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Letter to the Editor

A successful model of a Private-Public Partnership in increasing accessibility to critical care services in low-resource settings through tele-ICU

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ABSTRACT

In India, the dearth of critical care expertise is more pronounced in rural regions, and tele-ICU models have been associated with high costs and low acceptability. Private-public partnerships (PPPs) in India are a potential solution for improved healthcare delivery, although its establishment is challenging. Cloudphysician (CP), a private tele-ICU network, used adaptable, low-cost technology and collaborated with 14 Indian government hospitals (4 states) to provide critical care services in remote areas amidst the COVID-19 pandemic. Between June 2020-December 2021, 487 ICU beds were added (0.6% increase from estimated 2020 baseline) in 3 phases. Ramanagara district (8.06 beds per 100,000) and Ladakh state (2.57 beds per 100,0000) demonstrated the highest district-wise and state-wise impact respectively. Totally, 4514 admissions were treated (Leh recorded 112 admissions per 100,000), including 25% non-COVID-19 patients. Thus, this PPP demonstrates a successful model of increasing healthcare delivery to remote areas using a tele-ICU system and effective partnership strategies.

Lay summary

In India, critical care specialists are sparse, especially in remote areas. Tele-health solutions (where medical specialists provide care remotely), have been poorly accepted due to high costs and private-public partnerships (PPPs) have been associated with challenges. Cloudphysician (CP), a private tele-ICU network, used adaptable, low-cost technology and partnered with 14 Indian government hospitals (4 states) to provide critical care services in remote areas amidst the COVID-19 pandemic. Between June 2020-December 2021, 487 ICU beds were added (0.6% increase from estimated 2020 baseline) in 3 phases. COVID-19 patients accounted for 75% of all patients treated. District-wise and state-wise impact was highest in sparsely populated areas. Thus, this PPP demonstrates a successful model of increasing healthcare delivery to remote areas using a tele-ICU system and effective partnership strategies to overcome associated challenges.

Letter

Dear Editor,

The Indian healthcare system suffers from scarce resources (0.8 physicians, 0.7 hospitals/1000 persons), meagre healthcare spending (1% of GDP), [1] and has fewer critical care resources (~13,000 intensivists;30,000 ICU beds (2.3 beds/100,000) than other nations [2]. Although private and public healthcare sectors are equally utilised, [3] manpower and infrastructure inadequacies, long wait times and perceived lower quality of government hospitals [3] have allowed private healthcare facilities to flourish, despite being expensive, largely unregulated and unpredictable in quality.

Although LMIC tele-health services expanded during the COVID-19 pandemic, tele-ICUs remain underdeveloped due to ambiguous outcomes, high associated costs as well as regulatory, technological and financial hurdles, especially in low-resource settings. [4,5]

Private Public Partnerships (PPPs) have demonstrated benefits amidst challenges, particularly in LMICs. [6,7]

Here, we describe a successful PPP model that employed tele-ICU services to deliver critical care to adult patients in low-resource settings, during the COVID-19 pandemic.

Cloudphysician (CP) Pvt Ltd, a tele-ICU company, employs a "hub-and-spoke" model in partnering with tier II and III private/government health-centres to provide accessible, affordable critical care services. The command centre ("hub") is staffed with CP-employed ICU doctors, nurses, pharmacists and nutritionists, who provide medical expertise to partner hospitals ("spokes"). Although the "spokes" have varying baseline resources, they are chosen based on adequate technical, clinical and communication capabilities as well as a wide catchment area. They provide the physical infrastructure, equipment (per a CP pre-deployment checklist [2]) and the bedside medical team (doctors, nurses and allied health staff with little/no ICU experience) to undertake direct patient care. They also receive periodic staff training and technology upgrades to ensure quality care. High-definition pan-tilt-zoom cameras and a proprietary Tele-ICU Management Platform (TMP) that functions as an app on low-cost android mobile phones, are installed at "spokes" to ensure efficient, confidential data-sharing between both teams. Thus, the "hub" has access to all clinical data and are involved in medical-decision making, daily rounds and constant patient monitoring, although the final decisions are made by the bedside team. CP's operations have been detailed elsewhere. [2]

During the COVID-19 pandemic, CP established PPPs with 14 Indian government hospitals (4 states), in 3 phases (June 2020–December 2021), serving an estimated 59,203,037 people [8] including 4514 COVID-19 (75%) patients.

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Phase-wise addition of partnerships and ICU beds were as follows: The first phase (June-July 2020) coincided with the end of the nationwide lockdown and added 265 beds through four partnerships −3 in Karnataka (Ramanagar, Kalaburagi and Bidar), 1 in Maharashtra (Mumbai). The second phase (September-November 2020) was marked by rising COVID-19 cases due to community transmission, and added 140 beds through six new partnerships - 4 in Maharashtra (Nashik, Sangli, Islampur, Osmanabad), 1 in Ladakh (Leh) 1 in Kerala (Kozhikode). The third phase (May 2021) coincided with the second COVID-19 wave and added 72 beds through four new partnerships - 2 in Maharashtra (Beed and Thane), 1 in Karnataka (Bangalore), 1 in Kerala (Manjeri).

Using 2020 estimated population values [8] and ICU beds, [9] 0.04 ICU beds per 100,000 were added nationally (0.6% increase), with the highest impact in Ladakh (2.57/100,000) followed by Maharashtra (0.15/100,000 or 1.7% increase), Karnataka (0.32/100,000 or 1.6% increase) and Kerala (0.14/100,000 or 1.1% increase). Ladakh had the highest admissions (59.61/100,000) followed by Kerala (2.94/100,000), Karnataka (2.72/100,000) and Maharashtra (0.98/100,000). More state and district-wise details are available in Fig. 1 and supplementarytable S1.

