PROPOSAL ON TELEMEDICINE FOR COVID19 HUB HOSPITALS

August 7th, 2020

Submitted to:

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Executive Summary

The pandemic has revealed the gaps in the healthcare system of Nepal. In the current scenario, the Federal government is not in favor of a complete lockdown because of its economic consequences. The urban areas like Birgunj , Janakpur , Dhangadi can be the next epicenter of Covid 19 outbreak, with poor healthcare infrastructure and skilled manpower. The lack of super specialized experts for critical care lack in each hospital of urban and suburban areas of Nepal. Tele-medicine with super specialized support can be the best way to serve the needs of the current situation. Moreover, many of the patients are suffering from Psychiatric illnesses, which can be managed by Telepsychiatry. ASK foundation has been serving rural Nepal since its formal inception last 4 years ago and has served nearly 560 patients from four different centers. As a team, the doctors in ASK Foundation had been working in Telemedicine since 2010 serving more than 3000 patients. ASK foundation shall support the critical situation in Birgunj with its Tele medicine experience for psychiatry and critical care domain of health.

Background

Nepal has made rapid progress in providing healthcare services to its citizens. The health system in Nepal faces daunting challenges, with limited access to health services, a lack of trained healthcare professionals, inadequate infrastructure and a lack of access to essential medicines, with the issues being more prominent in rural areas. The Covid-19 pandemic has exposed the fragilities of health systems of all nations, with Nepal being no exception. The pandemic affects two domains in particular - Critical Care and Mental Health. In Nepal, both of these aspects of healthcare are under-serviced, the former due to a lack of trained medical specialists and infrastructure, and the latter owing to stigma and societal parameters. With no end in sight with regard to the pandemic, it is imperative that immediate steps be taken to produce innovative solutions. The pandemic has sparked the use of digital health and telemedicine services throughout the world. Telemedicine can be easily employed to improve patient outcomes, while concomitantly being cost-effective and lifting the burden of healthcare staff at hospitals. We put forth a proposal to leverage telemedicine in three key domains currently handicapping the Nepalese healthcare system - Critical care, Dermatology and Counselling for mental health issues.

Situation in Birgunj

Birgunj hardly has around 300 available beds for Covid 19 management and out of which all the beds are already occupied with Covid 19 cases. Dr Madan Kumar Upadhya is in charge for Naryani Regional hospital, and taking care of other additional hospitals which are treating Covid 19 cases. As per Dr. Upadhya, only 50% of Health care professionals are available than it is required for complete care. So far, nearly 38 security personnel and healthcare workers are infected. Health institutions hardly have few Ventilators with around 10 beds in Birgunj. The available anesthesiologist is already infected with Covid 19.

Problem

Nepal's health system is severely constrained by geography, a lack of access to healthcare services and poor infrastructure. For a population of 2.6 crores (in 2011, estimated to grow to 3 crores by 2021) (1), Nepal only has around 54,177 medical professionals, of which 39% were in the private sector, while the remaining 61% were employed in Government run health centers (2). Studies also show that around one-third of Nepal's requirement of doctors and nurses advertised as positions in health centers remain vacant. Nepal only has a combined total of 0.67 doctors and nurses per 1000 of its citizens compared to the WHO recommendation of 2.3 health professionals (doctors and nurses) for every 1000 population. The massive shortage of healthcare professionals is expected to rise, despite the spurt of private healthcare centers in Nepal, particularly in urban areas around the capital, Kathmandu (2), (3). The lack of adequate number of healthcare professionals is particularly evident in the number of trained specialist medical professionals. According to the MOHP and NHSSP (4), (5), as of 2011, there were only around 2000 medical specialists registered to practice within Nepal. The dearth of healthcare workers has also been pointed out by the WHO in 2008, when it was noted that one-third of primary health care centers in Nepal did not have any doctors. Policy within Nepal clearly indicates that healthcare recruitment has not kept pace with the growing population. Despite Nepal's population increasing by around 45% between 1991 and 2011, recruitment of healthcare staff has only grown by a paltry 3.4% (approximately 10% of the population growth rate) (5).

