INITIAL ANALYSIS, TRIAGE SORTING OF COVID-19 PATIENTS & EMERGENCY SURGERIES IN COMBINED MILITARY HOSPITAL, MULTAN

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ABSTRACT

Objective: To analyze results of triage sorting, weekly turnout of positive cases and their mortality and to see the pattern of emergency surgeries in various disciplines.

Study Design: Cross sectional study.

Place and Study Duration: Department of Surgery, Combined Military Hospital, Multan, from Mar 2020 to Jun 2020.

Methodology: National Institute of Health Pakistan guidelines 2020 on COVID-19, for admissions and contact tracing were adopted. Group A patients were admitted with strong clinical suspicion of COVID-19 based on high risk score. Group B patients presented for contact tracing and Group C were surgical emergencies. Lab, Triage counter and isolation ward records were analyzed.

Results: Out of 408 admitted patients, 293 were males while 115 were females. 167 (40.9%) were positive. 74/167 had comorbid 5 of these died. The case fatality rate was 3% (*p*-value 0.01). In contact tracing, the secondary attack rate was 2.56%. Maximum positive trend was observed in the last 4 weeks which is consistent with the exponential rise in local and national cases. 424 surgeries were performed and 12 /424 were positive for COVID-19.

Conclusion: Screening of symptomatic patients showed Positive Predictive Value of 41% and sensitivity of 67.6%. Significant number of patients will be missed because of low sensitivity of this method. So, we recommend using Polymerase Chain Reaction as a screening modality. Symptomatic patients are likely to be positive in an area where the incidence of disease is greater.

Keywords: Contact tracing, COVID-19, Emergency surgeries, Triage.

INTRODUCTION

Currently we are facing the COVID-19 Pandemic which started as a local outbreak of Respiratory Illness with flu like symptoms in Wuhan China back in December 2019 which then went on to spread via Foreign Transmission cases into various countries. Currently there are Over 7 Million cases in the world with 404,396 deaths as of 10th June 2020. Pakistan also faces the COVID-19 Pandemic with first case reported on 26 Feb 2020 via foreign transmission, Soon after that NIH gave guidelines for case definition[1,2] and contact tracing[3]. Isolation, Social distancing and early detection are vital to limiting the local

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Received: 11 Jun 2020; revised received: 30 Jun 2020; accepted: 24 Jul 2020

spread of the disease. Meticulous contact tracing is being done using RT-PCR for SARS-Cov2. CMH Multan had already adopted admission criterion for suspected cases in line with NIH guidelines. Contact tracing was started soon after identifying first positive case during 4th week of our study. This study is an effort to analyze our initial experience oftriage sorting in terms of gender, age, weekly turnout, sensitivity of the method, case fatality rate of admitted cases and secondary clinical attack rate.

METHODOLOGY

This is a cross sectional study conducted in the Department of Surgery, Combined Military Hospital Multan, from March 2020 to June 2020 using records of labs, Triage counters and isolation wards. It was based on NIH Pakistan

guidelines 2020 on COVID-19, for admissions and contact tracing. Stratified random sampling was employed, sample size was claclulated as 2144[11] by Raosoft Online calculator with confidence level of 95% and 2% margin of error however, we have taken more patients because of the ongoing duration of our study. Patients have been divided into 3 groups. Group A patients were admitted with strong clinical suspicion of COVID-19 from triage counter based on high risk score. Cumulative score of 3 or higher was high risk score for COVID-19 and warranted admission, while score of 0-2 was low risk core for COVID-19. Explained in the table-I (admission criteria).

Table-I Admission criteria.

S. No.	Group A	Risk Score
	Admission Cirteria	**Score**
1	Positive contact history with COVID-19 Patient or a symptomatic patient having contact history with a suspected patient or symptomatic patient with travel history to any area where COVID-19 cases have been reported.	2
2	Fever	1
3	Cough or Sore throat or difficulty in breathing.	1

Group B patients presented for contact tracing with low risk and group C were the cases of surgical emergencies. Inculsion criteria for group A was Risk sore of 3 or higher, while a score of 0-2 was exclusion criteria for group A. For group B those who were travelling together in close proximity with a COVID-19 patient, or those who were staying in same close environment with a COVID-19 patient and those who were providing direct care to the COVID-19 patient with personal protective equipment. While group C patients included the surgical emergencies. Pre-operative PCR testing was mandatory for them as per the Hospital Policy. Age strata, gender and weekly ratio of positive to negative tests were analyzed using SPSS version 22 with comparison of variables being done by Bi-variate regression. Pearson's chi- square test was employed for inter-group comparison of variables being expressed in percentages and numbers, with *p*-values <0.05 being considered significant.

