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Best practice guidelines

Sharp decline in acute and elective hospital attendances and admissions due to COVID-19 in Malta (Q1 2020) - A population-based study

ARTICLE INFO

Keywords
Coronavirus
Hospital admissions
Pandemic

ABSTRACT

Introduction: Social distancing measures and hospital preparations for the novel COVID-19 pandemic have been associated with a decline in elective and acute hospital encounters in March and April in several centres in different countries. Malta has one large acute general hospital, Mater Dei (MDH). This study retrospectively analysed these declines since soft lockdown commencing on the 13th March 2020 in a population-based study, the first of its kind.

Methods: Data was obtained as anonymised totals from MDH Clinical Performance Unit. Poisson regression was used to model the counts of weekly A&E attendances and hospital admissions.

Results: Outpatient attendances declined in March, stabilised in April 2020 and started to climb in May. April attendances fell to 18.8% in paediatrics and 23.4% in adults of the average of the previous January and February. A&E attendances showed the same pattern, down to 22.5% and all specialities registered a decline, paediatric > adult. Attendances dropped from circa 2600 to 588/month/100,000 population. These declines were abrupt after the second week of March. MDH admissions showed the same patterns, down from circa 1800 to 757/month/100,000 population. All declines were statistically significant.

Discussion: Many factors played a role in this unwilling experiment but the reduction in travel and physical human contact of all sorts (including school) contributed to a reduction in contagious diseases. Excess deaths of severely ill individuals who failed to go to hospital have yet to be formally quantified in Malta.

MeSH
Betacoronavirus*
Coronavirus Infections* / complications
Coronavirus Infections* / epidemiology
Coronavirus Infections* / rehabilitation
Humans
Mental Disorders
Pandemics*
Pneumonia, Viral* / complications
Pneumonia, Viral* / rehabilitation

1. Introduction

The current novel coronavirus (COVID-19) pandemic was initially identified in Wuhan, China, in December 2019 [1], and has globally resulted in over 50 million infections and well over a million deaths, with many more to come [2].

Malta is one of the smallest countries in the world and is comprised of a small archipelago in the centre of the Mediterranean with a total population of almost 500,000, a land area of 316 km² and the 7th highest population density in the world. There is one large National Health Service Hospital with intensive care facilities (Mater Dei Hospital) along with a few other much smaller facilities and private hospitals [3]. The first COVID-19 case identified in Malta was on the 7th March 2020 and, during the first wave of infection, COVID-19 was initially controlled with less than 700 total cases and 9 deaths.

The Malta Government issued a daily COVID Bulletin, and the first bulletin on 12th March documented nine cases and mandated immediate childcare, school and university closures along with all mass activities and a slew of other restrictive public health measures, a list which increased over the following weeks [4]. Elective outpatients (face to face appointments) were stopped on 15th March and, as in many other countries, phone consultations were held so that arrangements could be made for only urgent outpatient appointments/admissions to be seen and treated [5].

There have been a few reports with regard to decline in hospital admissions related the onset of the pandemic in March [6,7], as well as reductions in attendances to Accident and Emergency Departments (A&E) [8], but none on a national level.

A precipitous decline in acute and elective hospital attendances in admissions in Malta was noted from March 2020. This study was carried out to document and catalogue this reduction in service requirements in a national, population-based setting.
2. Methods

2.1. Data

All data was obtained as anonymised totals from Mater Dei’s Clinical Performance Unit. The format customarily used by the hospital to compile monthly reports was summarised for the purposes of presentation. Data was compiled on outpatient and A&E attendances as well as hospital admissions, including in-patient overnight (elective and emergency) admissions and day cases. Detailed data was available up to April 2020 and preliminary data was available for May. Annual population statistics were obtained from official annual publications of the National Statistics Office of Malta [9].

