



Role of Contact Tracing in COVID 19: A Tertiary Health Care Experience from South India

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Authors' contributions

This work was carried out in collaboration among all authors. Author SJ conceptualized, collected data was involved in data analysis and manuscript preparation. Author SAS was involved in data collection, analysis and manuscript review. Author SMJ aided in data collection and manuscript review. Author SKN provided guidance during the conceptualization, data collection and also manuscript review. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: As the cases surge in the ongoing COVID 19 pandemic, key lessons on the transmission dynamics among health care workers (HCWs) in a hospital setting through effective contact tracing will help strengthen an already overworked healthcare system.

Materials & Methodology: All HCWs who were exposed to laboratory confirmed cases of COVID 19 reported in the hospital during the period April 2020 to November 2021 were contacted. History regarding onset of symptoms, high risk and low risk contacts at the workplace from within 48 hours prior to onset of symptoms (symptomatic) or being tested positive (in asymptomatic) were enquired. Subsequently, among high risk contacts, staff turning positive following exposure were examined to ascertain factors associated with COVID 19 transmission

Results: A total of 184 staff was quarantined as high risk contacts following exposure to a COVID positive fellow worker or patient. Of this, 29.3% (54) turned positive. Factors associated with acquisition of COVID 19 disease identified were lack of use of goggles/ face shield during an aerosol generating procedure, spending excess time together during coffee breaks or in changing

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rooms. Vaccination, prompt reporting of symptoms and testing helped to curtail clusters through prompt contact tracing.

Conclusion: Judicious use of Personal Protective Equipments (PPE) with universal masking, vaccination, hand hygiene and following social distancing helps control of COVID 19 transmission in hospitals. Health Care workers especially of the non clinical sector must be well trained in infection control practices & PPE usage. Active surveillance and dynamic contact tracing effectively identifies as well as increases awareness in high risk areas that curtails COVID 19 clusters within the hospital.

Keywords: COVID 19; contact tracing; health care workers; vaccination; generalized testing.

1. INTRODUCTION

The evolution of the COVID pandemic since the last two years has been under immense scrutiny. The changing nature of the SARS – CoV -2 virus, its transmissibility and virulence are causes of concern as it influences our day to day activities. Since the onset of the pandemic while the community went into lock down, medical and other emergency services have been working round the clock. Maintaining all Covid precautions, at all times, across the day is exhaustive and stressful. Adding to that, is the stigma faced by Health Care Workers (HCWs) as a major source of Covid infection to other members in the community [1]. Hospital based contact tracing detects a significant proportion of cases and more importantly limits the number of staff quarantined [2]. In the context of an impending Covid outbreak with another variant, the lessons learnt so far in our journey battling Covid must be judiciously applied to prevent breakdown of an already overworked healthcare system. This article highlights the key lessons learned on transmission dynamics of COVID 19 in a hospital setting through immediate & effective contact tracing. It also explores SARS CoV 2 in terms of infectivity among vaccinated and unvaccinated primary contacts.

2. MATERIALS AND METHODOLOGY

All Health Care workers (HCWs) exposed to laboratory confirmed cases of COVID 19 reported in the hospital during the period March 2020 to November 2021 were contacted through the phone within six hours of the person being diagnosed positive. Based on the history regarding type of exposure from within 48 hours prior to symptoms onset (symptomatic) or being tested positive (in asymptomatic) and possible source of exposure in the Covid positive staff and reassessment on the extent of exposure from the contacts, they were classified as high and low

risk contacts. Among these, the entire cohort of 184 staff, identified as high risk contacts were followed up for 14 days for disease acquisition. High risk contacts were quarantined in accordance with the state guidelines.

Data was entered in excel and analysed using SPSS Version 25. Association between qualitative variables was done using chi square test. A p value < 0.05 was considered significant.

3. FINDINGS

In Kerala, the public health surveillance system was able to identify the first case of COVID 19 in India on January 30th, 2020 [3]. Subsequently, in our institution, by mid February, 2020 we commenced screening of all patients and bystanders for relevant history in the past 14 days pertaining to

- i. Symptoms
- ii. Travel
- iii. Contact with known case of Covid / persons with positive travel history

All patients with a positive epidemiological history were shifted to the Covid suspect room / ICU until RT PCR results were obtained.

