ARTIFICIAL INTELLIGENCE (AI) POWERED TOOL FOR COVID-19 SUSPECT CASES USING COUGH SOUNDS

STANDARD OPERATING PROCDEURES

APRIL 2020

Table of Contents

1. Introduction

COVID-19 has emerged as a pandemic. The Government of Bihar has been very proactive in responding to the global crisis and is taking several measures-identification of suspected cases and quarantining them, testing of high-risk populations and putting the COVID-19 positive cases in isolation besides looking at the introduction of innovative solutions to control the transmission. At this stage, it is also important that the health system is able to quickly triage and potentially screen high-risk populations to identify transmission pockets and take remedial measures accordingly.

One of the objectives agreed as per the Memorandum of Understanding (MoU) between Government of India and Norway and the State Health Societies of Bihar, Madhya Pradesh, Odisha, Rajasthan and Jammu and Kashmir under Norway India Partnership Initiative is to support the state NHMs in identification, testing and possibly scale successful Artificial Intelligence (AI) based solutions developed by local and global innovators. Toward this, NIPI has collaborated with the Wadhwani Institute of Artificial Intelligence to develop an Artificial Intelligence-powered tool for COVID-19 suspect cases using cough sounds.

2. Problem statement

As the state prepares to fight COVID-19, it is crucial to identify high-risk populations and test suspected cases early so that COVID-19 positive cases can be isolated and further transmission is minimized. However, there are challenges of limited COVID-19 testing capacities, with the result, all states including Bihar are using protocols limited to the highest risk groups-people with travel history, direct contacts of COVID-19 positive patients including healthcare workers, and hospitalized patients with symptoms of severe acute respiratory illness.

While the state of Bihar's testing capacity is increasing every day, it is still expected that the supply of test kits and the number of testing facilities will not be able to meet the demand, especially if simple **early-stage-symptom eligibility criteria** are used.

Further, one of the challenges of adopting a symptom-based testing protocol is that the most common COVID-19 symptoms are non-specific, and can deluge the system with unnecessary testing and health check-ups. More-so symptoms of COVID-19 being quite close to seasonal flu, there is all possibility of both missing symptoms or being over cautious and saturating the health system with unnecessary testing and health check-ups Hence, it is crucial to devise a triaging method that allows the most probable suspected cases to be prioritized for COVID-19 testing.

3. Solution

Cough is one of the predominant presenting symptoms in the case of COVID-19, with more than 70% confirmed patients experiencing it. Triaging based on characteristics of cough that are likely to correspond with the acoustic signature of COVID-19 may help guide high probability suspect cases towards early health interventions. AI-enabled solutions have been tried to use differential cough sound intensity to classify people with respiratory diseases like pneumonia, tuberculosis, etc (1,2). Similar concepts may be used for helping in screening and triaging of the population at large scale to guide them for testing for COVID19 too.

Wadhwani AI, a nonprofit organization is in process of developing an Artificial Intelligence enabled tool for COVID-19 suspect cases using cough sounds using Artificial intelligence utilizing the data collected through suspected cased from the state which would be utilized as screening/triaging tool for and can be integrated with 'Arogya-Setu' app developed by Government of India.

4. Geographical coverage and Approach

5.1. Geographical coverage

All COVID-19 suspected patients attending the identified public health facilities designated by Government of Bihar, namely PMCH, NMCH, IGIMS in Patna and SKMCH in Muzaffarpur would be considered as potential subjects for the data collection exercise.

Looking at the operational feasibility, private sector laboratories that are designated and approved by ICMR for testing, will be included in the later phases.

Wadhwani AI is also conducting a global crowdsourcing campaign that is aimed to collect samples of cough sounds from people who have been tested for COVID-19, as well as those who haven't. The goal is to get cough sounds in adequate numbers and this dataset will also be used as a complimentary dataset for the development of AI models.

5.2. Approach

Suspected cases presenting for COVID-19 testing at designated sites in the state of Bihar will be enrolled after informed consent. After basic demographic information and clinical history, the patient will be asked to provide three short "solicited cough" sound samples, which will be recorded using a smartphone-based application by the data collector. The result of the COVID-19 test will be used as labels to cough sounds. These parameters will be used to develop an artificial intelligence-based tool to triage symptomatic patients for testing for COVID-19.

