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Effect of COVID-19 Pandemic on Early Follow-up and Outcomes of Non-COVID Surgical Patients

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Abstract

Objectives: The present study evaluated the effect of COVID-19 pandemic on early post-operative follow-up of non-COVID surgical patients. Feasibility of telemedicine in providing early follow-up care was also assessed.

Background: Pandemic associated disruption of routine health care services and transport may be associated with early discharge and poor patient follow-up. Telemedicine may act as a tool to provide follow-up advice in this scenario.

Methods: The present observational study included all the non-COVID surgical patients discharged from the unit during 1st March 2020 to 30th Jun 2020. All the eligible patients were interviewed telephonically regarding their follow-up visit, post-operative complaints, complications and any medical attention they required.

Results: A total of 80 patients were operated during the study period of which 65 (81.3%) underwent planned discharge while an early discharge was issued to 12 (15%) of them. Fifty-one (65.0%) patients came for follow-up in-person either to the surgical ward or emergency department. During telecommunication, 72 (90.0%) patients responded and medical advice was given for their queries. Approximately 88.0% of the patients received satisfactory suggestions with this mode of communication.

Conclusion: Early follow up care of surgical patients was delayed in one-third of the cases. Telemedicine increased the proportion of patients receiving follow-up care.

Keywords: COVID- 19; Follow-up; Pandemic; Telehealth; Telemedicine

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Introduction

A cluster of cases of respiratory illnesses occurred in Wuhan, China in December 2019 which was linked to severe adult respiratory syndrome Coronavirus 2 (SARS-CoV-2), later named as COVID-19 [1,2]. The disease showed rapid human-to-human transmission due to droplet contamination [3,4]. COVID-19 affected almost all the regions of the world within few months and declared as global pandemic on 11th March 2020. The first case of COVID-19 in India was reported on 30th January 2020 in internationally returned travelers. Later, the disease spread rapidly throughout the country leading to implementation of lock down to contain viral transmission.

Pandemics are known to disorganize the health care systems, education, transport and economy [5]. The challenge of managing COVID-19 positive patients created a huge burden on the health care system of our country leading to interruption of routine health care and follow-up services. Lockdown further increased the hurdle to access the health services. Guidelines for essential health service delivery during Covid-19 were issued by Government of India in April 2020 [6]. According to the guidelines, visit to health facility should be minimized and telemedicine should be used for outpatient services [6]. Telemedicine has emerged as a potent tool to bridge the gap between health care demands and services in the present scenario. Literature supports the role of telehealth in providing care to the patients with a high level of satisfaction [7]. We planned the present study to evaluate the effect of COVID-19 on the early follow-up of non-

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COVID surgical patients. We also assessed the feasibility of using telemedicine in providing early follow-up care to our patients.

Research Methodology

The present observational study was conducted from 1st March 2020 to 30th June 2020 in a single unit of the Department of Surgical Disciplines of Northern India after obtaining approval from the Institute Ethics Committee (Ref.IECPG-164/23.04.2020). The study was conducted to evaluate the effect of COVID-19 pandemic on early post-operative follow-up of non-COVID surgical patients by telecommunication. Patients discharged after a surgical procedure within the study period were eligible for the study. Since the patients were contacted by synchronous telephonic communication, only a verbal consent was obtained before their inclusion in the study. As per our unit policy, early post-operative follow-up was defined as first scheduled follow-up, usually 7-days after the patient's discharge. The primary outcome of our study was to find out the proportion of operated patients coming for scheduled follow-up. The secondary outcome measures consisted of proportion of patients who could be contacted and given follow-up advice using telemedicine services, complication rate related to surgery and effect of COVID-19 pandemic on length of hospital stay.

All the eligible patients were interviewed telephonically by the principal investigator to collect the data on a predesigned proforma. Demographic details, indication for surgery, follow-up schedule, reasons for failed follow-up consultation and details of complications, if any were noted. At the end of the interview, patients were interrogated whether they are satisfied or dissatisfied with the advice given for their queries by telecommunication.