Health has been declared as a fundamental right in Nepal's constitution (6), but statistics indicate that only 62% of Nepal's population have access to basic health services within 30 minutes from where they live (3), (7). The discrepancy significantly widens in rural areas, where the mountainous terrain often results in long individual journeys for health consultations. The distribution of healthcare workers has been a long-term problem for the Nepalese government,

with the majority (two-third) of the workforce centered around Kathmandu or in major cities. Retention of healthcare workers in such remote regions remains a major hurdle in improving access to healthcare amenities in such areas (3), (8). A significant number of sanctioned posts, especially for skilled and specialist staff, are vacant in these areas. A 2009 review of the skills mix in the health workforce revealed that only 4.2% were doctors; 12% were nurses, excluding Auxiliary Nurses Midwives (ANMs); nearly half (47%) were paramedics; and almost one-third (28%) were support staff (6), (8). While the government has taken several steps to mitigate the challenge of under-staffing, a large section of Nepal's population still faces hurdles to access basic health amenities.

Impact of Covid-19

The Covid-19 pandemic has pushed health systems to extreme limits, particularly in the Indian sub-continent. Since Nepal's first case was reported on the 23rd of January 2020, Covid-19 positive cases have steadily risen to 19,771 by the last week of July. Almost 14399 patients have recovered, while 56 deaths have been attributed to the Covid-19 virus. While the Nepalese government has prepared a plan, the existing hospital infrastructure within Nepal allows only to manage and cope with approximately 10,000 covid positive cases at a time (Level - III) and the Nepalese Health Ministry has acknowledged that they would need to seek International Humanitarian Assistance beyond Level-III i.e. if there are more than 10,000 Covid-19 positive cases at a time. The health ministry also plans to expand the current infrastructure of 36,000 hospital beds in the country, estimated to cost approximately 7 billion NPR (9).

Community transmission inside the Birgunj area is growing and it seems to be beyond control, hence, the Health institutions are in dire need of support for Covid-19 treatment.

Critical Care:

Whilst the government is rapidly expanding the healthcare infrastructure, the existing health systems in Nepal, particularly urban areas have been stretched to the brink. With a current capacity of only 1600 Intensive Care Unit (ICU) beds, the pressure on medical professionals and hospitals has been immense. Reports of hospitals overflowing with Covid-19 cases have been increasing (10), (11). The current lack of doctors and the lack of specialists threatens to disrupt the health system, with countless reports of patients suffering owing to a lack of doctors and other qualified health personnel in health facilities. While the paucity of data only leads to further speculation, it is a well-established fact that the lack of health personnel has led to poor health outcomes, particularly in villages and with the current Covid-19 pandemic, needs to be addressed with utmost urgency.

Critical care faces the highest burden of patients from Covid-19. Number of cases requiring critical care can surge rapidly. A higher demand for ICU patients also raises the demand for equipment such as ventilators and pharmaceuticals which might be in short supply. Increasing the number of patients also requires a higher number of trained staff. Training these staff would

also consume time. Increasing the number of patients in ICU without increasing staff increases the risk of mortality and also increases the risk of complications (12), (13). Such a scenario not only demands the judicious use of current resources, but also using technology in easing the burden of nursing staff.

Mental Health:

Aside from the direct health impact of Covid-19, the socioeconomic effects of the pandemic is yet to be fully observed within Nepal (14), (15), (16). The pandemic has caused widespread loss of jobs, decreased foreign remittances, closure of the tourism industry along with diminishing supplies from neighboring countries. The relationship between decreased socio-economic status and health outcomes has been widely researched (17), (18) and it is expected to take a toll on Nepal's fragile health system. Deteriorating mental health owing to restricted movement and non-favorable social circumstances has been well-documented. With speculation and stigma rampant in Nepal, citizens are reluctant to seek medical help and with stress, loneliness and anxiety on the rise, mental health issues are expected to increase exponentially in the coming years. The impact of the Covid-19 pandemic on vulnerable populations like the disabled, daily wage-earners and patients from a low Socio-economic background is expected to be much higher (9), (16).