RESULTS

Out of a total of 408 Group A admitted patients 293 (71.8%) were males and 115 (28.1%) were females. Most of the patients were between 20-30 years age group. 167 (40.9%) out of 408 were positive. Out of 167 positive patients 74 (44.3%) had comorbids (Hypertension, Diabetes, Ischemic Heart disease, Chronic Liver Disease, Chronic Kidney Disease) 57/167 (34.1%) had single comorbid condition predominantly Hypertension, 14/167 (8.38%) had two comorbids, while 3/167 (1.79%) had more than two comorbids. 5 (6.7%) of these 74 patients died. The case fatality rate was 3% 5/167 (*p*-value 0.01) (table-II). When PCR status was plotted against the defined age strata the trend reflected that 73/167 (43.7%) of these patients were between 20-30 years age group followed by 43/167 (25.7%) were from age group 30-40 years (fig-1). First Positive case of COVID-19 was reported during the 4th week with subsequent increase of COVID-19 cases in the following weeks with a maximum positive trend in the last 4 weeks 133/167 (fig-1) (*p*-value 0.01) (table-II). The decrease in the number of admitted and positive cases during 9th (24/30) and 10th (25/29) weeks could be due to fewer people reporting to the hospital attributable to the National holidays during Eid ul Fitr.

In our study pertaining to the records of triage counter (group B), A total of 3,119 patients were tested for contact tracing. Out of these 3,119 patients 80 were found Positive which is 2.56%. Out of the 80 positive walk in cases majority of them 39 (48.5%) were dependent patients followed by 27 serving military personnel. Breakdown of positive to negative cases is 39/ 1321 dependent, 27/1205 serving persons, 9/ 451 civilians and 5/ 142 were retired. During 5th week number of walk in cases increased (2/176) significantly but the number of positive cases remained low (fig-3). The surge of positive cases can be seen during 10th (18/486) and 11th (54/602) weeks which shows an exponential

increase (fig-3) (*p*-value 0.01) (table-II). In group C, 424 emergency surgeries were performed in various surgical disciplines during this time. A significant portion of these cases were Obstetric Interventions, 270 mainly Lower Segment Caesarean Section followed by 75 Orthopedics cases due to trauma. General Surgery toll was 45, largely acute abdomen and polytrauma. Out of 270, 6 patients who required LSCS were positive

symptomatology. Rapid progression to fatality and exponentially rising cases in China led to the government-imposed lockdown to check the spread of the noveldisease. On 7th Jan 2020 nSARS-Cov-2 was identified as the causative agent of such symptoms. There have been similar outbreaks of SARS-Cov-1 back in 2003 in Guangdong, China and MERS-Cov in 2012 in Middle Eastern countries with the largest outbreak in

Table-II: P-values.

Group A - PCR Status vs Deaths		*p*-value	Group B - Weekly PCR Status			*p*-value
PCR Positive	167/408 (40.9%)		**Week**	**PCR Negative**	**PCR Positive**	
Deaths	5/167 (3%)	0.01	Week 2	10 (0.32%)	-	
PCR Neagtive	241/408 (59%)		Week 3	22 (0.71%)	-	
			Week 4	62 (1.99%)	-	
PCR Weekly Trend				Week 5	174 (5.58%)	2 (0.06%)	
Week	**PCR Negative**	**PCR Positive**	Week 6	384 (12.31%)	1 (0.03%)	
Week 1	27 (6.62%)	-	Week 7	422 (13.53%)	1 (0.03%)	0.01
Week 2	20 (4.90%)	-	Week 8	466 (14.94%)	2 (0.06%)	
Week 3	25 (6.13%)	-	Week 9	483 (15.49%)	2 (0.06%)	
Week 4	32 (7.84%)	2 (0.49%)	0.01	Week 10	468 (15.00%)	18 (0.58%)	
Week 5	46 (11.27%)	8 (1.96%)	Week 11	548 (17.57%)	54 (1.73%)	
Week 6	34 (8.83%)	6 (1.47%)				
Week 7	29 (7.11%)	18 (4.41%)				
Week 8	18 (4.41%)	37(9.07%)				
Week 9	6 (1.47%)	24 (5.88%)				
Week 10	3 (0.74%)	26 (6.37%)				
Week 11	1 (0.25%)	46 (11.27%)				

for COVID-19. Breakdown of positive cases is given below (fig-4). The data showed Positive predictive value of Triage scoring system by NIH Pakistan was 41% and Negative Predictive value of 97%. Over all specificity was 92% and Sensitivity was 67.6%.

DISCUSSION

COVID-19 is a new disease due to novel Coronavirus with first case reported in Wuhan, China in December 2019 when WHO China office was informed of an atypical illness with flu like

Saudi Arabia and UAE via animal to human transmission from camels. First case in Pakistan was reported on 26th Feb 2020 which was an imported case from a foreign travel, since then there have been exponential rise in the cases to date owing to improper infection control measures.