Statistical Analysis

Statistical analysis was done using statistical packages SPSS 24.0 (SPSS Inc. Chicago, IL) and Epi-info (Centres for Disease Control and Prevention, Atlanta, GA) software. Descriptive statistics was used to summarize the sample characteristics. The normally distributed data were reported as mean and Standard Deviation (SD) whereas non-parametric data were summarized as median and Inter-Quartile Range (IQR). Categorical data were expressed as proportions and associations between two or more qualitative data were assessed using Chi-square test or Fisher Exact test as appropriate. Quantitative data between groups were analysed using unpaired t or Mann Whitney U test as appropriate. Logistic regression analysis was applied to examine the effect of predictors possibly associated with early discharge and postoperative complications. The results of logistic regression analyses were presented as Odds Ratio (OR) with corresponding 95% Confidence Intervals (CI). All p values presented were two-tailed, and a p value <0.05 was considered statistically significant.

Results

A total of 98 patients were admitted during the study period, out of which 83 were operated. Eighty patients were discharged after surgery constituting eligible study population (**Figure 1**). Baseline characteristics of the study population were described in **Table 1**. Patients were most commonly operated for hepato-Biliary conditions 29 (36.3%). Almost half of the cases underwent minimal access surgery. Sixty-five (81.3%) patients were discharged in a planned manner. **Table 2** illustrates the follow-up details of the study population. Seventy-two patients could be followed telephonically of which 52 (65.0%) visited hospital in person. With the use of telemedicine, follow–up could be improved from 65.0% to 90.0%, p<0.001 **(Figure 2).** The rest 10% could not be contacted either because the details (phone number) given at the time of admission were not reachable or

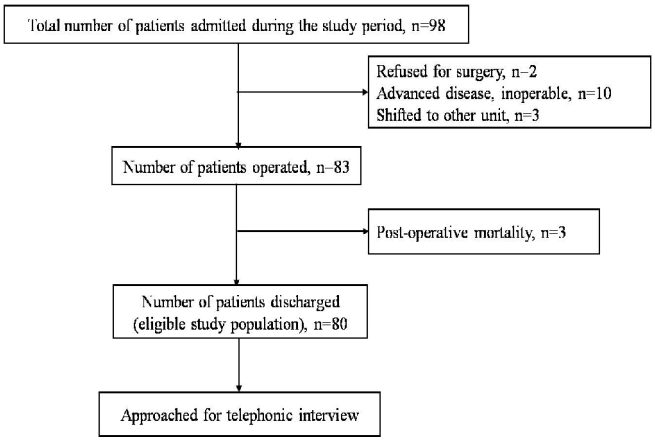

Figure 1 Study flow chart.

Table 1 Demographic characteristics of the study population.

Variables	n=80
Age, years, Mean ± SD	42.7 ± 14.9
Male, n (%)	30 (37.5)
Patients operated for malignancy, n (%)	14 (17.5)
Indication of surgery, n (%)	
Hepatobiliary	29 (36.3)
Bariatric	7 (8.8)
Endocrine	19 (23.8)
Gastro-intestinal	18 (22.5)
Miscellaneous	7 (8.8)
Duration of hospitalization before surgery, days, Median (range)	2 (0-17)
Type of surgical procedure, n (%)	
Open	36 (45)
Minimal Access	41 (51.3)
Conversion from minimal access to open	3 (3.8)
Discharge type, n (%)	
Planned discharge	65 (81.3)
Early discharge due to COVID-19 outbreak	12 (15.0)
Discharge on patient's request	2 (2.5)
Delayed due to COVID-19	1 (1.3)
Duration of hospital stay, days, Median (range)	5.5 (0-34)

Table 2 Follow-up details of the study patients.

Variables	n (%)
Details of follow up*, n (%)	
Follow up care sought in person	51 (65.0)
No follow up care sought but could be contacted telephonically	21 (25.0)
Patients who could not be contacted at all	8 (10.0)
Site of follow up#, n (%)	
Surgery out-patient department	17 (32.7)
Directly in ward	33 (63.5)
Emergency	2 (3.8)
Delay in follow up#, n (%)	35 (67.3)
Cause for delay in follow up@, n (%)	
Apprehension of catching COVID-19 infection	7 (20.0)
Lockdown and unavailability of transport	28 (80.0)
Post-operative surgical complications$, n (%)	18 (25.0)
Consultation at AIIMS for complication^k, n (%)	12 (66.7)
Consultation at other hospital for any reason$, n (%)	16 (22.2)
Patient satisfaction on telephonic communication for follow-up*, n (%)	
Yes	71 (88.8)
No	1 (1.2)
No response	8 (10)
*n=80; #n=52; @n=35; $n=72; ^k n=18	