Given the strains that the pandemic has placed on the existing health system in Nepal, solutions to mitigate the rising demand for health services is of utmost urgency. There is a critical need to leverage the use of technology to fill in the vacuum of diminished manpower and to increase accessibility to health services.

Solution

With growing demand for health services, technology has been hastened into healthcare with open arms. Telemedicine and digital health services have been used in healthcare delivery for the past two decades. The Covid-19 pandemic has accelerated the use of digital technologies in healthcare facilities globally from Europe to Australia, Asia to the Americas (19), (20), (21), (22). Nepal also should embrace telemedicine, given its shortcomings with the limited number of doctors and infrastructure.

Telemedicine has been used successfully in several countries, particularly in rural regions with depleted resources. Telemedicine has been shown to improve health outcomes, be cost-effective and assist in training and educating healthcare personnel in remote regions (23), (24), (25). Our primary aim is to provide telemedicine services related to **critical care in ICUs and online counselling for mental health issues**.

Benefits

Following direct benefits, the patients and hospital receives:

- Reduced ICU complication rates
- Efficient delivery of care Improved productivity of clinical staff
- Improved staff morale and decreased turnover
- Enhanced training opportunities

Telemedicine in Critical Care:

The number of intensivists (medical doctors who care for critically ill patients in ICUs) and the number of ICU nurses in Nepal is drastically low in Nepal to deal with the rapidly surging Covid-19 cases. ICU demands a staff-to-patient ratio of 1:1 or 1:2 in normal situations. However, with Covid-19, doctors and nurses have been under immense pressure to care for multiple patients at a time. Studies have shown that a staff-to-patient beyond the above-mentioned ratio often leads to complications and poorer health outcomes, particularly in mortality, occurrence of complications, medication errors and response time (13), (26), (27). Telemedicine has improved these outcomes while medical staff handle multiple patients. Telemedicine decreases the incidence of complications and mortality (number of deaths during a particular time period) and the duration of stay at the hospital and in ICUs (27), (28). The use of telemedicine technologies in ICU induces a higher rate of case reviews upon admission to ICU, higher adherence to ICU protocols and best practices, more rapid response to alarms and emergencies (faster response time) and improved decision making, while simultaneously, lifting the burden of the staff on duty (29), (30). Not only have studies shown that telemedicine in ICUs improve patient settings, but they have been shown to decrease ICU costs by almost 36%, with almost 20% of ICUs in the US currently being serviced as Tele-ICUs (31).

Our Experiences

ASK foundation is a Not-for-profit organization with the major objective to help support the underprivileged population residing in various parts of Nepal. ASK is a heterogeneous group of educated people from various aspects of life who are highly dedicated and interested in helping the

people of Nepal in various fields. ASK has been serving rural Nepal via telemedicine. So far it has served nearly 560 Rural people.

The telemedicine center which was established in Syuna, Raskot municipality Kalikot, not turned into a turning point to setup a community-based hospital, Raskot Community Hospital, where ASK foundation is still supporting the Digitalization part and Tele consultation part.

Technical Feasibility and Delivery:

Software capabilities and technical delivery of virtual consultations will be delivered and facilitated via Danphe Software Technology platform. Danphe Telehealth has been successfully running a virtual clinic. They already have facilities for Teleconsultation with payment integration. The doctor and patients have verified profiles that help in contacting directly for immediate action and hence, the system is user-friendly for real-time monitoring. Data security is kept under high priority and the server is maintained by reputed Datahub and verified via OTP. The data is authorized properly and proper identification is used to allow the users to enter the application. For doctors and other health professionals, Danphe has provided a digital library which includes informative documents, video and links regarding the treatment and PPE management. The qualified doctors can have direct interaction over the internet reducing the risk of close-contamination. Telehealth is also considered as an ideal solution of communicable disease and a sustainable model of health care. This way telecare can be used proactively rather than reactively. The professional team from Danphe is passionate about serving the remote population and is ready to integrate with their knowledge in technology and medical field, they will innovate and implement ideas and engineering processes to provide the best telehealth solutions.

The Telemedicine software & the digital library platform will be provided by Danphe for free.