Since April 2020, over 2300 cases of COVID 19 have been treated in the hospital. The hospital has more than 2500 employees, and all staff were supplied masks (N 95) for hospital use. Covid restricted zones (both suspect & confirmed cases) were designated as full Personal Protective equipment (PPE) areas which meant the body suit, gloves, goggles and facemask were worn at all times by staff. Staff were instructed to use face mask, shield and gloves during patient care even in non covid zones.

The first case was a 30 year old female, with interstate travel history, who presented to the

emergency department with mild fever and no respiratory symptoms. As a positive history of travel was obtained, all HCWs who attended to this patient took all Covid precautions and cohorted into the suspect zone. None of the staff who came in contact turned positive following the exposure.

In July, 2020, we had a 60 year old female, without any significant history pertaining to Covid who presented with features of coronary artery disease requiring cardiopulmonary resuscitation and later tested Covid positive. Based on the account of events, of the 43 primary contacts, 17 were listed as high risk and quarantined. Of these, 11 turned positive in the subsequent week (78.6%). None of the low risk contacts (26) developed symptoms in the subsequent 14 days. Lack of proper use of face shield during aerosol generating procedures (intubation) and lack of protective gown / PPE while handling the patient multiple times were found to be risk factors that led to infection. There were no subsequent cases in any of the concerned areas. Following this, Emergency Department was converted to a full PPE zone so emergency interventions in patients awaiting Covid results may be done without risk to the HCW.

In the next month, of the high risk primary contacts, only 18.75% turned positive. On exploration, we ascertained that though use of face mask was appropriate, lack of continuous use of goggles / face shields and conversations in close proximity (< 1meter) for prolonged periods (> 30 minutes) in air conditioned cubicles

were risk factors. In another cluster, among supportive staff, factors identified as contributors in disease transmission were the coffee breaks and changing rooms.

By the last of week of January, 2021, staff were vaccinated with ChAdOx1 nCoV- 19 Corona Virus Vaccine (Recombinant, Oxford /Astra Zeneca) – known as Covishield. By the 3rd week of March, 2021 majority of the staff were completely vaccinated. As vaccinations began to extend to the community and public transport re started, hostellers with history of travel were the new cohort emerging positive (April – May, 2021). However, we noticed that majority (96%) of the vaccinated roommates who were quarantined remained negative during this period.

Further evidence favourable to vaccination came in the month of June, 2021. Of the 21 staff quarantined, 19 turned positive (90.5%). Among those who turned positive, 7 (36.8%) were completely vaccinated while 12 (63.2%) were partially or unvaccinated. The reason for an incomplete vaccination status being that these were newly recruited staff into the supportive services of the hospital. Due to limited vaccine availability then, only adults over 45 years among the general public were supplied vaccine as per government directive.

A comparison of few factors to explore the characteristics in those who turned positive among the high risk contacts who were on quarantine.

