement telemedicine solutions in your contexts.

Webinar Topics and Dates

Sno	Date	Topic
1	06 March 2025	What is Telemedicine and How Are Health Systems Using It Globally? A Primer for Health System Leaders
2	10 April, 2025	Brick-and-mortar to Brick-and-click - Designing & Implementing Quality, Effective, and Impactful Telemedicine Programs
3	08 May, 2025	Evaluating telemedicine interventions: Evidence so far, and Methodologies
4	5 June, 2025	Creating a Telemedicine-Ready Healthcare Workforce: Training for Healthcare Providers
5	10 July, 2025	Telemedicine Policy: How Telemedicine is Regulated in Asia
6	7 August, 2025	Choosing a Telemedicine Software: The case for standards-compliant, interoperable & open-source Digital Public Goods (DPGs)
7	11 September, 2025	Ensuring Quality of Care & Patient safety in Telemedicine
8	9 October, 2025	Telemedicine Adoption by Communities – How Might We Drive Uptake of Telemedicine (TM) by Citizens?
9	6 November, 2025	Artificial Intelligence and Machine Learning in Telemedicine
10	4 December, 2025	Financing Telemedicine and ROI – The Business Case for Telemedicine
11	8 January, 2026	Telemedicine use cases to advance the SDGs - Part 1 Applications for Non-Communicable Diseases (Diabetes, Hypertension, Cardiovascular disease, Cancer and Mental Health)
12	5 February, 2026	Telemedicine uses to advance the SDGs - Part 2 Applications for Communicable Diseases (Tuberculosis, HIV)
13	12 March, 2026	Telemedicine use cases to advance the SDGs - Part 3 Applications for Primary Healthcare

Webinar Evaluation and Feedback

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Access the recording and slides at: https://intelehealth.org/webinars/

Please take a few minutes to fill out our feedback form – your input is invaluable!

https://forms.gle/r2rjQRN4Fxz3gP4v9

Q&A Session

Thank You For Joining Us!

We Appreciate Your Time and Participation!

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