Effectiveness of an institutional COVID-19 central sampling team during pandemic at a tertiary care centre

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ABSTRACT

Background: An efficient sampling is one of the key methods to identify all those affected by coronavirus disease 2019 (COVID-19).

Objectives: To analyze how efficient setting up of a central sampling team would be to prevent any outbreak within the institution by minimizing the movement of suspected COVID-19 patients admitted in the inpatient wards. The secondary objective was to train maximum resident doctors to collect samples of admitted patients.

Methodology: A central sampling team comprising of resident doctors from various departments was made who did sampling of the suspected COVID-19 inpatients admitted under various specialties.

Results: There were a total of 341 patients [209 males (61.29%), 132 females (38.7%)] and 335 patients underwent sampling. There was a positive correlation between: (1) number of calls from a department vs percentage of positive samples in that department [Pearson correlation coefficient (R) = 0.47; P = 0.026], (2) number of samples taken by resident of a particular department from central sampling team vs number of positive samples taken by resident of that department [R = 0.8739, P = 0.01] and (3) number of visits to a department vs number of residents trained in that department [R = 0.93; P = 0.00001].

Conclusion: Formulation of a central sampling team led to changes like a separate donning and doffing area in each ward and training of many resident doctors posted in different wards. This made each ward self-sufficient in collection of samples. This venture also ensured minimal movement of suspected COVID-19 patients in the hospital and thus least exposure to the hospital staff.

Keywords: Central sampling team, COVID-19, resident doctor

Introduction

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was declared a pandemic by the World Health Organization (WHO) on March 11, 2020.[1] To avoid nosocomial transmission among patients and health-care workers, it was essential to immediately sample patients admitted in non-COVID-19 wards who were suspected of harboring the disease. The fear of infection placed severe physical and mental strain on health-care workers. Therefore, the task of sampling of suspected COVID-19 inpatients admitted under various specialties at our tertiary care hospital was initially performed by a central sampling team, which was a dedicated team of doctors from various departments who were trained to do the same and were available round the clock in order to prevent any outbreak within the hospital. The sampling was done in the same ward where the patient was admitted, and the patient was isolated in the same ward until the results came, to ensure minimum movement of the suspected patient. The

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resident doctors from the central sampling team disseminated this knowledge by training resident doctors present in the ward so that they could themselves perform sampling in the future. We did this pilot study to evaluate the effectiveness of setting up a central sampling team.

**Methodology**

The study was done at All India Institute of Medical Sciences, an apex tertiary care center in Delhi. Ethical Clearance was taken from the Institute Ethics Committee, All India Institute of Medical Sciences, New Delhi (Ref. No.: IECPG-464). The team consisted of 24 residents from 7 departments, viz. Department of Biochemistry, Dentistry, Forensic Medicine, Laboratory Medicine, Microbiology, Otorhinolaryngology and Pharmacology. Over a period of 6 months (March 2020–August 2020), 6 teams were made of 4 resident doctors and they were posted in rotation. The sampling team could be contacted via helpline duty phone number which was circulated within the hospital. Calls were received from various departments to collect samples of the suspected COVID-19 patients. Prior to taking sample (Nasal and oral swab), the sampling team resident used to check the following for quality improvement:

- Separate donning and doffing area in the ward
- Personal protective equipment (PPE)
- Viral transport media
- Identification of patient and checking the sampling form duly filled by ward resident.

The resident doctors from the central sampling team would train the ward resident doctors regarding proper donning and doffing of PPE, correct method of taking sample, followed by triple layer packaging of the sample and transportation of the same. A google sheet/form was then filled by the sampling team resident to collect data regarding the same.

The main objective of this study was to determine the effectiveness of setting up a central sample collection team to minimize the movement of suspected COVID-19 patients admitted in the inpatient wards and gradually make these wards self-dependent for sample collection of suspected COVID-19 patients.

**Results**

There were a total 341 patients [209 males (61.29%), 132 females (38.7%)] for whom the central sampling team was called over a period of 6 months from March 2020 to August 2020. The mean age of the patients was 35.2 years (SD 19.9, IQR 20–50). The average time to sampling (time between receiving a call and actual sampling) was 1.9 h. The median number of calls per day was 4 (IQR 2–8).

As shown in Table 1 and Figure 1, maximum number of calls were received from the Department of Ophthalmology (43; 12.6%) and second highest number of calls were from Department of Gastroenterology (38; 11.1%). The percentage of positive samples out of all calls were highest in the Department of Ophthalmology (12; 27.9%) but the percentage of positive samples in the Department of Gastroenterology was among the lowest (1; 2.6%). There was a positive correlation between the number of calls from the department vs percentage of positive samples in that department [Pearson correlation coefficient (R) = 0.47; P = 0.026].

As shown in Table 2 and Figure 2, maximum number of samples were taken in the Department of Dentistry (170; 50.7%) followed by Otorhinolaryngology (65; 19.4%) and Laboratory Medicine (56; 16.1%). However, the percentage of positive samples was highest in the Department of Laboratory Medicine (5/17; 29.4%) followed by Otorhinolaryngology (10/65; 15.3%) and Dentistry (4/170; 2.4%). There was a statistically significant positive correlation between number of samples taken by resident of a department vs number of positive samples out of total samples taken by resident of that department [Pearson correlation coefficient (R) = 0.8739; P = 0.01].