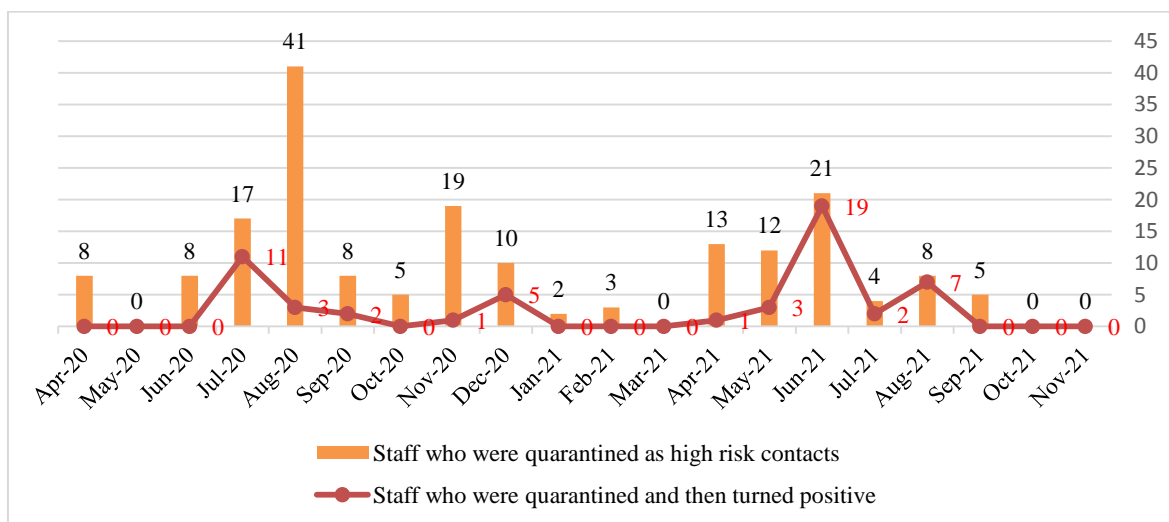


Fig. 1. Figure demonstrating the trend regarding staff who were quarantined following history of high risk exposure to a Covid positive patient in the hospital and subsequently emerging positive during the period April 2020 – November 2021

3.1 Comparison of Covid Infection with Certain Factors

Table 1. Gender and Covid Infection

There were no significant differences based on gender among staff who turned positive following a high risk exposure to a Covid positive patient

Category	Covid Positive (%)	Covid Negative (%)	P value	ChiSquare value
Males	15 (39.5)	33 (68.75)	0.73	0.11
Females	39 (28.7)	97 (71.3)		
Total	54 (29.3)	130 (70.6)		

Table 2. Clinical / non clinical sector and covid infection

A higher proportion of non clinical staff were found to turn positive when compared to clinical staff , however no statistical significance was found.

Category	Covid Positive (%)	Covid Negative (%)	P value	ChiSquare value
Clinical	10 (23.80)	32 (76.20)	0.36	0.80
Non Clinical	44 (30.9)	98 (69.01)		
Total	54 (29.3)	130 (70.6)		

Table 3. Vaccination status * and covid infection

The proportion of vaccinated employees who were high risk contacts yet remained Covid negative (57.2%) are higher when compared to those who were vaccinated and turned positive(42.8%). This difference in proportion is however not significant with a p value > 0.05.

Vaccination Status	Covid Positive (%)	Covid Negative (%)	P value	ChiSquare value
Vaccinated	18 (42.8)	24 (57.2)	0.07	3.17
Unvaccinated	14 (66.67)	7 (33.33)		
Total	32 (50.79)	31 (49.2)		

**Staff details from April 2021 onwards have only been taken , as individuals who completed 14 days after receiving the 2nd dose were considered vaccinated, anything else is categorized as unvaccinated*

4. DISCUSSION

Through the intensive contact tracing that was being done in the hospital, multiple workplace specific exposure possibilities for COVID 19 were being brought to light.

- **Use of face shields and goggles during all aerosol generating procedures of Covid positive / suspect patients**
- **Universal use of face masks & use of body gown if excessive handling of Covid patients are required**
- **Changing rooms , coffee breaks and lunch counters are possible areas where transmission amidst HCWs can go on unnoticed**
- **Prompt reporting, testing & self quarantine of symptomatic staff controls cluster outbreaks**
- **Vaccination limits transmission of COVID 19**

Fig. 2. Major findings on transmission dynamics of COVID 19 following contact tracing

The relevance of contact tracing and surveillance in a hospital for curbing transmission of COVID 19 among HCWs and promptly identifying concerns specific to that work place that helps to install several guidelines in place with specificity and focussed intervention has been highlighted in this study. Quarantine of a large number of health care workers and cluster outbreaks would exhaust the existing remnant workforce that further predisposes to infection. Karrlson et al. [4] in this regard has mentioned how the greatest risk for health care workers is not working in the ICUs, but exposure to colleagues or patients with unsuspected infections in the early stages when the viral loads are high. Unlike hospitals that cater to only COVID 19, in hybrid hospitals, the risk to HCWs are higher [5]. The need to allocate adequate as well as appropriate PPE, routine surveillance and maintain infection control measures gathers greater importance to ensure safety of the HCWs and patients.

In a paper by Angela et al. [6], it is stated that mass testing of asymptomatic HCWs to control nosocomial transmission is not necessary in hospitals with protocols for PPEs and a robust surveillance system. In our observations, similarly, we have arrived at a conclusion that proper infection control practices, appropriate PPE and constant surveillance helps to limit transmission of Covid among HCWs. This is also stated as the core in the control of Covid transmission by Karrlson et al. [4]. However, in the literature review by Mohammed Abbas [7], it is mentioned that generalized testing of HCWs as well as serial testing of all HCWs and patients during a cluster is a beneficial practice. With the establishment of guidelines on high and low risk contacts and prompt contact tracing, the necessity to expose HCWs to generalized testings may be minimized with effective cluster control.

