



# COVID-19 Pandemic: Impact on Financial Viability of Musculoskeletal and Sports Medicine (MSM) Service Line of Tertiary Care Hospital of LMI Country

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## Abstract

**Introduction:** The outbreak of COVID-19 has changed the dynamics of entire world. The pandemic had affected the functioning of hospitals and health care organizations. Majority of hospitals have shut down their outpatient clinic and elective operative work. The health organizations are facing unprecedented financial challenges due to less income and additional expenditure on procurement of PPEs. We conducted a retrospective cross-sectional study in a tertiary care hospital of LMI country. The main objective was to see reduction in volumes, revenue generation and impact on health care workers in terms of health, financial package and retention of their jobs.

**Materials and Methods:** This retrospective cross-sectional study was conducted at a Tertiary Care Hospital of Karachi, Pakistan over a period of twelve weeks from February 1<sup>st</sup> to April 30<sup>th</sup>, 2020. The study duration divided into two time periods; Pre-COVID Era and COVID Era of six weeks each. Pre-COVID era had normal functioning of outpatient clinics and inpatients services while in COVID era only emergent, semi-emergent work was allowed. Data was collected from Hospital management software system and following variables were collected; frequency of clinics and number of patients per day, number of admissions and operating procedures per day, expenses due to the use of PPEs. Data was entered in STAT A version 15.0. For quantitative descriptive analysis, median and interquartile ranges were calculated.

**Results:** There was decrease in outpatient volumes of rheumatology and Orthopedic both significantly (p value of <0.001) and reduction in revenue. The number of clinic and procedures per day were also reduced significantly (p value of <0.001) for both rheumatology and orthopedics. There is 100% increase in use of PPEs with p value of 0.005. The inpatient admissions and surgical procedures were reduced 50% and revenue generation went down to 40.7%. There was 100% increase in use of PPEs.

**Conclusion:** COVID-19 affected the outpatient clinic and inpatient services of MSM service line of a tertiary care Hospital with substantial reduction in all accounts leading to a huge loss in the earning of hospital. The hospital management took appropriate steps to compensate its employees.

**Keywords:** Outpatient; Pre-COVID; COVID Era; Musculoskeletal; Sports Medicine; PPE

## Abbreviation

MSM: Musculoskeletal and Sports Medicine; SOP: Standard Operating Procedure; PPE: Personnel Protective Equipment

## Introduction

The Chinese government declared an outbreak of novel Coronavirus (COVID-19) in December 2019, that originated from Wuhan Province [1-2] according to World Health Organization (WHO) and the Centre for Disease Control and Prevention (CDC). Presently COVID-19 pandemic has spread all over the world and had deleterious impact on the world economy, working of institutions, growth and production of various industries including health care industry [3-4]. COVID-19 pandemic was announced on March 11<sup>th</sup>, 2020 by WHO [2]. The different countries have opted different strategies to control the spread of this novel coronavirus infection. These measures

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include lockdown of public gatherings, closure of different industries, maintaining social and physical distancing, and essential use of masks. Standard Operating Procedures (SOP) have been developed by governments and implemented forcefully to control the spread of disease [5].

The substantial increase in the number of COVID-19 cases has become a challenge for hospitals especially of countries with low socio-economic resources. COVID-19 brought unemployment, poverty and hunger among already underprivileged people that has become a major issue for developing countries to cope financially with COVID-19. The outbreak of COVID-19 has revolutionized the health care industry and changed the dynamics of functions and financial set up of private sector hospitals. The hospitals are crowded with patients of COVID-19 and management of hospitals is taking extraordinary measures to accommodate those patients. These preventive and curative measures include construction of temporary COVID zones for screening and tests, converting various wards in COVID isolation units, Intensive Care Units (ICU) and special COVID Operating Rooms with negative suction [6]. The hospitals had to defer normal functions like closing outpatient clinics and operation theatres for elective surgeries. Only emergency work was allowed to control spread of disease among community and health care workers. The major source of revenue generation for hospitals is outpatient clinics and elective procedures (total joint replacements, reconstructive work, and sports injuries) [7].

The hospital organizations had to spent additional money in procuring (PPE) personal protective equipment (face masks, N95 masks, gowns, gloves, shields, head and shoe covers, sanitizers), ventilators and ICU monitors to cope with unprecedented COVID-19 pandemic [8].