the patients came from remote areas where they didn't have any mode of communication. Most common site of consultation was the surgical ward. A total of 18 patients developed complications related to surgery of which most common were pain at the surgical site [n=5(27.7%)] and surgical site infection [n=5(27.7%)]. Excessive drain output, drain leak, excoriation at the site of stoma, fever, per rectal bleed and marginal flap necrosis were reported in one patient each. Two (11.1%) patients complained of pain in the abdomen. We have compared the patient's characteristics between early and planned discharge groups in **(Table 3)**. Logistic regression analysis evaluating predictors of early discharge were also presented in **Table 3**. Most of the studied factors were not significantly associated with early discharge (p>0.05) except indication of surgery. Patients with bariatric [odds ratio (OR) 37.3, 95% CI 3.1, 452.1; p=0.004)], and endocrine surgeries [OR 10.8, 95% CI 1.1, 101.7; p=0.038] were significantly more likely to get discharged early compared to hepato-biliary cases. Patients with early discharge had lower post-surgical duration of hospital stay (OR 0.65, 95% CI 0.40, 1.04) and overall duration of hospitalization (OR 0.88, 95% CI 0.73, 1.06) compared to the planned discharge group, however the difference was statistically insignificant (p>0.05). Older patients with age >40 years (OR 1.10, 95% CI 0.32, 3.76) and patients with malignancy (OR 2.07, 95% CI 0.47, 9.15) were associated with higher early discharge rates compared to patients with age ≤ 40 years and benign diseases, however this difference didn't reach statistical significance (p>0.05).

Post-surgical duration of hospital stay was significantly higher in the group of patients developing post-operative complications compared to those who did not develop complications (OR 1.17, 95% CI 1.03, 1.34; p=0.020). Older patients with age >40 years had twofold higher risk of developing post-operative complications (OR 1.94, 95% CI 0.66, 6.09) compared to younger age group patients (age ≤ 40 years), however this difference was statistically insignificant (p=0.221). Similarly, female patients, surgery for conditions affecting systems other than hepato-biliary disorders, and patients with malignant disease had increased risk of developing post-operative complications; however, these differences didn't reach statistical significance (p>0.05). Other parameters were comparable between the patients with and without complications **(Table 4)**.

Discussion

COVID-19 pandemic has posed a huge burden on the health care system of the developed countries [8]. Its impact on the care of patients with non-COVID illnesses is going to be far worse in the developing countries as limited hospital resources are redirected to tackle COVID-19 patients. Lockdown instituted to prevent the transmission of the virus has further hampered the patient care. Lazzerini et al. have documented delayed access to health care

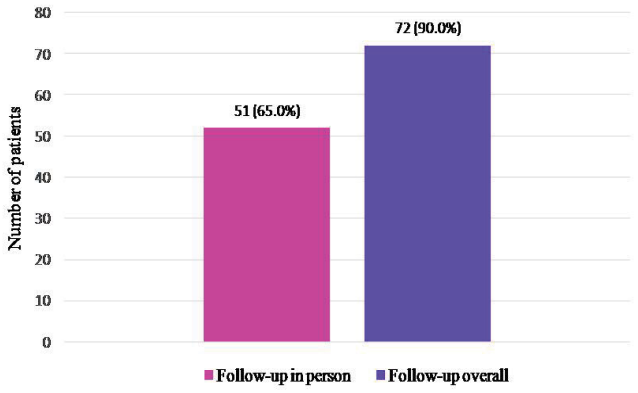

Figure 2 Follow-up rate of the post-operated patients.

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Table 3 Comparison of patient characteristics between early and planned discharge groups.