5. Resources requirements

Designated area

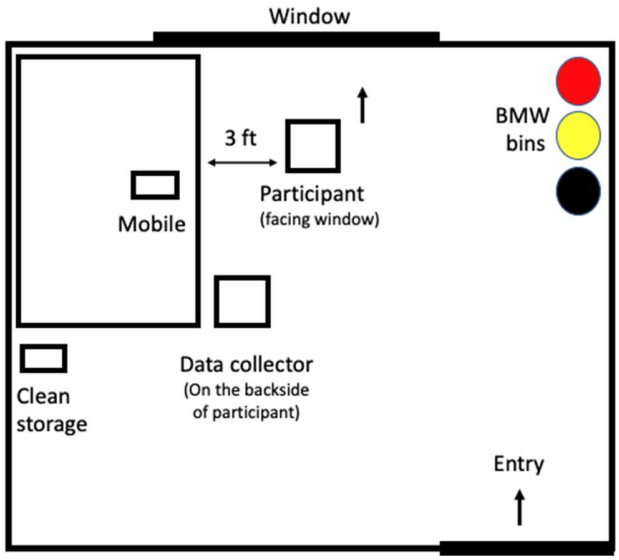
We recommend having a designated area assigned for cough sound collection in order to prevent the transmission of infections in the hospital setting. Specifications of this area are as follows:

1. The designated area or room should be clean and ventilated, with minimal or no furniture. In case there is any furniture, it should be moveable and also should be metallic.
2. The designated area or room should have a movable table and 2 chairs for the data collector as well as the participant.
3. Essentially this designated area should be in close vicinity of the swab sample collection area, in order to minimize participant movement.
4. The designated area should also comply with the biomedical waste management protocols of the institute.

5. Entry to this designated area shall be restricted only to the data collector and one participant at a time.

Infection prevention protocols for the designated area

1. The data collector shall enter this room only after wearing adequate PPEs.
2. The participant shall enter only after wearing a triple layer mask.
3. Mobile used for the cough sound collection should be kept at a defined place and participants should sit 3 ft away from this defined place.
4. Data collector should not be sitting facing the participant during the recording of cough sounds. Please refer to the adjoining layout.



5. Participants will be asked to provide three separate samples of solicited cough as per the guidelines, without touching his face or holding their hands in front of their mouth while coughing.
6. After this, the data collector will check the completeness of the recordings and will submit their entry.
7. The participant will then be provided with a new triple layer mask and will be asked to dispose of the old mask in the dustbin with a yellow liner.
8. The data collector should ensure hand hygiene and disinfection of the mobile used for data collection as per the guidelines provided in annexure 5.
9. After every participant, the data collector should use 1% hypochlorite solution for disinfection of the designated area as per guidelines provided in annexure 6.
10. At the end of the shift, the data collector should also ensure disinfection of designated area as per housekeeping protocols of the institute.

5.3. Human resource

Data collection team

Data collection team in each identified facility will consist of a Health Manager/Nodal Officer and a Laboratory technician. These will be identified from existing staff of the health facilities who will be trained for data collection. Specific role and responsibilities are as follows;

Health Manager/Nodal Officer:

1. The Health Manager/Nodal Officer will be the overall nodal person for the data collection activity in the given facility.

2. The Health Manager/Nodal Officer will play an overall monitoring and supervision role.
3. He/She will coordinate for overall logistics supply and communicate with NIPI/Wadhwani AI as required.
4. He/She will ensure that the data collection team adheres to SoPs and is following prescribed infection prevention protocols.
5. The Health Manager/Nodal Officer will coordinate with concerned health staff managing patients in the health facility.
6. Identification and recruitment of potential participants.
7. Delivering consent and ensuring written consent from the participants.
8. Conduct initial assessment of the patient and fill in essential demographic and primary clinical information on the data collection app.
9. He/She will ensure that cough sound samples are collected as per prescribed guidelines and safety precautions are followed. He/she will also ensure adequate quietness prior to collection of sound samples.
10. He/She will be tracking and tracing COVID-19 test results for all participants and will be responsible for ensuring completeness of data collection.

Laboratory technician:

1. Laboratory technician will assist Health Manager/Nodal Officer in adhering to infection prevention guidelines in the cough sound collection area
2. He/She will be assisting for providing necessary support to Health Manager/Nodal Officer in identifying patients who are eligible for testing and hence also for cough sound sample collection
3. He/She will ensure that patients are correctly identified as per facility based Unique IDs and same is tracked towards COVID-19 RT-PCR test results

If this data collection is extended to the private sector network of laboratories, respective laboratory technicians will be engaged as cough sound data collectors.