The first case of COVID-19 in Pakistan was reported on February 26<sup>th</sup>, 2020 that was diagnosed and treated at this institution [9]. Following the successful treatment of that case, our hospital being a tertiary care centre took the lead role in screening, diagnosis and treatment of patients with COVID-19 due to its international certification (JCIA) and robust infrastructure (ICU, isolation units and operation theatres with negative suction, trained staff and elaborate infection control measures). The lockdown in our country was announced on March 13<sup>th</sup>, 2020 [1,9]. Following the instruction of Government, all elective surgeries were put on hold and only emergency and semi-urgent procedures were facilitated nationwide, and in our institute as well, from March 16<sup>th</sup>, 2020 to April 30<sup>th</sup>, 2020. Outpatient clinics and the orthopedic emergency bay were restricted to emergency issues such as infections, fractures, and follow-up care of post-operative patients. The screening of these patients was done by clinical staff and patients were managed by consultants only (residents were excused from the clinics); the rest of the patients were managed *via* tele-clinics which is a promising evolving modality [5,6]. All academic and administrative meetings were switched from physical to virtual ones.

Musculoskeletal and Sports Medicine (MSM) service line comprises of two subspecialties, Orthopedic Surgery and Rheumatology. There is a dedicated clinic area in the outpatient clinic building designated as Musculoskeletal and Sports Medicine (MSM) clinic. Our inpatients are located in designated general ward (one bay has 5 patients) semiprivate room for two patients and private room for single patient. There are 12 orthopedic surgeons (11 full time and one part time) and five rheumatologists (2 full time and 3 part time)

working together in that clinic.

American hospital Association has recently published a report regarding the catastrophic financial challenges faced by the private hospitals due to COVID-19 pandemic that has shifted all efforts of hospital management and health care workers towards treatment and prevention of COVID-19 [8].

With outbreak of COVID-19 all the elective surgeries have been postponed and deferred, that had made financial survival of hospital difficult. The hospital management and MSM service line has focused their efforts to treat the incoming patients with COVID-19 and control the spread of disease in the community and among health care workers. Due to implementation of above measures revenue generating elective procedures decreased tremendously [8,10,11]. Recently Khullar et al. [11] pointed out that major source of earning of private hospitals is through inpatient elective surgeries especially orthopedic and outpatient clinics. These steps challenged the financial viability of the hospital and MSM service line to cope with burden of monthly salaries and compensations of health care workers. Based on the above changes in our day-to-day functioning, we conducted a retrospective study and analyzed the impact of COVID-19 on operations of MSM service line to see how those changes affected outpatient volumes, admissions, surgical procedures, and financial income of service line. The secondary objective was to see impact of COVID-19 on health care workers (in terms of contracting disease, isolation, quarantine, leaves and functioning) and analyze compensation plan of hospital.

## Materials and Methods

This is a retrospective cross sectional single center study conducted in a tertiary care teaching hospital; one of the best in the region. We collected data of patients admitted from February 1<sup>st</sup>, 2020 to April 30<sup>th</sup>, 2020 in the Musculoskeletal and Sports Medicine (MSM) service line using non-probability consecutive sampling. This study population was divided into pre-COVID and COVID eras (6 weeks each) according to date of admission; Pre-Covid-19 era was from February 1<sup>st</sup>, 2020 to March 15<sup>th</sup>, 2020, and COVID-19 Era was March 16<sup>th</sup>, 2020 to April 30<sup>th</sup>, 2020. Patients in the pre-COVID era were admitted through Orthopedic Emergency Bay and MSM clinics before imposition of lockdown and all sorts of emergency and elective surgeries were performed, while patients in the COVID era were admitted through Emergency Bay mostly when lockdown was imposed in the city. Data was obtained from Hospital management system, operation theatre and outpatient clinic logs. The data included patient demographic parameters like age, gender, admission through clinic, or emergency bay, number of clinics per day for each consultant of rheumatology and orthopedic, numbers of patients per day (initial, follow up, brief, procedures), number of surgeries per day (emergency *vs.* elective). We also collected data regarding use of PPEs in inpatients and outpatients' areas, involvement of health care workers and decrease in revenue generation in COVID-19 era (Graph 1).

We divided our data into 5 categories; outpatient data, inpatient data, additional expenses of PPEs, exposure of health care workers and measures taken by hospital to compensate health care workers.

Data were entered in STAT A version 15.0. For quantitative descriptive analysis, median and interquartile ranges were calculated. Wilcoxon rank sum test for two independent samples was applied to assess group difference and p value of  $\leq 0.05$  was considered



statistically significant.

## Results

### Out patients result

We compared the data of Pre-COVID with COVID era in terms of number of clinics per day, number of patients (initial and follow up) and for both Rheumatology and Orthopedic Surgery of MSM service line. Looking at the Table 1, number of rheumatology clinics and patients (both initial and follow) were reduced significantly comparing Pre-COVID with COVID periods with p value of <0.001, that had significant financial implications. The total number of patients seen in Pre-COVID era of rheumatology section were 798 while only 188 patients were seen in COVID era; 76.4% decrease in the clinic volumes with a consequential 76.4% reduction in revenue generation.

