Internal medicine patients admitted without COVID-19 during the outbreak

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Abstract

Background: The first case of COVID-19 in Israel was reported on February 21, 2020. Shaare Zedek (SZ), a 1000-bed tertiary care medical center in Jerusalem, Israel, cared for a significant number of these patients. While attention focused on COVID-19 patients, uninfected patients were admitted to decreasing numbers of available internal medicine (IM) beds as IM departments were converted to COVID-19 isolation wards. Due to the increase in COVID-19 patients, closure of IM wards, re-assignment of staff, and dynamic changes in available community placement options, we investigated the impact of the outbreak on IM patient not admitted for COVID-19. Methods: We reviewed IM admissions during March 15 – April 30, 2020 for patients without COVID-19. Characteristics assessed included number of admissions, age, length of stay, mortality rate, number of discharges, number discharged home, and functional status of the patients. Data was compared to the previous three years (2017 – 2019) during the same time period. Results: During March 15 – April 30, 2020 there were 409 patients admitted to IM compared to a mean of 557 over the previous three years. Fewer patients were admitted to the ED and the IM wards during the outbreak. There was no significant difference between the two groups with regards to gender, in-hospital mortality rate, number discharged, number discharged home, and patient functional level. Patients admitted during the outbreak to IM were younger (74.85 vs 76.86 years) and had a mean shorter hospital length of stay (5.12 vs 7.63 days) compared to the previous three years. Conclusion: While the characteristics of patients admitted to IM during the outbreak were similar, hospital length of stay was significantly shorter. Internal management processes, as well as patient preferences may have contributed to this observation. An infectious disease outbreak may have a significant effect on uninfected admitted patients.

Background

While the first cases of coronavirus disease (COVID-19) were reported in December 2019 (1), the first case of COVID-19 in Israel was reported on February 21, 2020 and rapidly spread (Figure 1). Shaare Zedek (SZ), a 1000-bed tertiary care medical center in Jerusalem, Israel, cared for a significant number of these patients. The hospital adapted to the surge in patients as information regarding clinical signs and symptoms, possible treatments, and testing were in development (2,3,4). While attention focused on COVID-19 patients, uninfected patients were admitted to decreasing numbers of available Internal Medicine (IM) beds. Pre-outbreak, SZ had four functioning IM departments. During the outbreak, the hospital developed five patient COVID-19 isolation wards and a dedicated COVID-19 Intensive Care Unit (ICU). There were fewer Emergency Department (ED) patients, but COVID-19 isolation wards filled up quickly. Staff had to be trained and deployed to work in these units. Many times, staff included subspecialist, and non-IM tract interns. During the peak of the outbreak, two IM Departments were converted to COVID-19 isolation wards. Due to the increase in COVID-19 patients, closure of IM wards, re-assignment of staff, and dynamic changes in available community placement options, we investigated the impact of the outbreak on IM patients not admitted for COVID-19.

Methods

We reviewed IM admissions during March 15 – April 30, 2020 for patients without COVID-19. Characteristics assessed included number of admissions, age, length of stay, mortality rate, number of discharges, and number discharged home. Data was compared to the previous three years (2017 – 2019) during the same time period. Functional status of the patients was approximated using the Norton scale. The Norton scale has traditionally been used to assess risk for pressure ulcers (5). However, it is also a valid assessment tool for predicting hospitalization length, complications during hospitalization, and in-hospital mortality in elderly patients admitted to an internal medicine department (6,7). The scale consists of five questions addressing physical condition, mental condition, activity level, patient mobility, frequency and type of incontinence. The score ranges from 5-20; less than 10 (very high risk), 10-14 (high risk), 15-18 (medium risk), and greater than 18 (low risk). Use of the scale is obligatory at SZ, and an assessment is conducted at the time of admission to the IM ward from the ED, and once a week thereafter. The last value during the admission was used for this analysis. Descriptive statistics were utilized to assess characteristics of the study population. Association between categorical variables were tested using the Yates' chi-square. Comparison of quantitative variables in two independent groups were performed using the t test. For statistical tests, two-sided Pvalues of < 0.05 were considered significant. Statistical analyses were performed using Statistical Package for the Social Science software version 17 (SPSS Inc., Chicago, IL, USA).

Results

During March 15 – April 30, 2020 there were 409 patients admitted to IM compared to a mean of 557 over the previous three years (Table). Fewer patients were admitted to the ED (Figure 2) and the IM wards during this time. With regards to patient gender, in-hospital mortality rate, number discharged, number discharged home (i.e., versus a healthcare facility), and the mean Norton score, there did not appear to be a significant difference between the two groups. In both groups, more than half of the patients were considered high or very high risk according to the Norton score, consistent with lower functional status for this study. Patients admitted during the outbreak to IM were younger and had shorter mean and median hospital stays by over two days, when compared to the previous three years.

Discussion

This was an extremely dynamic period in Israel. A national shutdown severely limited movement, except for essential personnel and activities. During this period, the overall number of patients presenting to the Emergency Department (ED) was visibly less than the previous three years. While there were fewer patients admitted to IM via the ED, there were progressively fewer IM departments. During one of the peak days of the outbreak, the number of IM wards had been decreased from four to two. Additionally, a small14-bed satellite unit was established to help decompress the IM wards. By this time, five isolation wards had been rapidly established, including an ICU ward for COVID-19 patients. Therefore, in comparison to the previous year, four IM wards had been replaced by two IM wards and five COVID-19 isolation wards (Figure 3). There are reports of hospitals having to shutdown wards and re-allocate personnel and resources to be able to care for the influx of COVID-19 patients (8). While no approach has been standard, there will be a need to look back and assess individual site response to the pandemic, as well as to formulate a plan for the current effort and future healthcare epidemics.

