Research Article

A Case-Control Study of Risks Factors for Corona Virus (COVID-19) among Health Care Worker

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ABSTRACT

Background and Aim: The ongoing epidemics of coronavirus disease 2019 (COVID-19) have caused serious problems on public health, particularly affecting the health care workers worldwide. There are limited data on number of staff affected by this serious and fatal diseases in national and international level. This study aims to find out the cause of risk of virus transmission and spread among the health worker in Herat Regional Public Hospital, Herat–Afghanistan.

Method: We conducted a retrospective case control study to figure out the risk factors of novel covid 19 infection amongst health care workers in Herat Regional Hospital–Afghanistan in late April 2020 approximately 2 months from first case of diseases confirmation in Afghanistan which occurred here in Herat. The staff were divided into two group each of 26. The case group (n=26) were the ones with positive PCR test, while the control group (n=26) were those health workers with same criteria with negative PCR test result, the control group were randomly selected of 178 negative PCR by an administrative colleague who did not have a role in data analysis. Both groups had close contacted with positive covid 19 patients. The data were entered in spreadsheet and analyzed using Epi info 7.

Results: Regardless the type of job and place of work, the risk of infection was 4 times higher in those without prior training comparing those who had received a covid 19 training prior to exposure to the disease (OR=4:00, P<0.05, CI 95%). Mean age in the case group was slightly higher (33.9 year) comparing to the control group (30.7 year). Fever was the most common complain of both groups but more common in the case group comparing to the control (70%, 30%) respectively, this finding was significant, p=<0.05. Interestingly, shortness of breath was more common in control group comparing to the case group (30%, 7%). This was statically significant, P=<0.05 more than 50%of positive staff were belongs to two categories; nurses and residents (n=11, n=7) respectively. Comparison of sex, the place and types of job showed no significant differences in being either safe or at more risk of getting infection.

Conclusion: Health care workers are at higher risk of getting and transmitting infections from/to the patients. A comprehensive training prior to any exposure to a contagious disease is mandatory to decrease the risk for infection transmission among health care workers, KAP survey may give further information and is suggested.

Keywords: Corona virus; Health care worker; Virus transmission; Risks factors

INTRODUCTION

In December 2019, an outbreak of the 2019 coronavirus disease (COVID-19) associated pneumonia was reported in Wuhan, a mega city with an 11 million population in central China, and soon spread to other cities in China and overseas [1]. The causative pathogen was identified as a novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1].

The epidemiological data in China showed that most cases had mild symptoms, with the overall case fatality rate of 2.3%. Although SARS-CoV-2 appears less virulent than two previous zoonotic coronaviruses SARS-CoV and MERS-CoV, it was far more efficient to transmit between close contacts [1].

Health Care Workers (HCWs) play an essential role at the front lines, providing care for patients. In the context of COVID-19 and during routine health services, they provide critical care to patients and ensure that Infection Prevention and Control (IPC) measures are implemented and adhered to in healthcare facilities in order to limit healthcare-associated infections.

As of 8 April 2020, 22073 cases of COVID-19 among HCWs from 52 countries had been reported to WHO. However, at the present

time, there is no systematic reporting of HCW COVID-19 infections to WHO and therefore this number probably under-represents the true number of COVID- 19 HCW infections globally [2].

To date, there are a limited number of publications and national situation reports that provide information on the number of HCW infections. For example, a publication from China CDC on 44 672 confirmed cases as of 17 February 2020 indicated 1688 (3.8%) infections were among HCWs, including five deaths. In Italy, a situation report from 10 April 2020 reported 15314 infections among HCW, representing 11% of all infections at that time [2]. Further publications have described the epidemiological and clinical characteristics of infections among HCWs. While many infections are indicated as mild, severe outcomes, including deaths, among HCWs have also been reported [2].

METHODS

Study design

We received the primary data from the surveillance department of public health directorate of Herat. Selected 26 cases of positive and 26 cases with negative results as a control group. PCR test was the only confirmatory test. However, previous studies argued that false negative cases might be common for COVID-19 infection cases due to low virus titers, sampling at late stage of illness, and inappropriate swabbing sites [1].

The 26 cases were selected in control group randomly from the data sheet (out of 178 negative result for health care workers by the time of the research) by an administrator person who was not involved in statistical analysis.

Both groups were further classified into three groups, frequent contact with the patients (nurses, residents) limited contact with the patients (technicians, trainers, technicians, etc) and not direct contact with the patients (administrative staff and medical record staff).

Data analysis

The primary data received from the surveillance department for both case and control group were checked for any duplication and missing. Mobile phone was used to complete the missing items whenever needed. All the data entered in spreadsheet and Epi Info 7 was used to analyze data.