Looking at the outpatient clinic data of orthopedic surgery, the figures are more or less same as the rheumatology outpatient data. The numbers of orthopedic clinics, patients' volumes and outpatient orthopedic procedures (removal of K wires, external fixators, aspiration and intra-articular injections) were reduced significantly each with p value of <0.001. The total number of outpatients seen in Pre-COVID era of orthopedic section were 4775 and only 1696 patients were seen in COVID era, 64.48% reduction in clinic volumes with significant reduction in revenue generation. Tele clinic was started in COVID era to facilitate our follow up and semi-emergent patients but response was slow to start with. Only 72 patients were seen in tele-clinic in COVID era, although numbers are rising now.

Table 2 shows the financial implication of COVID-19 on outpatient volumes and sequential revenue generation of MSM service line; the fall in than earnings of rheumatology was 76.4% and that of orthopedic was 64.48%.

Looking at the use of PPEs, there is 100% increase in use of face masks, N95 masks, shields, gowns and shoe cover that is significant with p value of 0.005. The use of hand sanitizer increased and we detected 100% compliance in hand washing as shown by audit report of Department of Infection Prevention and Hospital Epidemiology (DIPHE).

Due to decrease in number of orthopedic and rheumatology clinic per day, the utility of staff and health care workers was reduced and working hours were diminished. The total number of staff was reduced to 50% in COVID period [12] as compared to pre-COVID [22]. The health care workers availed their earned leaves in COVID era significantly, may be due to fear of contacting novel corona virus infection. We got only one staff of outpatient clinic infected with

COVID-19 who went into isolation for 3 weeks. Similarly, eight staff members who were exposed to this infected staff were sent on quarantine for two weeks and their PCR for COVID-19 turned out to be negative.

### Results of inpatient

We compared the admissions and surgical procedures of Pre-COVID era with COVID era of six weeks each and found significant reduction almost 50% in numbers. There were 269 admissions with 261 surgeries in pre-COVID era and only 136 patients were admitted in COVID era with 129 surgical procedures. MSM service line is highest revenue generating section among 12 section of department of surgery of this tertiary care hospital. With reduction in number of elective orthopedic surgeries (total joint replacement, ligament reconstruction, nerve and tendon transfer) the revenue of MSM service line went down almost 41%. In addition to losses in revenue generation, the hospital had to spend additional money (54.5% more as compared money spent in Pre-COVID) on procuring adequate number of PPEs for health care workers.

### Use of PPEs

The hospital management had to spend additional money to have adequate supply of PPEs (Face mask, Gloves, Goggles, Eye shield, Respirators, N95) due to COVID-19, availability of PPE was another area of concern. There was 100% increase consumption of face masks, goggles, N95s, and face shields) while use of gloves and hand sanitizers increased 40%.

### Exposure of health care workers

There were three health care workers (one each nurse, resident, nursing assistant) from inpatient areas who got infected with COVID-19 and their treatment was done in the same institution according to its financial package (employee has to pay only 15% of total charges of admission).

One of our outpatient clinic staff also got infected who was sent in isolation for 3 weeks and he recovered over period of 6 weeks.

### Compensation of Health care workers

With substantial reduction in earnings of hospital (65% reduction in outpatient and 41% in inpatient revenue) the hospital management decreased the pay of all health care workers by 20% in the consultant category and 10% in the admin level whereas rest of the deficit was compensated by the hospital for three months period of time from April to June, 2020. The compensation plan was changed in favor of hospital employees to compensate their reduced salaries.

## Discussion

COVID-19 has revolutionized the operations and working environment of health care organizations especially private hospitals. It has badly affected the financial earnings of private hospitals. Our results show outpatient volumes of rheumatology decreased 76.45 and that of orthopedic decreased 64.48%; that had a lot of financial implication. The literature review also showed the same results. Ateev Mehrotra et al. [10], in the common wealth report have shown the outpatient clinic volume went down up to 60% as patients do not want to come for elective consultations to save themselves from the COVID-19 disease. Outpatient clinic of Musculoskeletal and Sports Medicine (MSM) changed its operations in terms of practices and infrastructure to prevent the spread of COVID-19 among patients and across our health care workers. The entries for elective patients

were restricted and only follow up; postoperative and semi-emergent patients were entertained in the clinics that resulted in significant decrease in outpatient volumes of service line. Due to above measure the elective orthopedic work went down to negligible numbers that was a big financial hit to private university hospital setting.