Maximum number of residents were trained in the Department of Gastroenterology (23) and Ophthalmology (19) [Figure 3]. There was a statistically significant positive correlation between the number of visits to a department vs the number of residents trained in that department [Pearson correlation coefficient (R) = 0.93; P = 0.0001].

Out of 341 calls which were received, 335 patients underwent sampling and 30 patients (9%) came positive. Out of 206 male patients and 129 female patients who underwent sampling, 19 males (9.2%) and 11 females (8.5%) were positive.

**Discussion**

SARS-CoV-2 can spread via both direct means (droplet and human-to-human transmission) and by indirect contact (contaminated objects and airborne contagion). Reverse transcriptase-polymerase chain reaction (RT-PCR) testing
is required to determine whether an individual is currently infected with SARS-CoV-2 or not. Although rapid antigen tests are also used to detect SARS-CoV-2, but these tests may miss some COVID-19 patients who are shedding the infectious virus. A systematic review with meta-analysis of the accuracy of diagnostic tests for COVID-19 by Boger et al. concluded that RT-PCR remains the gold standard for the diagnosis of
COVID-19 in sputum samples. As stated by WHO, testing all suspected cases is essential for pandemic control. Therefore, an effective sampling strategy should be the mainstay of any hospital/institution/community to check the spread of COVID-19.

We did a pilot study at an apex tertiary care institution in India to evaluate the effectiveness of a central sampling team to check the spread of COVID-19 in the hospital and reduce the risk of exposure among health-care professionals.

Out of 341 patients, 335 patients (98.24%) underwent sampling and 6 patients (1.76%) did not. The reasons for not sampling these 6 patients in different wards were as follows:

- No separate donning and doffing area
- Non-availability of full PPE
- The resident who called for sampling later told that it is not required
- Non-availability of ice pack/ice box to carry viral transport media.

All 334 samples except one were taken on the same day to prevent delay in management of patients. The average time to sampling was 1.9 h. This time gap was due to two reasons: First, the sampling team resident used to go for sampling after receiving 3–4 calls from various departments to minimize the movement of resident doctor from sampling team and second, time taken to go from one department to another after proper doffing.

The maximum number of calls for sampling were received from the Department of Ophthalmology which also showed the highest percentage of positive cases. Most patients who were tested in this department were those who had to undergo a surgical procedure which highlights the need for testing as ophthalmology is one of the departments whose doctors are at the highest risk for exposure. The second highest number of calls received were from the Department of Gastroenterology, but it had one of the lowest percentages of positive cases. Similarly, a high number of calls were received from the Department of Cardiology but none of the patients came out to be positive. One of the reasons for this disproportion may be the high index of suspicion for COVID-19 in these wards due to the type of patient profile admitted in these wards like those with fever due to non-COVID-19 causes and older patients with multiple co-morbidities who are at high risk. Overall, there was a positive correlation between the number of calls from the department vs the percentage of positive samples in that department ($P = 0.01$). This may indicate increased efficiency of resident doctors with increased sample collection.

No sample was inadequate and residents from all departments in the central sampling team were effective in taking samples and providing proper training to ward residents who used to send calls for sampling. The main purpose of training was to ensure that the respective ward resident can perform sampling of the suspected patient himself/herself without waiting for and needing assistance from residents from the central sampling team. It was observed that the purpose of calls from various departments changed over time gradually. Initially, the call used to be for sample collection but as the ward residents got trained over time, the call used to be only for supervising the sample collection while the inpatient ward resident collects the sample themselves.

Although there was no known exposure or breach in PPE during sampling, 2 resident doctors out of 24 from the central sampling team tested positive for COVID-19 and were sent for home isolation for 2 weeks. Both residents recovered within 2 weeks and resumed their duties.

The formulation of a central sampling team for COVID-19 suspect patients admitted in the hospital led to the following changes in the hospital:

- A separate donning and doffing area in each ward
- Training of maximum resident doctors to perform sampling of suspected COVID-19 patients admitted in their respective wards
- Limiting the movement of suspected patients admitted in wards and thus reducing the risk of hospital spread.

Over time, all these changes made each ward self-reliant for collecting samples of suspected COVID-19 patients admitted in the ward and hence fulfilled our objective of doing this study. This study also suggests that repeated emphasis on reinforcement of institutional policies is must.

Conclusion

This study was done to see the feasibility of a central sampling team in a hospital to ease the sampling work and in turn limit the spread of COVID-19. An effective sampling strategy is required in any institution/community to check the spread of COVID-19. This can also be extrapolated to control the spread of any other epidemic or pandemic – the possibility of which cannot be denied in the changing dynamics of present-day society. Our venture of institutional COVID-19 sampling task force resulted in the training of many residents from almost all departments in all aspects of safety and optimal sample acquisition. This was realized soon after that departments became self-reliant in sampling and number of calls to the central sampling team decreased over time. Our central sampling team also ensured minimal movement of suspected COVID-19 patients in the hospital and thus leading to least possible exposure to the hospital staff. The in-patient wards also benefited by incorporating...
changes like a separate donning and doffing area in each ward and thus becoming self-sufficient in collection of samples.

**Key points**
- An effective sampling strategy is the key to curb the spread of COVID-19 – be it in an institution or in a community.
- Forming a central sampling team in a tertiary care hospital can lead to training of resident doctors in all aspects of safety and optimal sample collection. This also makes in-patient wards self-reliant in collection of samples of suspected patients admitted in the ward.

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**Conflicts of interest**
There are no conflicts of interest.

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