Variables	Early discharge group (n=12)	Planned discharge group (n=65)	Odds ratio (OR)† (95% CI)	P-value
Age, years, mean ± SD	43.50 ± 12.65	42.15 ± 15.33	1.01 (0.97, 1.05)	0.772
median (range)	43 (21-60)	36.5 (11-76)		
Pre-surgical Duration (days)	3.08 ± 2.50	3.28 ± 3.05	0.97 (0.79, 1.22)	0.977
mean ± SD, median (range)	2 (0-18)	2 (0-17)		
Post-surgical Duration (days)	1.67 ± 0.89	3.32 ± 3.06	0.65 (0.40, 1.04)	0.071
mean ± SD, median (range)	1 (1-3)	2 (0-12)		
Total length of stay in hospital (days)	4.75 ± 2.90	6.60 ± 4.61	0.88 (0.73, 1.06)	0.185
mean ± SD, median (range)	3.5 (11-76)	6 (1-11)		
Gender, n (%)				
Male	5 (41.7%)	24 (36.9%)	[1]	0.755
Female	7 (58.3%)	41 (63.1%)	0.82 (0.23, 2.87)	
Age group, n (%)				
≤ 40 years	6 (50%)	34 (52.3%)	[1]	0.883
> 40 years	6 (50%)	31 (47.6%)	1.10 (0.32, 3.76)	
Indication of surgery, n (%)				
Hepatobiliary	1 (8.3%)	28 (43.1%)	[1]	
Bariatric	4 (33.3%)	3 (4.6%)	37.3 (3.1, 452.1)	0.004
Endocrine	5 (41.7%)	13 (20%)	10.8 (1.1, 101.7)	0.038
GI	2 (16.7%)	14 (21.5%)	4 (0.33, 47.99)	0.274
Miscellaneous	0 (0%)	7 (10.8%)	n.a.	
Pathology, n (%)				
Benign	9 (75%)	56 (86.2%)	[1]	0.335
Malignant	3 (25.0%)	9 (13.8%)	2.07 (0.47, 9.15)	
Surgical procedure, n (%) Open	5 (41.7%)	28 (43.1%)	[1]	0.824
Minimal Access	7 (58.3%)	34 (52.3%)	1.15 (0.33, 4.03)	
Minimal access to open	0 (0%)	3 (4.6%)	n.a.	
Did the patient come for follow up, n (%)				
Yes	8 (66.7%)	43 (75.4%)	[1]	0.529
No	4 (33.3%)	14 (24.6%)	1.53 (0.60, 8.02)	
Was there a delay in follow up, n (%)				
Yes	8 (66.7%)	24 (42.1%)	[1]	0.13
No	4 (33.3%)	33 (57.9%)	0.36 (0.10, 1.35)	
Post-operative surgical complication, n (%)				
Yes	3 (25%)	12 (21.1%)	[1]	0.763
No	9 (75%)	45 (78.9%)	0.80 (0.19, 4.18)	

†Odds ratios (OR) were computed using logistic regression analysis.
For some parameters, the add-up may not be equal to n=80 due to non-response/missing observations and hence the corresponding % values were computed using non-missing values.

Table 4 Comparison of characteristics of the patient who developed post-operative complications versus those who did not develop complications.

Variables	Complications present (n=18)	Complications absent (n=54)	Odds ratio (OR)† (95% CI)	P-value
Age, years, mean ± SD	45.33 ± 14.43	41.38 ± 14.89	1.02 (0.98, 1.06)	0.326
median (range)	46 (21-67)	36 (11-76)		
Pre-surgical Duration (days),	3.72 ± 4.11	3.30 ± 3.01	1.04 (0.89, 1.21)	0.639
mean ± SD, median (range)	2 (0-15)	2 (0-17)		
Post-surgical Duration (days),	6.06 ± 6.92	2.96 ± 2.45	1.17 (1.03, 1.34)	0.02
mean ± SD, median (range)	3 (1-22)	2 (0-12)		
Total length of stay in hospital (days), mean ± SD, median (range)	9.78 ± 9.51	6.26 ± 4.03	1.10 (1.0, 1.19)	0.05
	6 (1-34)	6 (0-23)		
Gender, n (%)				