Inpatient data showed significant (40.7%) reduction in the number of admissions and surgical procedures. It was because of the fact that all elective, high revenue generating procedures (total Joint replacement, Sports related, spine, tumour and reconstructive procedures) were deferred. Only emergency work of fracture, infection, dislocation and open injuries were being dealt. In our service line 60% revenue generation is by elective surgery and only 40% revenue come from trauma related work. The data of American Hospital Association [8] and others show that elective procedures (joint replacement, arthroscopic ligament reconstruction) in orthopedics are major source of revenue generation [10-12].

The use of PPEs in inpatient and outpatient are of MSM service line was increased significantly. The hospital management had to spend additional money and resources on procuring PPEs, monitors and ventilators and to reconstruct temporary COVID zones for screening, testing and isolation. All these measures were additional burden on the hospital resources and constraint to the limits of bankruptcy.

Four of our staff got infected with COVID-19 one from outpatient clinic and 3 from inpatient area; were sent to isolation and recovered well. Similarly, COVID-19 pandemic pushed our clinic staff to avail their earned leave that was quite significant due to fear of contracting COVID-19. Reviewing the international data, the involvement of health care workers and morbidity is variable. In one of the studies from Italy [13] Carla Felice et al. found 18% of the health care workers were infected with Corona virus. Only 4 out of 98 members of MSM service line were infected with incidence of 4%.

Our hospital management was proactive and took concrete steps to accommodate incoming patients with COVID-19 to control disease and protect our health care workers. The hospital established followings; a separate COVID zone for screening and PCR testing, COVID Isolation Unit of 100 beds, ICU of 16 beds and separate COVID operation theatre of 3 large theatres rooms with negative suction. The hospital management provided state of the art PPEs to all health care workers including nurses, technicians, residents, doctors of all subspecialties. Hospital management also paid special attention on training of health care workers for prevention and treatment the COVID-19.

The American Hospital Association in a recent issue of May 2020 [11] pointed out unprecedented financial pressure faced by the private hospitals and has pointed out need of help from Government, agencies and personal donations. According to a recently published viewpoint in JAMA June issue [11], Khullar raised questions regarding financial viability of private sector hospitals as outpatient clinics were closed and elective work was postponed or deferred. With substantial reduction in earnings, the hospital management decreased the pay of all health care workers by 20% in the consultant category and 10% in the admin level whereas rest of the deficit was compensated by the hospital for three months period of time from April to June, 2020.

Hospital management contributed financially to its employees in the crisis when hospital had difficult time to pay salaries. Basic salaries were reduced only 20% reduction in consultant rank and 10%

in the administrative staff. The clinical component of clinical faculties was paid up to 80% in spite of reduced earning of faculty and service line (-65% in outpatient clinic and -41% in inpatients areas). With outbreak of COVID-19, all above financial losses, and sufferings of health care workers were born hospital that was commendable effort on the part of hospital.

COVID-19 pandemic has changed the dynamics of world. It has challenged the health care systems and organization on many fronts; training of staff, reconstruction of COVID zones for screening, testing, and isolations, acquiring PPEs, Monitors and ventilators on one hand [7-8]. On the other hand, the health organizations and private hospital had to suspend outpatient services and elective surgeries; that is main source of revenue generation for the private hospitals. These steps challenged the financial viability of private hospitals and pushed the health organizations to reduce the staff and their salaries [10-12]. Looking at the operations and steps of our tertiary care hospital, the volumes of outpatient and inpatients went down with subsequent decrease in revenue generation. The various measures implemented were unprecedented and mandatory to save patients and health care workers.

Present operations of outpatient clinic have changed with daily tele-clinic for each consultant along with regular physical clinic. The patient volumes in clinics have gone down and clinics are being held without resident with all precautionary measures like face masks, shields and gloves. The hand washing is mandatory before and after examination of patient. Similarly, the inpatient care and practices have also changed due to less number of patients and COVID-19 screening and PCR is mandatory for admission.

## Conclusion

To the best of our knowledge none of the private hospital has published data regarding the fall in their revenue generation. This is most probably first effort/report to highlight the drop in finance of a MSM service line of a private hospital that is trying to reduce its share of profit and passing it on to health care workers while preventing layoffs. Similarly report of Common Wealth Fund shows a significant dip in outpatient visits because of COVID-19 pandemic [10]. Most of the recent reports from USA has shown the financial constraint of private hospitals who need a big support from Government, agencies and welfare organizations in form of donations [11,12].

COVID-19 is an invisible enemy of mankind that had threatened the health care organization and challenged their financial viability of private sector hospital. The timely strategic actions of our hospital saved the financial collapse and lives of many patients and maintained smooth functions with retention of all hospital employees.

## Ethical Consideration

The study was approved by the Institution ethical review committee (ERC number 2020-4988-10919).

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