The case fatality rateis the proportion of deaths from a certain disease compared to the total number of people diagnosed with the disease for a certain period of time. Statistics from

a summary report of CDC China of 72,314 cases from which 44,672 confirmed cases showed a case fatality rate of 3%[4] in a study in Pakistan of 1179 COVID-19 cases CFR was 0.8%[5] in another study from multiple cities of Pakistan CFR was 1.7%[6,7] in our study out of 167 confirmed cases 5 patients

secondary clinical attack rate of 0.7%[11]. In a similar study from Shenzhen China 1286 contacts of 391 confirmed cases showed a secondary attack rate of 11.2%[12]. In our study a total of 3,119 patients were tested for contact tracing. These patients had relevant contact history with no
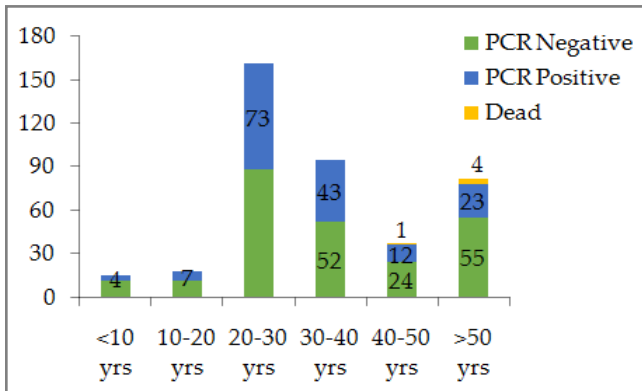

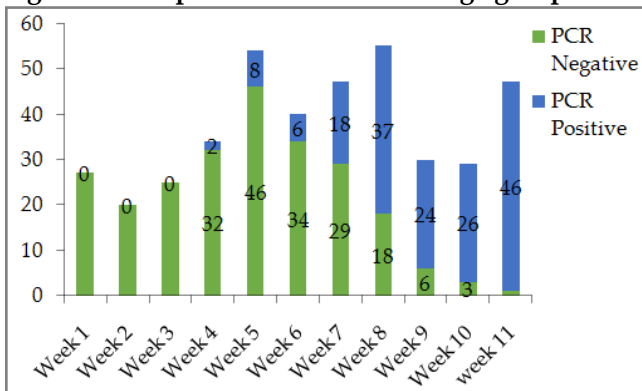**Figure-1: Comparison PCR status vs age groups.**

Figure-3: Weekly PCR trend (Admitted Patients).

Figure-2: Weekly PCR status of triage counter.
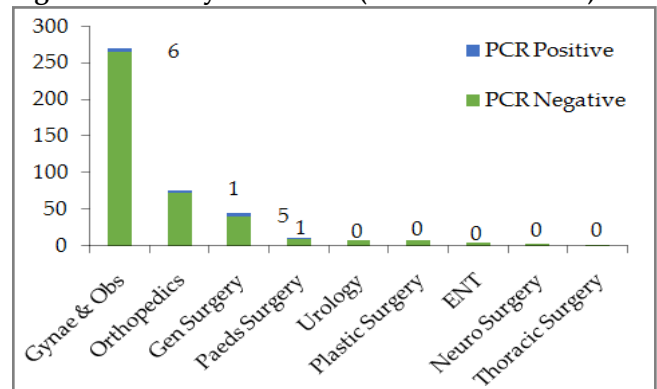
Figure-4: Surgical emergencies PCR status.

died the case fatality rate was 3%. As of 27th March there were only 3 cases in Multan which increased upto 2447 confirmed cases by early June 2020, which shows an exponential risein the total cases in Multan as per the routine updates by Punjab health department[8]. Consistent with weekly data updates in our study first positive case of COVID-19 was reported during the 4th week with subsequent increase of COVID-19 cases in the following weeks with a maximum positive trend in the last 4 weeks 133/167 total confirmed patients. Contact tracing was done as per NIH Pakistan guidelines using all the recom-mended PPEs as per WHO/CDC guidelines[9,10]. Contact tracing from 2761 close contacts of 100 positive cases in a study from Taiwan showed
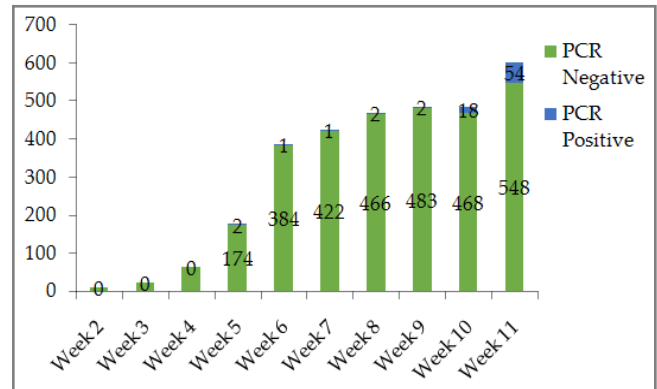
symptoms, out of these 3,119 patients 80 were found Positive which gave secondary attack rate of 2.56%.