RESULTS

In positive cases, nurses with 11staff and residents with 7 staff were in the highest with 42% and 27% of the total cases respectively (Figure 1).

Age

Mean age in case group (positive group) was 33.9 with a range of 24-62 years. While in control group it was 30.7 for mean and range of 21-62 years. Mean was closure to the median in case group with minimal standard division (Table 1).

Sex

4 out of 26 in case group were female and 5 in the control group were female, which makes 15% and 19% respectively (Tables 2-4).
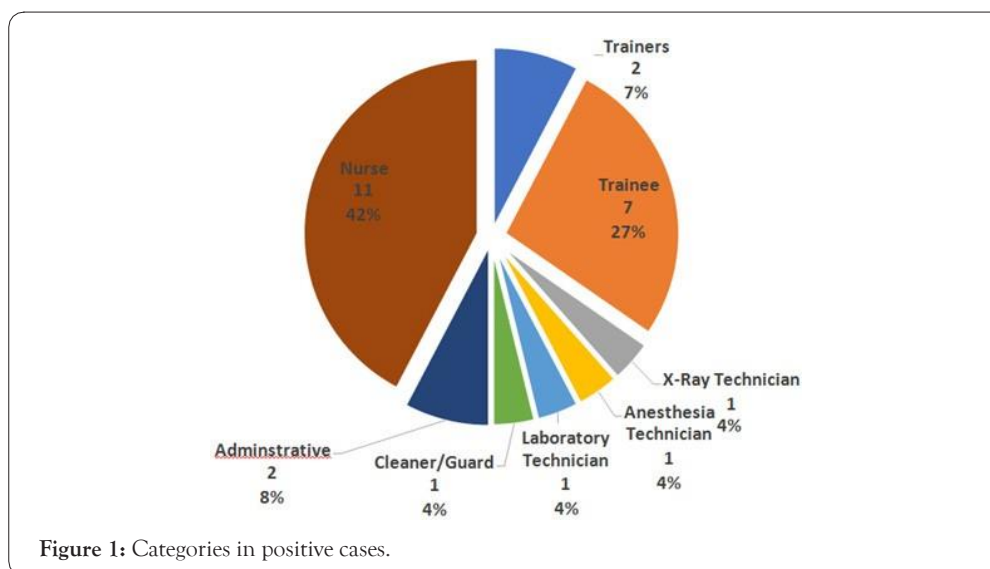

Figure 1: Categories in positive cases.

Table 1: Comparison of age for case and control group.

Age × Test Result	Obs	Total	Mean	Var	Std Dev	Min	25%	Median	75%	Max	Mode
Negative	26	883	33.962	73.239	8.5579	24	28	31.5	38	62	30
Positive	26	800	30.769	142.02	11.9174	21	24	27	29	62	27

Table 2: Sex in case group.

Sex	Frequency	Percent	Cum. Percent	Exact 95% LCL	Exact 95% UCL
F	4	15.38%	15.38%	4.36%	34.87%
M	22	84.62%	100.00%	65.13%	95.64%
Total	26	100.00%	100.00%		

There were no risk differences among sex group. It indicates that both sexes are equally at risk of being infected. Odds ratio=1.3 with p=0.3.

Table 3: Risk assessment for sex.

Sex	Test result		
	Negative	Positive	Total
F	5	4	9
Row %	55.56%	44.44%	100.00%
Col %	19.23%	15.38%	17.31%
M	21	22	43
Row %	48.84%	51.16%	100.00%
Col %	80.77%	84.62%	82.69%
Total	26	26	52
Row %	50.00%	50.00%	100.00%
Col %	100.00%	100.00%	100.00%

Table 4: Knowledge of COVID-19.

Training on COVID-19	Test result		
	Negative	Positive	Total
Yes	10	3	13
Row %	76.92%	23.08%	100.00%
Col %	38.46%	11.54%	25.00%
No	16	23	39
Row %	41.03%	58.97%	100.00%
Col %	61.54%	88.46%	75.00%
Total	26	26	52
Row %	50.00%	50.00%	100.00%
Col %	100.00%	100.00%	100.00%

Knowledge about COVID-19

Interestingly, having knowledge about covid19 prior to exposure to the diseases, can significantly decreases chance of getting infection. The staff without training had 4 times higher chance of being infected comparing to those who had received the training p=<0.05.

Clinical Signs and symptoms

Cough: 1 patient in case group and 2 patients in control group, had cough. This was not significant for details P=0.3 (Table 5).

Table 5: Cough in both groups.