Criteria for selection of data collector

1. Age < 45 years
2. Minimum Educational qualification
    a. Diploma Nurse - GNM
    b. Laboratory Technician - DMLT
    c. Graduate with good aptitude and trainable in IPC protocols - MSW / BSc / BCom
3. Medical fitness - The individual should not have any known comorbidities (Diabetes, Hypertension, Heart Disease, active Tuberculosis, Bronchial Asthma, renal or liver disease)
4. The individual should not have a history of smoking or alcohol dependence.

5.4. Logistic resource

Following logistics will be provided by Wadhwani AI

1. Personal Protective Equipment for each data collector for each shift
2. Smartphones for data collection per facility
3. Infrared thermometers
4. Surgical masks for all participants

5.5. Incentive

The data collector will be paid Rs. 100* for collecting data for each participant. The amount will be credited directly into account based on the number of patients whose forms have been successfully completed in the application.

6. Capacity building of data collectors

5.6. Components of training

Data collectors will be trained on essential aspects of following components;

- Participant recruitment (Annexure 1)
- Obtaining Informed Consent (Annexure 2)
- Infection prevention practices as per MOHFW guidelines (Annexure 5).
- Handling of smartphone, recording features and data collection tool
- Importance of report tracing, recording and reporting
- Reporting & management of adverse events

5.7. Training Duration

Full day online training for data collectors through virtual platforms / classroom setups that are available within the government facility. Virtual platforms like zoom or google hangouts can also be used if required.

5.8. Trainers

Overall, management of the training will be facilitated by NIPI and Wadhwani AI. All Staff involved in data collection and project management will be trained on infection prevention and control before engaging in the data collection process.

7. Reporting of Adverse Events

Any unexpected or unfavorable medical incident/s in patients and/or data collectors, including any unexpected findings, signs, symptoms, or disease, arising as a direct result of their participation and engagement in activities related to prescribed processes of sample collection, will be considered and classified as an adverse event. If the eventuality of occurrence of an adverse event and its confirmation, the program team will follow standard reporting and management protocols in accordance with National and State guidelines.

8. Data Management

5.9. Data collection tool

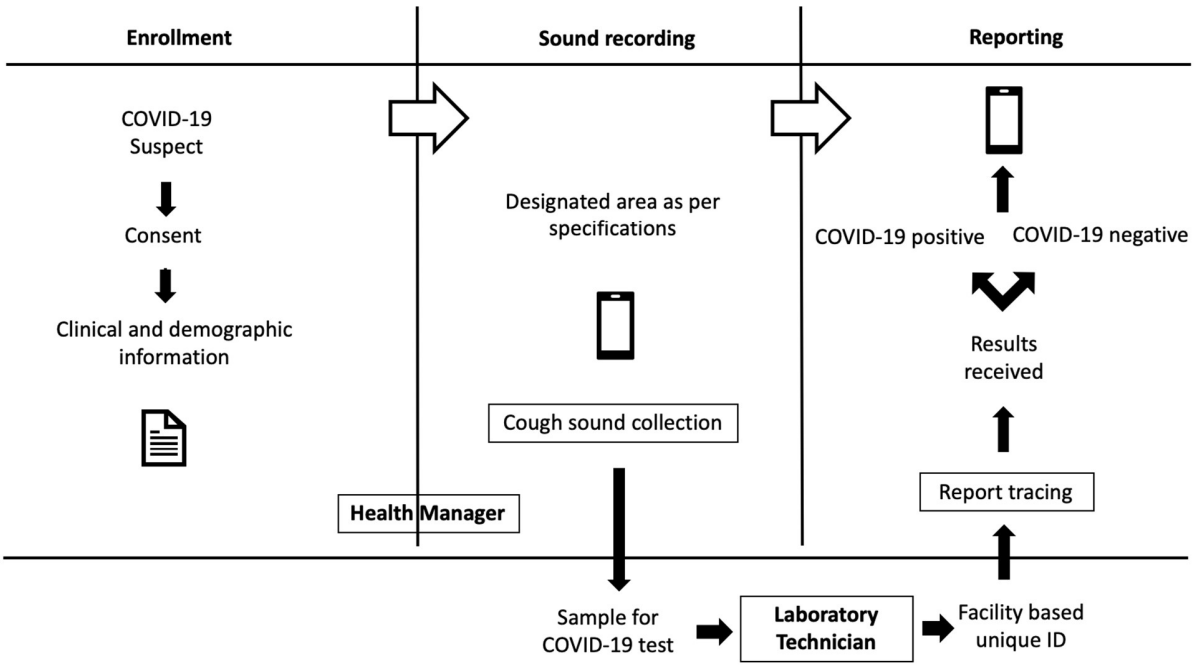
Data collection will be conducted through paper based as well as app-based methods. The relevant mobile application will be provided by Wadhwani AI. The data collectors will have to ensure written consent from the participant. The photo of this consent form will then be uploaded on the app. Similarly, the clinical/demographic data will be noted on the sheet and its image will also be uploaded. There is a possibility that in later phases, this clinical/demographic data can also be recorded on app.