2.2. Statistics

Poisson regression was used to model the counts of weekly A&E attendances and weekly hospital admissions to Mater Dei Hospital. Due to lockdown measures implemented from 12th March 2020 onward, possible drops or changes of slope (change-points) in data trends in or after 11th March were tested for significance. The appropriate change-point methodology has been treated and proposed in the literature [10,11]. A change of slope is formally specified by the interaction of time (in days or weeks) with the drop: time * drop, i.e., the product of time with a dummy variable for the period from 11th March onward. The assumption of a Poisson distribution for counts implies that the variances of the random deviations are determined by the Poisson parameter $\lambda$. In practice, the estimated sample variances are smaller or larger than theory predicts, e.g., for randomness, unspecified co-
time with a dummy variable for the period from 11th March onward. The assumption of a Poisson distribution for counts implies that the variances of the random deviations are determined by the Poisson parameter $\lambda$. In practice, the estimated sample variances are smaller or larger than theory predicts, e.g., for randomness, unspecified co-
vARIABLES, or unknown reasons. Therefore, the Poisson regression models can be generalized by introducing a heterogeneity parameter: deviance/DF. In order to err on the conservative side, we allowed for this extension in case of overdispersion (deviance/DF > 1) but not in case of underdispersion deviance/DF < 1. A p value $\leq 0.05$ was taken to represent a statistically significant result.

The software employed was: MS-Excel-365, SAS/STAT software 9.4 (SAS Institute Inc.; SAS/STAT User’s Guide, Cary NC: SAS Institute Inc., 2014). For the statistical trend analyses of the counts of the attendances and admissions, Poisson regression (SAS GENMOD) was used.

3. Results

Malta’s Superintendent for Public Health declared a national public health emergency in early March 2020, triggering a series of measures that created a near-total lockdown situation in the entire country.

3.1. Outpatients attendances

Outpatient attendances increased year on year, and for 2017, 2018 and 2019 were 495,816, 512,535 and 518,589, respectively. Attendances declined in March 2020 and stabilised in April 2020. When compared to the average of January and February 2020, attendances in April fell to 18.8% in paediatrics and 23.4% in adults (Table 1).

3.2. A&E attendances

A&E attendances for 2017, 2018 and 2019 were 141,758, 142,519 and 140,209, respectively. Admissions fell in March 2020 and stabilised in April 2020. When compared to the average of January and February 2020, overall attendances in April fell to 22.5% (Table 1). All specialities registered a decline. General paediatric A&E registered a greater decline than general adult A&E.

When analysed on a weekly basis (Fig. 1), a slow and general decline is seen in attendances from the beginning of the year which accelerates rapidly after the second week of March 2020, in paediatrics even more than in adults (Table 2). Both drop as well as change in slope were highly statistically significant from March 11 in almost all categories (Table 3).

3.3. Hospital admissions

Admissions for 2017, 2018 and 2019 were 93,658, 94,803 and 97,618, respectively. Admissions fell in March 2020 and stabilised in April 2020. Again, the paediatric decline exceeded the adult decline (Table 1).

When analysed on a weekly basis (Fig. 2), a slow and general decline was seen in admissions from the beginning of the year which accelerates rapidly after the second week of March, in paediatrics even more than in adults. The declines in admissions were characterized by highly significant drops only, with insignificant changes in slopes, from 11th March (Table 3).

Both A&E attendances and admissions are shown in Table 4, indexed per 100,000 population, for time periods of interest i.e. annual aggregates for 2017–9, quarter 1 for these years and for 2020, and January to May 2020. The data for the latter month shows an increase in activity.

4. Discussion

4.1. Outpatients attendances

Malta’s Superintendent for Public Health declared a national public health emergency in early March, acquiring wide-ranging powers to take all measures necessary to ‘reduce, remove or eliminate’ the public health threat of COVID-19 [4]. Globally, there was and remains public health concern regarding the adequacy of extant healthcare resources to treat COVID-19 patients in surge situations particularly in the primary exponential surge of COVID-19 cases, an unprecedented and arguably one of the most devastating events a hospital may ever have to face [12], with the possibility that systems would be overwhelmed at all levels of care [13], as witnessed in Italy [14], with extreme resource strain, precipitating excess patient mortality and negatively impacting staff wellbeing [12].

On the 15 March 2020, the hospital administration team decided to postpone all non-urgent hospital appointments and interventions, with
the exception of oncology and antenatal clinics so as to redeploy staff in preparation of possible COVID-19 surge/s [4]. The Maltese decline in hospital outpatient attendances was therefore unsurprising as all upcoming appointments and interventions were vetted and only urgent/serious cases were called for, and the rest dealt with using telemedicine [5].

