

# The early impact of the COVID-19 pandemic on the Emergency Department at Mater Dei Hospital

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## Background

On the 1<sup>st</sup> of April 2020, Malta declared a Public Health Emergency. Mater Dei Hospital (MDH) is the only public hospital catering for 441,543 inhabitants, until recent 2020 statistics. Several changes had to be implemented to improve the infrastructure, manpower and other resources of the Emergency Department.

## Method

This observational clinical study is based on retrospective data collected for patients presenting to the Emergency Department between March 2019 to December 2019 and March 2020 to December 2020. Randomisation was attained by choosing the seventh day of each month as to have a different day of the week for each month under study. Following the data collection, a Microsoft Excel Sheet® was created to document and analyse the retrieved information. Permissions to collect this data were duly obtained from the CEO, Data Protection Officer and Clinical Chairperson of the Emergency Department at Mater Dei Hospital.

## Results

Between March and December 2019 a total of 1811 patients were seen during the randomised days while 1681 patients were seen between March and December 2020. Data collected showed that Emergency Department attendances decreased by 7.2% while the hospital's percentage of daily admissions increased by 3.4%, when comparing ten pre-COVID-19 months with the ten initial COVID-19 months.

## Conclusion

MDH's Emergency Department, remained the main port of call for the population whether in declared states of health emergencies or not. MDH and its Emergency Department have to remain consistently prepared and resilient to sudden and unexpected patients' surges.

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Malta reported its first COVID-19 case on the 7th of March 2020 and this was published in local newspapers on that same day.<sup>1</sup> On the 1st of April 2020, Malta declared a Public Health Emergency.

Pandemics are notorious for disrupting day to day healthcare delivery systems. For example, the American Pandemic Influenza Plan update issued in 2017 reported that viral pandemics place an extraordinary demand on both Public Health and the health care systems.<sup>2</sup> Despite the fact that the outcome of COVID-19 was unclear at the time, previous such events foretold that the global health-care infrastructure would be overwhelmed. A paper issued by Emanuel EJ et al, in the New England Journal of Medicine in May 2020, stated that the health needs created by this pandemic had already exceeded the capacity of the United State (US) hospital resources by May of last year.<sup>3</sup>

In Malta, Mater Dei Hospital (MDH) is the only public hospital on the island and it caters for 441,543 inhabitants, until recent 2020 statistics.<sup>4</sup> Up to March 2020, MDH was never logistically challenged to such an extent. Following the declaration of a national state of health emergency, hospital administration, in consultation with many stakeholders, including the Emergency Department management, had to establish a preparedness plan to respond to such a pandemic.

Several changes had to be implemented to improve the infrastructure, manpower and other resources of the Emergency Department (ED) namely:

- The restructuring of the previous existent adult Emergency Department to cater for High risk COVID-19 patients.
- The creation of a second adult Emergency Department to cater for low COVID-19 risk patients (later known as ED2).
- The relocation of the existent paediatric Emergency Department.
- The re-location of the 112-call receiving room.
- The re-engineering of the ventilation system in the Emergency Department.
- The re-structuring of the waiting area.
- The creation of a Filter Pathway to stratify and separate patients according to their COVID-19 risk prior to triaging patients.
- The allocation and availability of different types of Personal Protective Equipment (PPE).

- The general ED shop floor management, including the staff's breaks.

On the 6<sup>th</sup> of May 2020, the Royal College of Emergency Medicine published a position statement with five recommendation statements regarding the resetting of the Emergency Department in the UK.<sup>5</sup> These statements aimed to optimise the delivery of patient care by minimising the risk of exposure to airborne / droplet infections to both patients and health care personnel and stated that:

- Emergency Departments must not become reservoirs of nosocomial infection for patients
- Emergency Departments must not become crowded ever again
- Hospitals must not become crowded again
- Emergency care must be structured to ensure the safety of vulnerable patients
- Emergency Departments must be a safe workplace for staff

The aims of this study are three-fold:

1. To determine the number of ED attendances and admissions during the pandemic's first year and assess if there was a significant difference compared to the previous year and to other countries.
2. To outline the structural adjustments that the Emergency Department had to undertake during the COVID-19 pandemic to make it a safe environment for both patients and staff, to minimize COVID infection cross-contamination, and to avoid overcrowding.
3. To compare the changes applied locally with those in other tertiary Emergency Departments and suggest recommendations for future similar crisis management.

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## MATERIALS AND METHOD

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This observational clinical study is based on retrospective data collected for all the patients presenting to the Emergency Department between the period of March 2019 to December 2019 and March 2020 to December 2020. To gain insight on how COVID-19 may have impacted Emergency Department attendances, ten months of such randomised days were chosen before identification of the virus in Malta, and these were compared to

**Table 1** The Inclusion and Exclusion Criteria for the Study

Inclusion Criteria	Exclusion Criteria
Patients over the age of 16 years Patient presenting to the Emergency Department on the seventh day of each month during 2019 and 2020	Patients under the age of 16 years Patients presenting on other days of the months in 2019 and 2020 Patients with an OBS& Gynae complaint Patients presenting with an ENT complaint Patients with an ophthalmic complaint

randomised days in the same months during the COVID-19 pandemic in 2020. Such data collection allowed a comparative analysis of Emergency Department attendances prior to and during the COVID-19 pandemic in Malta.