Cough sound samples will be recorded through the smartphone as per the guidelines.

The smartphones that will be provided to the data collectors, which will be kept in the facility and disinfected at regular intervals. The variables that will be captured using the tool are annexed. (Annexure 3)

5.10. Data collection method

Considering the importance of infection prevention protocols in this data collection we intend to provide two smartphones and collect data in three steps. Details are provided in the below mentioned flowchart.



- The Health Manager/Nodal Officer will enroll every eligible participant and will take complete informed consent for the participation. He will collect relevant information in the 'Enrollment Form' of the data collection tool.
- Cough sound recording should be initiated on the smartphone before sample collection for the COVID-19 testing. This is to mitigate any potential changes in characteristics of cough sound due to the sample collection procedure. Standard operating procedures for data collection are given below.

- The laboratory technician will provide necessary support to the Health Manager/Nodal Officer in identifying patients who are eligible for testing and hence also for cough sound sample collection.
- Enrollment of COVID-19 suspects is planned when they go for the RT-PCR (Reverse transcription polymerase chain reaction) test. The RT-PCR test will be considered as the gold standard for the comparison and will be used to differentiate between COVID positive and negative participants.
- The Health Manager/Nodal Officer will keep track of test results and ensure that results are traced and reported for each patient as per facility based unique ID accurately and data collection activity is completed.
- The laboratory technician should assist the Health Manager/Nodal Officer for tracking COVID-19 RT-PCR test results of participants.

5.11. Infection prevention and control measures during cough sound collection

Stringent infection prevention protocols as per national guidelines will be followed during data collection and afterwards through recorder

1. Prevent infection while coughing
    a. Cough sound will be collected in an isolation ward / quarantine facility
    b. Patient will cough with a mask on his face and all the cough hygiene measures
    c. Data collector will be wearing PPE with N95 respirator mask
    d. Data collection mobile and cough sound collection mobile will be different.
    e. Data collectors will be standing at least 5 feet behind the subject when their cough sound is being recorded.
2. Disinfection of device / phone to prevent it to be a fomite (SOP is placed at Annexure 4)
    a. Device will be kept at a flat surface at a distance of approximately 3 feet from the participant
    b. Participants will be asked to cough away from the recording device (if the device is on the left, direction of the cough should be on the right).
    c. Models have an IP68 rating, which means they are designed to withstand immersion in freshwater at a depth of 1.5 m for 30 minutes.
    d. Disinfection of phone as per SOP attached

5.12. Data collection and analysis

Data will be stored on an NIC authorized server and will be the property of the state. Data will be compiled and analyzed by Wadhwani AI and NIPI and a draft report will be submitted by NIPI to the state for review and inputs.

5.13. Ownership of Data and Authorship Rights

Wadhwani Institute for Artificial Intelligence (WIAI) will be responsible for collection of data with Norway India Partnership Initiative (NIPI) facilitating the data collection process. WIAI will suitably anonymize the collected data using appropriate technology-based approaches prior to use in AI algorithms. WIAI will utilize the collected data to conduct Artificial Intelligence research to develop the cough sound based triaging solution for programmatic purpose and for greater social good. Concurrence of Government of Bihar will be sought for publications and sharing of data externally or with external stakeholders. Additionally, Government of Bihar and NIPI will be acknowledged regardless, be it publication or any other literature which features the tool or associated results.

5.14. Data confidentiality and security

Personal Identification Information will not be collected. Government provided ID numbers will be used in getting patients' test results. Data shall be uploaded to empanelled clouds compatible with GoI regulations. Data will be uploaded and stored using encrypted mechanisms as specified by national standards and industry best practices. Anonymized health data shall be hosted and processed within the geographic boundaries of India.