Test result	Cough		
	No	Yes	Total
Negative	1	25	26
Row %	3.85%	96.15%	100.00%
Col %	33.33%	51.02%	50.00%
Positive	2	24	26
Row %	7.69%	92.31%	100.00%
Col %	66.67%	48.98%	50.00%
Total	3	49	52
Row %	5.77%	94.23%	100.00%
Col %	100.00%	100.00%	100.00%

Fever: Fever was more common in the case group comparing to the control (70%, 30%) respectively, this finding was significant, p=<0.05.

Shortness of breath: Interestingly, shortness of breath was more common in control group comparing to the case group (30%, 7%). This was statically significant, P=<0.05.

Occupation/type of job: All staff in both group were divided into professional (doctors, nurses, technicians, etc) and supportive (administrative, cleaner, driver, etc) to figure out whether the occupation can play a role. Although supportive staff were slightly more affected, this was not significant and not proved statically Odds ratio=0.6, p>0.05.

Trainer *vs* resident: In general, 12 trainees and 6 trainers were included in both group in the study. Data analysis confirmed higher risk of infection as thrice among the trainees comparing to trainers (OR=2.8), however, this was not statistically significant due to small size sample for both groups p>0.05.

Comparison of Wards and Departments

Infectious ward *vs* other wards/departments: Infectious ward was compared with other departments to figure out whether working in infectious ward can bring staff more in danger than other department. Only 1 staff of infectious ward was among the 26 positive cases and 4 in control group. Overall, the findings shows infectious department is even safer than other wards and section of the hospital, but this was not significantly confirmed OR=4, P>0.05.

Emergency *vs* wards: Emergency staff are as twice higher in risk of infection compare to other department (OR=1.8) but due to small size of sample, this was not significantly confirmed P>0.05.

Internal medicine *vs* surgery principles: All other ancillary and supportive departments (laboratory, pharmacy, administrivia, emergency, etc) were excluded to compare internal medicine departments and surgery ones, although in total number 13 out of 26 were positive in internal medicine principles, and 4 out of 8 in surgery principle, both showed 50% affected, it was not statistically significant P>0.05.

DISCUSSION

Health care workers are at higher risk of contagious diseases as well as transmission the diseases to the community. We searched different sources to find out relevant topic to compare with our study, unfortunately, no result was found. Therefore, other viral diseases with more or less similar fashion of transmission among health care provider.

One study in Indonesia on 644 HCW, including administrative, non-interventions and intervention on HBs virus infection confirmed that the duration of work regardless the type of job is the most important risk factor for getting infection although HBs is a virus diseases that might affect health care workers similar to those of corona virus, due to its chronicity and longer exposure to the virus, these two studies are incomparable [3].

In a cross-sectional web-based survey of 529 health care worker on 1st week of March 2020 in UAE, showed 61% had poor knowledge about the disease's transmission and 63.8% with no knowledge about symptoms onset [4]. In our study the knowledge and training prior to exposure to COVID-19 positive patients could significantly decrease chance of infection transmission among health care worker regardless the type of job and its direct or indirect interventions.

In a case control study on risk factors for tuberculosis among health care workers in south India, the staff of internal medicine and microbiology laboratory, were at more risk comparing other parts

of the hospital while in our study, the departments or place of work, did not have significant difference [5]. This would be due to long exposure to the infection in India, comparing to our study with shorter exposure.

Fever was the most common complains of both groups, and even more common in the case group, the difference was significant ($p < 0.05$, with CI 95%). Shortness of breath on the other hand was more common in control group but was not significant ($p > 0.05$, CI 95%). These two clinical symptoms were only reported while interviewing the staff and were not measured clinically, hence, the data reliability, remains in doubt. Comparison of Infectious Ward with other departments and ward of the hospital, shows that infectious ward is even safer for the staff to work; however, this was not significant ($p > 0.05$, CI 95%) this could be related to several factors such as; more attention of health authority toward infectious ward, increase staff knowledge and awareness by the attending doctors and ward management system, access to and using of properly protective measurements in routine activities and COVID 19, being exposed to several infection in daily activities might strengthen immune system, taking preventive medication in this case HCQ by the staff of infectious ward, etc. Health outcome of case group was fortunately good till the research date, but as it was in the progress, the figures were not completely obtained. Fever was the most common finding in both case and control group which is supported by the study performed in Iran however, in our study body temperature was not measured and only explained as a symptom by the staff [6].

CONCLUSION

Health Care Worker (HCW) of all part of the hospital even those with less direct contact to the patients, are at high risk of infections. Training prior to exposure, to all staff is mandatory, providing enough PPE supplies and proper utilization can significantly decrease infection transmission to and from the health worker to the community. Accessibility to on time testing would help on time detection of affected staff and minimize the chance of spread among health care worker.

CONFLICT OF INTEREST

The author reports no conflict of interest.

ACKNOWLEDGMENT

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