Basic technical support :

Hardware component
1. Computer systems to collect, assemble, and transmit information
2. Communication lines and Internet
3. Video feed (with angle and zoom adjustments)
4. Audio communications
5. Video display panels

Software Component
Software to operate hardware and enable data transmission
Possible option:
        Danphe Telemedicine Software with EMR

Informal software systems: a. Zoom b. Google meet

How it works

People with symptomatic Covid-19 group are classified into into following on the basis of the activity and response to disease:

1. Symptomatic and Isolated
2. Symptomatic and Hospitalized
3. Symptomatic and Critical

   As per the discussion with Dr Kumar Upadhya, Narayani Regional Hospital, nearly 300 cases are symptomatic and cases are increasing geometrically.

<u>**Tele psychiatry and Tele counselling**</u>

The first and second groups need supportive care and psychological support through Tele psychiatry. Those individuals can even need access to direct contact with medical professionals on their symptoms.

<u>**Tele ICU**</u>

The Hospitals with more than 300 covid 19 cases and 10 beds ICU has no Intensivist. The hospital lacks critical care experts and experienced healthcare worker. The ability of Tele-ICU clinicians to influence care is crucial to the success of a Tele-ICU system. Tele ICU can be established from Tele medicine center located at Kathmandu and can be accessible from various corners of world.

Implementation Process

Step 1: Resource information sharing

Step 2: Recruitment and Scheduling

Step 3: Training, Protocol development and format development

Step 4. Set-up, testing and implementation

Step 5. Normal execution of process

Step 6: Review of Discharged or Death cases and reporting

Step 7: ongoing monitoring, evaluation & reporting

Human Resources

Best practice for Tele ICU is:

- Tele-ICU staff, including physicians, nurses, clerical support staff and IT support staff
- Physical ICU staff (same as above, but in the ICUs where the patients are located)
- Hospital (or health system) IT management and staff
- Tele-ICU system (or components) management and technical staff
  Same existing system with a Psychiatrist and a counselor can support the Tele psychiatry for isolated and hospitalized patients.

Proposed Staffing

1. Project Coordinator and Healthcare staff- A Health Assistant or Nurse can be best for this role. She/he can play an active role in managing and coordinating the system.
2. IT support- For any Technology related issue will be supported by IT personnel and work on partial payment basis.
3. Consultants: Intensivist, Infection control experts and Psychiatrist.

Costing

At present 10 ICU beds are occupied and need care for such patients. Out of 10 cases, at best case scenario 5 cases need to be reviewed by Critical care experts. Similarly, out of 300 patients, 5 patients may need psychiatric support. The cost incurred for in setting up a Telemedicine Center:

- Server
- Computer / desktop
- Web camera
- Microphone
- Call center operator salary
- Dedicated phone line
- Dedicated internet service
- Mobile phone
   Same Telemedicine center can be scalable for **5** hospitals to be worked with.

Projected cost of consultation service per month :

	Pt/Day	Service cost per pt.	Total cost per month
Critical Care Consultant	5	500	62,500
Psychiatrist Consultation	5	500	62500
Total			125000

Now, let's project total cost of running for 3 months (consultation cost included)

Initial capital	Office Equipment			
	Stationary	5000		
	Technology : Hardware (2 computers and one smart phone)	130000		
	Additional Gadgets(Web camera and Microphone)	15000		
	Toll Free Number setup	20000		
	Training	12000		
	Contingency (10%)	28200		
	Total	**210200**		

		Month 1	Month 2	Month 3
Operational Cost	Nurse/HA and IT support	30000	30000	30000
	Travel	3000	3000	3000
	Stationary	2000	2000	2000
	Training	5000	5000	5000
	Consultation cost (ICU/Psychiatrist, etc)	125000	125000	125000
	Telecommunication	3000	3000	3000
	Contingency (at 10% of above)	16800	16800	16800
Monthly Operational cost		**184800**	**184800**	**184800**

GRAND TOTAL : NRs 7,64,6400

(This can easily be scaled up to provide Telemedicine support to many other centers all over Nepal beyond 3 months, with mere addition of monthly operational cost, which will largely be dependent on the volume of consultation request)

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