In a meta analysis done by Valerie et al. [8], second line departments had a higher proportion of Covid infected HCW rather than the first line departments due to disproportionate allocation of PPEs. This was a source of concern in our institution too. Table 2 confirms this. Initially, shortage of PPEs and furthermore continuously wearing the entire PPE kit throughout duty hours by staff in all areas particularly those associated with direct patient care was challenging and impractical. Screening, cohorting and testing of all patients for COVID 19, with adequate PPE in the first line areas of initial exposure and in Covid areas was the strategy applied. This was also

found to be conclusively protective in a study by Muhammed Salim Khan et al. [9] where patient testing and cohorting as an adjunct to infection control practices helps limit Covid transmission. Also, mandatory use of face mask, gloves and goggles in other non covid zones helped to limit transmission during patient care. Various studies later on have validated the benefit of universal masking inclusive of non covid areas [7]. Body suits or gowns were made mandatory for the care provider if the patient needed a lot of handling. In another study by Adrien et al. [10], it was found conclusively that lack of adequate PPE was a risk factor in acquiring the disease. The increased propensity of infection among HCWs without adequate PPE & appropriate training are also stated by Karrlson et al. [4].

Atypical presentation of Covid can be a reason for an outbreak. Our 3rd case of Covid with cardiac features on presentation was the first cluster among HCWs in our institution. In a study by Wang et al, a patient who came with abdominal symptoms was found to have infected more than 10 health care workers there [11].

The prevalence of Covid infection were found to be more among staff in the non clinical sector than clinical sector, though not statistically significant (Table 2). This was similar to the finding by John et al. [12] in his study where non patient facing support staff was having a higher incidence of Covid infection. Also in the study by Nishanth Dev et al. [13], proportion of technicians and sanitation workers were more with Covid infection than compared to doctors. Focussed and repeated trainings of the non patient contact staff on hygiene practices have brought about a notable decline in disease transmission in our experience. On the contrary, Adrien et al. [10] reported a higher frequency of Covid among physicians with patient contact. This probably is accountable to the fact the inadequate PPE and lack of proper training in the initial phases predisposed HCWs with direct patient contact to infection.

Similar to a study by Pinki Tak et al. [14], in the current study there was no significant difference in the gender among HCWs who turned positive following exposure and quarantine (Table 1). However, females were a greater proportion. This is similar to another study by Samaranyake et al. [15].

The prevalence of Covid infection in our experience was found to be less among

vaccinated than unvaccinated HCWs (Table 3), but it was not statistically significant. Similarly, in a study by Samaranayake et al. [15], acquisition of disease was significantly higher among unvaccinated. This affirmed that, though beneficial, vaccination is not 100% effective in reducing transmission and the role of prevention through hygiene precautions should not be ignored.

5. CONCLUSION

Judicious use of Personal Protective Equipments with universal masking, vaccination, hand hygiene and following social distancing during meals, coffee breaks helps control of COVID 19 transmission in hospitals. Health Care workers especially of the non clinical sector must be well trained in infection control practices & PPE usage. Active surveillance and dynamic contact tracing effectively identifies as well as increases awareness in high risk areas that curtails COVID 19 clusters within the hospital.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Approved by Rajagiri Hospital Institutional Ethics Committee – RAJH2020015.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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ANNEXURE 1

Corrective measures taken up by the hospital administration following recommendations from findings of contact tracing of Covid patients

1. Reminder messages being sent as mail and messages to all staff on maintaining Covid protocols at home and at work place , especially during travel
2. Coffee and lunch breaks to be limited to < 15 minutes. Seating in the cafeteria was limited to one or 2 per table, maintaining a distance of atleast 1 metre in between
3. Notices placed in changing rooms - One person at a Time
4. Constant surveillance across the hospital.
5. Targeted training on Covid protocols to the new employees and focussed vaccination were given.
6. Alerting the hostel in charge, who ensured proper cleaning of the premises where the positive person spent time or stayed within the last 48 hours.
7. Staff with symptoms, who had given sample for testing were also ensured quarantine facilities until results came.

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