Long-term benefits from this venture include resource upgrades resources and staff training at "spokes". Overall, 200 healthcare workers (doctors, nurses and allied workers) received skill enhancement in critical care management through a dynamic process involving formal and informal means over the course of deployment and operations.

Half of all Indian households seek healthcare at government hospitals. [3,10] However, critical care accessibility to rural inhabitants is limited due to a lack of specialists in rural government centres (shortfall of combined specialists rose from 76% (2020) to 80% (2021) vs. 34% in urban centres), [10] and poor penetration of tele-ICU services (due to high estimated installation and operational costs, a lack of regulatory framework and guidance for medicolegal reimbursement and confidentiality aspects, as well as concerns regarding shared risks, responsibility and quality of care). [4,5] Private tele-ICU set-ups require rural partner hospitals with a bedside medical team and resources to deliver services. Given the higher penetration of government health-centres in these areas, a PPP for the delivery of tele-ICU services was ideal. With each party responsible for an integral part of service delivery, (CP with tele-ICU expertise and public partners with bedside resources), this PPP successfully provided ICU services during the COVID-19 pandemic to underserved areas.

A review of PPP deployment in developed and developing countries, including India's Chiranjeevi Yojana, Janani Suraksha Yojana and state-sponsored health insurance schemes, revealed several challenges including managerial and leadership challenges, infrastructural barriers, incompatibility with clinical goals, intrinsic relationship incompatibilities as well as a lack of policy and regulations. [6,7] (Table S2). The PPPs in this venture were not devoid of these challenges. During implementation, there were large infrastructural gaps and a lack of domain experts within the public team. An absence of comprehensive and flexible regulations governing this area of healthcare as well as navigating hierarchical and bureaucratic obstacles often delayed project establishment and functioning and increased implementation costs. Strategies responsible for the success of CP's partnership with government hospitals include open communication regarding expectations, workflow, allocation of risk and responsibility, financial motives, and internal policies. This surmounted the bulk of managerial and relationship obstacles. Infrastructural inadequacies were overcome with regular personnel training sessions, virtual IT support, and robust technology with fewer requirements. The pre-deployment checklist[2] of required baseline infrastructure played an important role in the success of this venture. Regular internal audits with KPI comparisons to identify pain points and progress also contributed to partnership evaluation and quality assurance.

This model illustrates PPPs' importance in expanding healthcare accessibility but requires a road map for upscaling. As with most PPPs, this venture had general and unique challenges (Table S2). Open communication and effective strategies ensures a successful and fair partnership.

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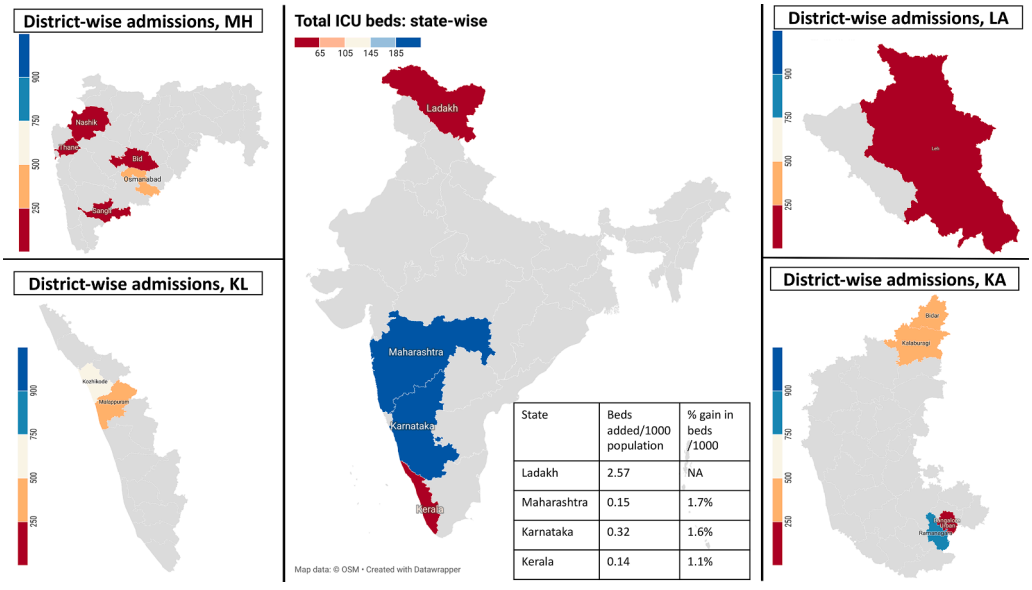
Patient consent

Not required.



State	Beds added/1000 population	% gain in beds /1000
Ladakh	2.57	NA
Maharashtra	0.15	1.7%
Karnataka	0.32	1.6%
Kerala	0.14	1.1%

Fig. 1. The state-wise distribution of ICU beds added and district-wise distribution of total admissions attended to by the PPPs described in this case report.

CRediT authorship contribution statement

Sitarah Mathias: Conceptualization, Data curation, Visualization, Writing – original draft, Writing – review & editing. **Mohan Sonu Chandra:** Data curation, Writing – original draft, Writing – review & editing. **Carl Britto:** Conceptualization, Formal analysis, Supervision, Writing – review & editing.

Declaration of Competing Interest

None

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.hlpt.2023.100781.

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