Randomisation of data collection was attained by choosing the seventh day of each month; this was done to have a different day of the week for each month under study. This randomisation method removed any bias that may be linked to a particular day of the week vis a vis Emergency Department attendance. Furthermore, the first identified COVID-19 case in Malta was on the 7<sup>th</sup> March 2020.

Table 1 summarises the inclusion and exclusion criteria of the study. Patients attending Paediatrics, OBS & Gynae, ENT, and Ophthalmology were omitted from this study since they are managed by other departments at MDH rather than the Emergency Department.

Following data collection, a Microsoft Excel Sheet® was created to record and evaluate the data. The data was filtered to analyse the number of Emergency Department attendances on the randomised days and the number of admissions to MDH from the Emergency Department. Permissions to collect this data were duly obtained from the CEO, Data

Protection Officer and Clinical Chairperson of the Emergency Department at Mater Dei Hospital.

## RESULTS

In the 10 months preceding the local declaration of the pandemic, a total of 1,811 patients were seen during the randomised days, with a mean of 164.6 patients daily. In comparison, during the 10 randomised days during the pandemic year, a total of 1,681 patients were seen with a mean of 152.8 patients daily.

In both years under study, there were some days that had abnormally low attendances compared to others (August and December 2019 and April 2020). There were no documented reasons for such, although they might have been either due to IT issues with computer data collection on those days, or due to really low attendance days.

Of interest, in 2019 the busiest seventh day of the month was June with a total of 270 whilst in 2020 it was September with a total of 203. These are both summer months. Table 2 compares the number of patients who presented to the Emergency Department during the study period.

**Table 2** A comparison of the number of patients presenting to the Emergency Department on the seventh day of each month during 2019 and 2020.

	Year 2019	Year 2020
<b>March</b>	237	193
<b>April</b>	218	18
<b>May</b>	225	181
<b>June</b>	270	182
<b>July</b>	244	193
<b>August</b>	58	185
<b>September</b>	255	203
<b>October</b>	144	173
<b>November</b>	108	163
<b>December</b>	52	190

An overall reduction in Emergency Department visits was seen following the identification of the first COVID-19 patient in March 2020. However, with the easing of pandemic restrictions in June 2021 and the reopening of schools in October 2020, the number of visitors to the Emergency Department increased and, from October 2020 onwards, topped that of the preceding pre-COVID-19 year.

With regards to hospital admissions from the Emergency Department, Table 3 shows that besides the two months following the pandemic declaration, that is, March 2020 from April 2020, the percentage number of admissions increased significantly when compared to 2019.

Overall, there were 698 ward admissions from the ED in 2019 and 741 admissions in 2020. The average daily admission percentage compared with the respective daily ED attendances in 2019 was 34.6% whereas this percentage in 2020 was 38%. There were surges in admissions in the months of November and December 2020, and these coincided with the consistently high numbers of new COVID-19 infections during those months.

Overall, the data collected showed that Emergency Department attendances decreased by 7.2% while the hospital's percentage of daily admissions increased by 3.4%, when comparing 10 pre-COVID-19 months with the 10 initial COVID-19 months.

## DISCUSSION

Upon declaration of a National Health Emergency, several structural and process changes occurred at the Emergency Department of Mater Dei Hospital.

The structural changes had to be implemented in line with Public Health, Infection Control and World Health Organization (WHO) guidelines.

A COVID-19 Risk Stratification or Filtering Tool was introduced. This Filtering Tool was used to risk stratify the COVID-19 high-risk patients from the low-risk ones and direct them to two spatially separated Emergency Department areas. These filtering algorithms were regularly updated in line with the hospital infection control guidelines. The High-Risk Emergency Department was kept in the original Emergency Department whilst the Low-Risk Emergency Department was established at the Endoscopy Unit / Day Care of the hospital. On the 18<sup>th</sup> of May 2020, the two areas were subsequently called Emergency Department 1 and Emergency Department 2. Resuscitation cases or anyone who was unable to answer the filtering tool check list was automatically considered as high risk for COVID infection.

Structural changes also involved the re-engineering of the Emergency Department Ventilation System. Negative pressure ventilation systems were implemented in areas where either high risk or confirmed COVID patients were being managed, together with three standalone High-Efficiency Particulate Absorbing (HEPA) Filters.

New Infection Control rules were integrated with the aforementioned structural modifications. Social distancing for patients waiting in the waiting area, personal protective equipment for staff according to WHO regulations, the elimination of patients waiting in corridors whilst waiting for a hospital bed, the

**Table 3** Comparison of the percentage admissions from the Emergency Department between the year of 2019 and 2020.

	Year 2019	Year 2020
<b>March</b>	116 (49%)	71 (36.7%)
<b>April</b>	93 (42.6%)	5 (28%)
<b>May</b>	92 (41%)	83 (46%)
<b>June</b>	82 (30%)	77 (42%)
<b>July</b>	80 (32.8%)	71 (36.8%)
<b>August</b>	18 (31%)	96 (52%)
<b>September</b>	108 (42%)	94 (46.3%)
<b>October</b>	48 (33.4%)	74 (34.1%)
<b>November</b>	39 (36.1%)	82 (50.3%)
<b>December</b>	22 (42.3%)	88 (46%)

prohibition of relatives entering clinical areas with patients, swabbing of all admitted patients and their initial admission into high-risk wards were amongst the changes.