As of 23rd march 2020 total number of cases in Pakistan were 892 with 5,857 tests done which increased upto 103,671 cases with a total of 705,833 tests conducted for COVID-19 by 7th June 2020 as declared in daily national COVID-19 statistical updates by National Command and Control Center[13] there was also an exponential rise in the number of cases[14]. In our study during 5th week number of walk in cases increased (2/176) significantly. A significant and compar-able surge of positive cases was observed during 10th (18/486) and 11th (54/602) weeks showing

an exponential increase. CMH Multan acquired PCR facility for COVID-19 during the 5th week of our study, previously the samples were being sent to Armed Forces Institute of Pathology Rawalpindi and Nishtar Hospital Multan which limited the number of tests conducted during the initial 3 weeks with no walk-in case during the first week of our study.

A study from United Kingdomreviewed 32 cases who were affected by COVID-19 near full term showed that 6% cases developed severe disease and needed to be shifted to ICU, however, no maternal and neonatal deaths were reported[15] it was comparable to the results of our study, 6 patients who were positive for COVID-19 out of 270 none of them showed any symptom of COVID-19 during their hospital stay and they did not require intensive care or supplemental oxygen. Their follow up PCRs were negative and were subsequently discharged with no neonatal and maternal deaths related to COVID-19. Obstetric Interventions mainly Lower Segment Caesarean Sections were performed during our study. In another study conductedin Tongji hospital in Wuhan, China, 7 pregnant females with positive COVID-19 status were observed in late pregnancy, maternal and neonatal outcomes were good[16].

A study conducted in three children hospitals from Seattle USA showed the overall incidence of COVID-19 in Children undergoing emergency surgeries was less than 1%[17] in comparison to our study which showed 8.3% incidence of COVID-19 in pediatric patients undergoing emergency intervention. In a study conducted in Pesaro-Fano Italy where during lockdown the toll of surgical emergencies presenting in ER dropped to only 12 cases in a month of lockdown as compared to 82 emergency surgeries before the imposition of lockdown, largely comprising of acute abdomen this result was comparable to the drop observed in our study, general surgery toll was 45 cases in 11 weeks duration of our study as compared to 58 emergency surgeries in the month preceding the imposition of lockdown these also comprised largely of acute abdomen and polytrauma[18].

Special measures were taken for surgeries during this time including pre-operative COVID-19 testing if possible. For positive cases emergency surgeries were conducted with proper PPE in designated Operation theaters. Two Operation theaters were reserved for COVID-19 cases. A total of 12 positive cases were operated during this time in our study. Special sterilization protocols and Donning of appropriate PPE for emergency surgeries were adopted to minimize the risk of exposure during emergency surgeries. Similar methods have been adopted by a team of surgeons from 13 health setups of USA who established similar protocols for emergency surgeries[19].

After adding both the admitted and outdoor cases we found out total positive cases to be 247 and total negative cases 3,280. A total of 3,527 PCR sample results were analyzed. Specificity, sensitivity, Positive and negative predictive values of Triage scoring system by NIH Pakistan were calculated using RT-PCR for SARS Cov-2 as standard diagnostic modality. The data showed Positive predictive value of 41% and Negative Predictive value of 97%. Overall specificity was 92% and sensitivity was 67.6%.

LIMITATION OF STUDY

There are some limitations to our study. During the first five weeks few individuals had positive contact history because the incidence was low in Multan but with the passage of time number of cases grew rapidly leading to decreased capacity of hospital beds resulting in fewer admissions. For contact tracing serving military personnel were vigorously tested due to service compulsion some of whom might not have contact with a positive case increasing the number of negative results. Retrospective collection of the data was dependent on the quality of documentation. The incidence of COVID-19 in patients requiring emergency surgery may not represent the true incidence. Finally, while we have tried to collect the data of all patients for COVID-19 even

if surgery was delayed due to positive result, cases could have been missed, undermining the true incidence. We have analyzed our data using PCR as a standard modality but studies have shown that PCR is not 100% sensitive too.

CONCLUSION

Screening of symptomatic patients based on NIH Guidelines showed PPV of 41% and sensitivity of 67.6% which can separate positive patients from general population but significant number of patients will be missed because of low sensitivity of this method so we recommend using PCR as a screening modality. Symptomatic patients are likely to be positive in an area where the disease is prevalent. We also found out the secondary attack rate was 2.56% which is quite high, but more studies are needed with a larger sample size. Pre op testing for COVID-19 is an important measure to decrease the risk of spread.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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