9. Annexures

Annexure 1: Participant Information Sheet

Please read this form carefully. If you don't understand the language or any information in this document, please discuss with the Data Collector / Team Supervisor. If you decide to volunteer for this activity, you must sign at the end of this form.

Introduction:

You are being asked to take part in this activity because you have acute respiratory illness. We wish to improve reliability and validity of a screening tool designed for detection of COVID-19 disease using cough sound recordings and other relevant medical details of suspected patients.

***Please note: This is a preliminary screening procedure and not the diagnostic or evaluation test you have come here for. This activity will not generate any report and* will not affect your routine examination and treatment.** After discussion, you will ask to give your throat / nasal swab sample for COVID-19 test as prescribed by your treating physician or public health functionary. You will receive the report of that test directly from the testing laboratory.

Purpose:

To build AI-powered cough-sound and symptom checker for improved self-screening within limited COVID-19 testing capacity

Who can take part:

Suspected patients with acute respiratory illness and who are not critically ill and are willing and comfortable in providing cough sounds for this development exercise.

Procedure:

- Data collector will conduct initial assessment as per routine procedure
- You will be asked few specific questions regarding possible contact with COVID-19 positive patient, travel history, existing other diseases/habits, symptoms
- Before sample collection for COVID-19 test, you will be requested to provide cough sound at three points in time as per prescribed procedure
- Data collector will guide you to complete the exercise

Your role/responsibility:

- Provide accurate information whenever asked
- Must inform the Data Collector / Team Supervisor about any problem experienced during the procedure

What are the potential benefits of participation?

If you take part in this activity, you will help in detection of suspected patients of the COVID-19 disease who may get missed, especially when we have limited testing capacities.

Compensation for injury:

In case of any activity related injury or illness, the program team will be responsible for making sure that proper and free medical care is provided to you. However, the team will not be liable for any other compensation.

Confidentiality of information:

Information including your name, address, your name, recordings and reports will be reviewed only by authorized personnel. Your privacy and confidentiality of information provided by you will be maintained throughout this exercise.

Voluntary participation:

The participation in this activity is purely on a voluntary basis. If you volunteer, you have the right to stop at any time and you need not give any reason for the same. Your decision not to participate will not affect your future treatment. The investigator may stop your participation in it at any time for some or other reason without your permission.

Annexure 2: Informed Consent Form

UID:

Title of the project: Artificial Intelligence powered screening for COVID-19 using cough sounds and symptoms amongst acute respiratory syndrome cases in India

The contents of the information sheet provided have been read carefully by me/ explained in detail to me, in a language that I comprehend, and I have fully understood the contents. I confirm that I have had the opportunity to ask questions. The nature and purpose of the activity and its potential risks/ benefits and expected duration, and other relevant details have been explained to me in detail. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal right being affected.

I understand that the information collected about me from my participation and sections of any of my medical notes may be looked at by responsible individuals from respective facilities or from regulatory authorities where ever relevant. I give permission for these individuals to have access to my records.

I agree to taking part in the activity.

(Signature / left thumb impression)

Name of the participant:

Date: Place:

This is to certify that the above consent has been obtained in my presence.

(Signature / left thumb impression of witness)

Date: Place:

This is to certify that the above consent has been delivered by me.

(Signature)

Name of coordinator:

Date: Place:

Annexure 3: Data collection tool

	Mobile app fields
Prerequisite	Informed consent (Yes/ No) (Photo of signed informed consent to be uploaded) [PAPER]
General information	State
	District
	Name
	Age
	Gender
	Address
	Facility name / Name of referring doctor for home setting
	Unique ID (Facility initial/Patient number)
	Name of data collector
Contact history	Travel history
	Contact with known confirmed case
Presenting Symptoms (with duration in days)	Fever
	Cough
	Shortness of breath
	Others (Open field)
Comorbidities	Diabetes
	Hypertension
	Cardiovascular Disease

	Cancer
	Other lung ailments
Habits	Smoking
	Tobacco
Vitals	Temperature Respiratory rate (Optional)
Cough relief measures (within in past 6 hours)	Yes
	No
Cough recordings (with timestamp)	First recording (Spontaneous cough – After a deep breath)
	Second recording
	Third recording
Speech sample	Narrate 1 – 10 numbers in hindi/local language
	A long hindi statement: "□□□□ □□□ □□ □□□□□□, □□□□□□□□ □□□ □□□□ □□□□ □□□□ □□□□□ □□□□□ □□□□ □□"
Breath sound sample	Recording of breath sound sample
COVID-19 test result	Positive/Negative

5.15.