Furthermore, all countries [15] including Malta [16] were shocked by the unfolding events earlier during the year in neighboring Northern Italy [14]. It was thus with difficulty, when at all possible, to convince patients to attend outpatients during the acute COVID-19 phase, even when these were specifically flagged as needed to be urgently seen to. This suggests that there may a similar sort of difficulty in getting back to a ‘new normal’ despite the hospital’s mandating of social distancing in clinics, outpatient corridors and waiting rooms, and hence a relatively COVID-safe environment [17].

4.2. A&E attendances and hospital admissions

The general slow decline witnessed from the beginning of the year is normal for this time of year and signals less community transmission of disease as weather improves. At the onset of COVID-19, a decline in A&E visits and admissions has been noted in many countries, with, for example a fall in A&E visits in England by 25% [7,8]. This was uniform, for all ages, with a 30% decrease in paediatric attendances as well [18]. In the United Kingdom, this happened immediately after the Prime Minister, Mr. Boris Johnson announced a lockdown on 23rd March [8]. Similarly, in Italy, a decline in total A&E visits was noted in the early part of the pandemic, followed by a steep rise in COVID cases and a continued decline in non-COVID cases [19].

However, the “Covid-19 Paradox” suggests that acutely ill patients should still need to be admitted to hospital. These include, for example, primary acute cardiovascular events which declined, for example by...
circa 40% in the United States, raising concerns that treatment for such conditions may have been delayed or deferred [20]. Indeed, it has been reported that during the height of the pandemic in New York City, there was a surge in out-of-hospital cardiac arrests [21].

The situation for other conditions is of equal concern, with for example UK urgent GP referrals for cancer dropping by 60% in April 2020, compared with the same month last year [22]. Similarly, the number of patients commencing treatment following an urgent GP referral fell by 18% in the same period [22]. These sharp declines are of concern since treatment for serious conditions may be delayed with increased mortality, morbidity and additional disease burden that may further exacerbate the strain on health services when these cases do eventually come to light. The deaths directly and indirectly attributable to COVID-19 will only be quantifiable when regional, reliable, excess mortality data becomes available [23].

Several reasons have been posted for hospital activity reductions. There may have been less disease because of the reduced contact between people. This includes school contact: children with children and with teachers. There may also have been less trauma due to shelter in place orders, including lower vehicle use. In addition, patients may have found other ways to seek advice/treatment without visiting hospital and these include remote consultations with their GPs and/or patients with pre-existing conditions possibly being treated directly by their specialist team/s. Furthermore, there may have been public discretion, in self-interest (for fear of leaving home and becoming infected) or knowing that services were stretched and waiting for complaints/symptoms to evolve or pass before seeking help [7]. Moreover, there may also have been fewer road accidents during the stay-at-home orders.

Additional factors may have included a reduction in supply-induced demand by health care professionals with less unnecessary/overcautious referrals as well as the general drastic suspension in the number of services offered by the hospital of a diagnostic and therapeutic nature.

The effect of decreased infectious disease burden may have played a disproportionately significant role. Children are known to be highly effective carriers of disease including viral respiratory tract infections, even when asymptomatic [24], and sheltering may have broken the school transmission chain. Malta has a National Health Service based on the UK system, but also has private practice. In paediatrics, this is provided by qualified paediatricians in private clinics and pharmacies [25]. Even this sector experienced a >50% decline in demand, with >90% of visits after lockdown related solely to vaccinations, routine health visits and with the onset of spring, allergy related complaints such as allergic rhinitis and conjunctivitis, eczema and asthma (VG – personal communication).

While non-COVID-19 hospital workloads decreased, in many countries which experienced surges, hospital services were highly strained by COVID-19 related morbidity and mortality [16] Furthermore, in many individuals, mental health has been compromised not only by lockdown, but also by concern for livelihoods and jobs potentially lost [17,26]. There were also concerns with regard to domestic violence, especially in the setting of increased alcohol consumption during lockdowns [27].

Mater Dei data for May shows that the hospital is remobilising in an attempt to resume normal activities. The transition phase will need to deal with the inevitable escalation of waiting lists caused by suspension of normal activities. This will be hampered by the fact that Malta (and indeed the world) is experiencing its second wave of COVID-19 [28], a worldwide phenomenon that must be coped with for the next 6–12 months until the arrival of a vaccine [29].

Declaration of competing interest

The authors have no conflict of interest to declare.