Also, irrespective in which Emergency Department the patient was being managed, the patient had to remain inside the cubicle throughout his/her stay, until he/she was either discharged or admitted. Between patient turn over, thorough cleaning of the floor, cubicle, and the stretcher had to be carried out each time.

These structural and process changes necessitated changes in the Work Force management. In the initial phases of the pandemic, trainees from different departments namely the Surgical Department and its subspecialties, Radiology and Pathology departments were tasked to help with the assessment and management of patients in the Low-Risk Emergency Department. Emergency Physicians were mostly tasked to manage the High-Risk Emergency Department. Nurses from other departments were also mobilised to the Emergency Department to help the Emergency Nurses.

These local structural adjustments were similar to those implemented by other Emergency Departments worldwide. Papers published throughout 2020 revealed that tertiary hospitals in Singapore, fifteen Emergency Departments in Daegu Metropolitan City Korea, Merano General Hospital in Italy, to name a few, had implemented such adjustments to prevent nosocomial transmission, keeping staff and patients safe.<sup>6-8</sup>

This clinical observational study was an eye-opener regarding the attendances and admissions during the COVID pandemic. From March till July 2020, the number of patients attending the Emergency Department was less when compared to that of 2019. Nationally that period coincided with the country's declaration of National State of Health Emergency and several Public Health restrictions were put in place. This local observation was similar to other observations abroad. On the 12<sup>th</sup> June 2020, the Centre for Disease Control and Prevention (CDC) issued a Morbidity and Mortality weekly report, stating that between the 29<sup>th</sup> March and the 25<sup>th</sup> April 2020 there was a 42% decline in presentation nationwide when compared to 2019.<sup>9</sup> Similarly, Sless RT et al, in April 2021 stated that the attendances at the Cork University Hospital in Ireland (Level 1 Trauma Centre) noted a 32% reduction in attendances between 15<sup>th</sup> February 2020 and 11<sup>th</sup> April 2020 as compared to the same period in 2017 – 2019.<sup>10</sup>

The local percentage admissions were also noted to be less between the months of March and April 2020, which was also reflected worldwide. In Australia, a retrospective cohort study performed at the Royal Melbourne Hospital showed that there was a general decrease in hospital admission rate in the month of March 2020 as compared to 2019. From this study, it was concluded that patients with milder illnesses were presenting late thus resulting in late presentations of treatable illness and poor outcomes.<sup>11</sup> In Germany an analysis of six hospitals concluded that there was a decrease in the admission rate between the week of the 12<sup>th</sup> March and the 08<sup>th</sup> April 2020.<sup>12</sup>

However, these early pandemic decreases were followed by an increase in Emergency Department attendances and hospital admission rates in the latter months of 2020. This was partly due to increased numbers of seriously sick COVID-19 patients presenting to MDH and late presentations of diseases that evolved into serious pathologies.

This study also revealed that MDH's Emergency Department, being the only such department on the island, remains the main port of call for the population whether in declared states of health emergencies or not. This was shown by the relatively minor differences in Emergency Department attendances and hospital admissions when pre-COVID days and COVID days were compared. This means that MDH and its Emergency Department have to remain consistently prepared and resilient to sudden and unexpected patients' surges.

COVID-19 brought with it many changes and this experience needs to be systematically evaluated. Some changes that enhanced the overall administration of the Emergency Department may be implemented for the day to day running of the place, while others that are necessary in exceptional circumstances must be kept on standby and ready to be deployed instantly if needed.

The authors recommend that to increase the Emergency Department preparedness for future biological disasters, the following actions should be considered:

1. A post-pandemic, pan-hospital taskforce should be instituted and led by the hospital management to perform a complete After-Action Report to ascertain what worked or not during the peak of the COVID-19 pandemic. The aim of such an exercise will be to improve the resilience of the hospital to biological catastrophes.

2. A revision of the Hospital's Major Incident Policy with the inclusion of a complete disaster plan should such a situation arise again.
3. An improved patients' pathways in and out of the Emergency Department to minimise the time of the patient's stay in the Department and to decrease risk of cross infection.
4. Constant infection control vigilance pathways and champions/ overseers of proper infection control in the ED.
5. Continuous training programs for all Hospital and Emergency Department staff in dealing with communicable diseases.

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## LIMITATIONS

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This study is only a snapshot of 2 years and the numbers are small, retrospective, and observational. However, they do reflect the perception of how the local Emergency Department scene evolved during the early months of the COVID-19 pandemic in Malta. There were outlying, unexplained data like the Emergency Department's attendances in August and December 2019 and April 2020. One assumption is that these could be due to hospital computer faults on those days.

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