Variables	Complications present (n=18)	Complications absent (n=54)	Odds ratio (OR)† (95% CI)	P-value
Male	7 (23.3%)	23 (76.7%)	[1]	0.783
Female	11 (26.8%)	31 (73.2%)	1.16 (0.39, 3.64)	
Age group, n (%)				
≤ 40 years	7 (18.9%)	30 (81.1%)	[1]	0.221
> 40 years	11 (32.4%)	24 (67.6%)	1.94 (0.66, 6.09)	
Indication of surgery, n (%)				
Hepatobiliary	5 (21.7%)	18 (78.3%)	[1]	
Bariatric	0 (0%)	7 (100%)	n.a.	
Endocrine	5 (29.4%)	13 (70.6%)	1.37 (0.31 6.14)	0.655
GI	5 (29.4%)	12 (70.6%)	1.50 (0.36, 6.32)	0.58
Miscellaneous	3 (42.9%)	4 (57.1%)	2.70 (0.45, 16.26)	0.27
Pathology, n (%)				
Benign	12 (21.1%)	46 (78.9%)	[1]	0.086
Malignant	6 (42.9%)	8 (57.1%)	2.87 (0.84, 9.88)	
Surgical procedure, n (%)				
Open	11 (33.3%)	22 (66.7%)	[1]	
Minimal Access	6 (17.1%)	30 (82.9%)	0.41 (0.13, 1.24)	0.109
Minimal access to open	1 (33.3%)	2 (66.7%)	1.0 (0.08, 12.27)	0.999
Discharge types				
Planned discharge	12 (21.1%)	45 (78.9%)	[1]	
Early discharge	3 (25%)	9 (75%)	1.22 (0.29, 5.23)	
Did the patient come for follow up, n (%)				
Yes	15 (30.0%)	36 (70.0%)	[1]	0.178
No	3 (14.3%)	18 (85.7%)	0.39 (0.10, 1.56)	
Was there a delay in follow up, n (%)				
Yes	11 (31.4%)	24 (68.6%)	[1]	0.221
No	7 (19.4%)	30 (80.6%)	0.51 (0.17, 1.51)	
Cause for delay in follow up, n (%)				
Lockdown and unavailability of transport	7 (25.0%)	21 (75.0%)	[1]	
Apprehension of catching COVID-19 infection	4 (57.1%)	3 (42.9%)	3.82 (0.64, 25.2)	0.240

†Odds ratios (OR) were computed using logistic regression analysis.
For some parameters, the add-up may not be equal to n=80 due to non-response/missing observations and hence the corresponding % values were computed using non-missing values.

among pediatric patients due to fear of infection with COVID-19 [9]. Guidelines have been postulated to postpone elective surgeries [10]. However, there are controversies in defining elective surgical procedures [11]. There is no clear guideline to provide follow-up care to the patients operated during the pandemic phase. Telehealth has the potential to bridge the gap between demand and availability of medical care [7]. It is important to describe the outcomes of these patients which may help in better planning of their discharge.

The present study highlights that the follow-up care of the patients can be improved from 65.0% to 90.0% with the utilization of telehealth facilities. From the study, we also realize that the rest 10% of patients who were not reachable can also be contacted if we keep an alternative contact detail of the patient or his relatives and maintain proper outreach to even the remotest areas. Our patients visited outpatient clinics, wards as well as emergencies to contact the doctor. A prior telephonic communication may help to prefix the date, time and venue of consultation thus limiting the patient's movement and reduce the risk of infection transmission. Follow-up in two-third of the cases discharged from our unit got delayed. Planning the follow-up via telephonic consultation at the time of discharge itself could have prevented such delays. In the present study, 88.8% of the patients were satisfied with telephonic follow-up which has been shown in the previous studies [12]. One-fifth of our patients visited local hospitals for consultation due to various reasons. Patients can be counselled at the time of discharge to review at their nearby hospital for minor issues like suture removal or dressing change. Such advices can prevent their unnecessary travel and visit to government hospitals already over-burdened with COVID-19 positive patients. Telephonic consultation should also include counselling regarding post-operative care, estimated date and time for subsequent follow-up and measures to be taken to prevent spread of COVID-19 infection. We are providing a summary of situations which can be dealt with telehealth

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services as mentioned by Centers for Disease Control and Prevention (CDC).

CDC states that telehealth services are useful to maintain continuum of medical care in the scenario of COVID-19 pandemic while maintaining social distancing, thereby minimizing the burden on the health care facilities and reducing the consumption of personal protective equipment. According to CDC, telehealth services can be used to screen patients suspected to be infected with COVID-19, provide nutrition counselling, monitor clinical signs and adjust medication of patients with chronic disorders, participate in physical and occupational therapy, assist in case management for the patients residing in remote areas, explain care plan and counsel patients' family to choose a management option in case a medical crisis occurs, follow up of the patients after hospitalization and teaching and training of the health care professionals [13]. Guidelines have also been postulated by Ministry of Health and Family Welfare, Government of India to be followed by registered medical practitioners while practicing telemedicine [14].

The strength of our study includes objective assessment of use of telemedicine to improve follow-up care during the period of pandemic. We admit our limitation of not including sample size calculation in the study because we attempted to include all the patients discharged during the study period to deliver follow-up advice. Long term follow-up of these patients is also desired to find out late complications.

Conclusion

Follow-up care of post-operative patients has been adversely affected by the COVID-19 pandemic and lockdown. Use of telemedicine to provide follow-up advice is feasible for post-operative patients with a high level of satisfaction.

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