Annexure 4: Standard Operating Procedures for data collection

1. At the sample collection site, subjects will be enrolled after informed consent from subjects, before the COVID-19 sample is collected. This is to 1mitigate any potential change in cough sound characteristics due to sample collection (nasal secretion / throat swab etc).
2. Complete informed consent will be taken from the participant; photo of the consent form will be taken in the data collection application. In case of minors, consent from legally acceptable relatives will be accepted.
3. Stringent infection prevention protocols as per national guidelines will be followed during data collection. For this, all recommended supplies (PPE, N95 respirators etc) and training of data collectors and 2 disposable triple layer surgical masks for each subject will be provided by Wadhwani AI.
4. Data collectors should ensure that he/she is wearing all the personal protective equipment (PPE) as per the guidelines.
5. If participant is not wearing a suitable mask, a new triple layer surgical mask will be provided and participant will be asked to wear the same.
6. Trained data collector (Health Manager/Nodal Officer) will secure primary details of the participant in the given format on the mobile application for data collection. The Health Manager/Nodal Officer will also provide a unique ID through a voucher to the subject. The subject has to provide this voucher to the lab technician.
7. Basic demographic details and clinical history will be collected. This will be followed by recording of cough sound by the lab technician.
8. As clinical evaluation of the participant gets over, participants will be sent to the area identified for sample collection. The Laboratory Technician will acquire the voucher from the subject. Then he will open the recording form through the mobile app for cough sound recording. The unique ID from the voucher will be inserted prior to recording to ensure unique records for the subject. (**Disinfection of smartphone shall be ensured after every patient)**
9. Devices should be kept at a flat surface at a distance of approximately 3 feet from the participant.
10. Participants will be asked to cough away from the recording device (if the device is on the left, direction of the cough should be on the right). Participants will keep wearing masks at times of cough.
11. After initial recording of 3-5 seconds (basically to record noise), the participant will be asked to simulate a cough for the next 5-7 seconds.
12. If the participant is getting a spontaneous cough, the data collector should record the same.
13. Data collector ensures that all the mandatory fields are filled and submits the form on the data collection device.
14. Data collector disinfects the recording device using provided alcoholic wipes as per the guidelines and lets it dry before the next participant.
15. Test results will be updated by contacting the laboratory by the data collector.

Annexure 5: Disinfection of a Smartphones/ Recording Devices

For Samsung, we shall use guidelines provided by them. For other phones, we shall follow guidance issued by the CDC.

CDC guidelines: (https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cleaning-disinfection.html)

- For electronics such as cell phones, tablets, touch screens, remote controls, and keyboards, remove visible contamination if present.
- Follow the manufacturer's instructions for all cleaning and disinfection products.
- Use of wipe able covers for electronics.
- If no manufacturer guidance is available, consider the use of alcohol-based wipes or sprays containing at least 70% alcohol to disinfect touch screens. Dry surfaces thoroughly to avoid pooling of liquids.

Guidelines issued by Samsung:

- Before you begin, power down your device, remove any case or cover and unplug any accessories.
- Wipe the exterior surface of the phone with a soft, lint-free microfiber cloth.
- Samsung warns against applying liquid cleaning solutions directly on the phone as that may damage the device, particularly the oleo-phobic coating which helps protect the display from fingerprint smudges.
- Liquids and water could even get into open spaces, particularly on devices that don't have an IP rating, so you could end up damaging your phone.
- For disinfecting the phone, dampen the corner of your cleaning cloth with a small amount of distilled water or disinfectant.
- Use a hypochlorous acid-based (50-80ppm) or alcohol-based (formulated with more than 70% ethanol or isopropyl alcohol) product and wipe the front and back of your phone gently without too much pressure.
- Avoid wiping the device excessively. Samsung also cautions against using compressed air or applying spray bleaches or liquid solutions directly on the phone.
- These cleaning guidelines are meant for glass, ceramic and metal surfaces, not for soft accessories that are made from materials like plastic, rubber or leather.
- If you use cases or covers on your phone, it would be a good idea to disinfect them as well, since they tend to capture a lot of dirt and grime anyway over time.

Infection Prevention and Medical Care to Data Collector

Following measures will be undertaken at a first place to prevent infection to staff involved in data collection and avoid any misfortune

1. Persons with willingness and dedication to work in this situation will only be recruited with written informed consent
2. The staff will be trained by the qualified trainers on Infection Prevention and Control Practices before joining duty to attend health facility
3. Personal protective equipment (PPE) will be provided to the staff and they will be trained on how to use PPE
4. Infection prevention measures during data collection will be ensured that will include
    a. Cough sound will be collected in an isolation ward / quarantine area
    b. Patient will cough with a mask on his face and all the cough hygiene measures.
    c. Data collector will wear PPE
    d. Data collection device will be disinfected as per the instruction of the manufacturer or as per annexure 3 collection of cough sound from each patient
5. Staff will be allowed to work in health facilities for not more than 6 hours and all precaution measures will be followed as per the IPC guidelines
6. Pre-recruitment fitness check-up will be conducted for health staff. High risk persons (i.e. old age, having comorbidity) will be refrained from recruitment
7. Any staff develop respiratory symptoms will be taken out of duty of data collection
8. In case if the staff will get the disease by any chance, management of the staff will be followed as per the Government guidelines and adequate compensation will be offered by the Wadhwani AI.

Compensation for Data collector

1. Medical Insurance

a. Staff will be offered medical + accidental insurance with sum assured being Rs. 7.5 lakh per staff for the duration of data collection

2. Life insurance

a. Staff will be covered with life insurance of worth Rs. 50 lakhs with coverage of accidental death or disability

Use of PPE

a. Full complement of PPE will be used by data collectors as per the guidance of MoHFW. The setting is an isolation room / quarantine room. In such settings, even for clinical examination of symptomatic persons, N-95 masks and gloves have

been recommended. However, cough is a prerequisite for the data collection, this may be considered high risk activity and to avoid any chance of infection to the data collector, full complement of PPE will be used. Patients will also be asked to wear N-95 masks during data collection.

b. Full complement PPE will include goggles, face-shield, mask, gloves, coverall/gowns, head cover and shoe cover.
c. The PPEs will be as per the specifications described by the MoHFW.
d. PPEs will not be alternative to basic preventive public health measures such as hand hygiene, respiratory etiquettes which will be followed at all times.
e. The staff will be asked to refrain from touching their eyes, nose, and mouth with potentially contaminated gloves or un-gloved hands.
f. Avoid contaminating environmental surfaces that are not directly related to patient care (e.g. door handles and light switches)
g. Perform hand hygiene
h. Distance of at least 1 meter from contacts/suspect/confirmed COVID-19 cases will be maintained always
i. The laid down protocol for disposing off PPEs as detailed in infection prevention and control guidelines of MoHFW will be used.

Implementation of appropriate IPC measures

- IPC is a critical and integral part of data collection from patients, as per the guidelines of the MoHFW.
- Standard precautions will always be routinely applied. Standard precautions include hand hygiene; use of PPE to avoid direct contact with patients' respiratory secretions. Standard precautions safe waste management and cleaning and disinfection of equipment (including data collection devices).
- Implementation of infection prevention and control measures for patients with suspected or confirmed nCoV infection as per guidelines of MoHFW

Suspected patients

- The suspect patient will be given 2 triple layered surgical masks and direct the patient to a separate area, if available.
- Keep at least 5 feet distance between suspected patients and data collectors.
- Instruct all patients to ensure cover of nose and mouth during coughing or sneezing with the mask.
- Perform hand hygiene after contact with respiratory secretions
- Apply droplet and contact precautions
- Use PPE (medical mask, eye protection, gloves and gown) when entering the room and remove PPE when leaving.
- Dedicated equipment (mobile phone and recorder) will be used.
- The equipment will be cleaned and disinfected between each patient.

Annexure 6 - Infection control protocol for the designated area

We will follow all the infection prevention practices as per site based operational feasibility, with reference to below mentioned guidelines.

1. NATIONAL GUIDELINES FOR INFECTION PREVENTION AND CONTROL IN HEALTHCARE FACILITIES **https://www.mohfw.gov.in/pdf/National%20Guidelines%20for%20IPC%20in%20HCF%20-%20final%281%29.pdf** accessed on 17th April 2020, 20.00 hours.
2. Infection Prevention and Control (IPC) for COVID-19 by National Centre for Disease Control. **https://ncdc.gov.in/WriteReadData/l892s/53436598731586345131.pdf ,** accessed on 17th April 2020, 20.00 hours.