Patients admitted to IM were significantly younger, as older patients may have been admitted to isolation wards, died at home, or feared coming to the hospital, thinking it an epicenter of infection. Nursing homes may have been hesitant to send patients to the hospital, knowing that an open bed might mean accepting a possibly infected patient in return. While patients were younger, they were not young (i.e., mean age of approximately 75 years). More than half of the patients on the IM ward were not independent, and their pre-discharge Norton score indicates a low functional status. This finding is consistent with the local demographics, the aging population, and the reported observation of functional decline in hospitalized elderly patients (9). While not classically used for assessing the case-mix of patients, the use of the Norton scale is obligatory for every IM admission at our facility and does describe many aspects of the patient's physical and mental attributes. More complex, albeit possibly harder to derive, metrics for assessing functional assessment do exist as well (10). It is not a novel observation that people, in general, are living longer

and consuming healthcare resources at a rapid and worrisome rate (11). However, the present outbreak has served to expose this vulnerable group, deficiencies in the public health infrastructure, as well as the impact of social isolation. Research should focus on prevention and access to services for this group of patients.

We observed a significantly decreased hospital length of stay, without an increase in mortality. After admitting the first infected patient, the hospital director established a team dedicated to overseeing patient flow from admission to discharge. This team was comprised of a chief medical officer, a department head of IM, the director of social work, and senior nursing managers. The team was in constant communication, met with staff and family members, and had discussions with the ministry of health, health maintenance organizations, and local nursing homes. It is possible that this team aided in decreasing hospital length of stay. However, like many places in the world, Jerusalem has a significantly older and more dependent population. In addition, Patients are unwilling to be discharged to locations outside the city as this might limit the possibility of being visited by family members. There are also limited options for skilled nursing facilities. Even with these challenges, a decrease length of stay was observed. While patients themselves may have been more eager for discharge, there may be more unmeasured variables that explain this observation. Interestingly, comparing the mean SD of the length of stay for both groups accentuates the impact of outlier patients who have complicated admission, or more likely (i.e., in our system), complex discharge needs combined with limited community resources (e.g., skilled nursing facility beds). During the outbreak, the mean SD hospital length of stay decreased significantly compare to 2017 – 2019 (5.52 vs 10.87 days), possibly related to patient preference, or the above-mentioned increased effort by the hospital to free up potential beds. Patient functional level was similar to prior years, but the patient case-mix based on diagnosis (e.g., admitting or discharge) was not assessed, and might have differed between the two groups, possibly explaining the observed difference in hospital length of stay.

Physician staffing during this time was a concern. Some IM residents and senior physicians were home in isolation, caring for children no longer at school during the day, or retasked to COVID-19 isolation wards. We succeeded in maintaining IM staffing on the non-COVID-19 IM wards during this time and believe this helped allow us to maintain pre-outbreak mortality rates and numbers discharged. IM department teams were broken down into smaller groups, and interaction between the groups was limited. Conversations between different hospital groups were conducted via video conferencing. While the administration was actively engaged and promoted regular top-down and bottom-up communication, burn-out was a concern on the IM as well as the isolation wards. However, the relatively short duration of the outbreak, as compared to other global locations, likely helped to keep the hospital functioning at a high standard.

IM patients on the regular non-COVID-19 wards and the COVID-19 isolation wards were all admitted, cared for, and discharged by internal medicine physicians and medical sub-specialist. Most patients were discharged home. Discharging patients to nursing homes was challenging. Specific requirements for SARS-CoV-2 testing prior to discharge changed frequently and were site-specific. The reported mortality rate in nursing homes during this time, and the possibility of being isolated for an extended period, may have influenced patient preferences (12).

Weaknesses of this study include its single center design, and that we did not analyze individual patient diagnoses. However, there were a large number of patients, and the two groups were similar in-terms of functional status. Statistical significance of the variables addressed is only a measure of association and not an indication of causality. This analysis is unique in that it focused on non-COVID-19 patients admitted during the outbreak in a westernized country with a robust healthcare infrastructure, generalizable to other countries around the globe.

While hospitals have observed decreased admissions for appendicitis and myocardial infarction during the outbreak (13), non-COVID-19 infected IM patients continued to arrive to SZ. Their care and clinical course were likely affected by the over 400 patients admitted to SZ with COVID-19. The outbreak identified weaknesses in the present healthcare infrastructure, but it also emphasized the role and versatility of internal medicine physicians (i.e. hospitalists), the vital role of communication, and the importance of teamwork at every level. Proper planning allowed SZ to remain functional, and even shorten IM patient length of stay.

Further studies and research should address how outbreaks affect entire hospital populations and surrounding community resources.

References

1. Rothan H, Byrareddy S. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *Journal of Autoimmunity* 2020; 109.
2. Segal G, Mevorach D, Elis A, and Dicker D. Clinical insights and management recommendation for COVID-19 patients hospitalized in internal medicine departments: recommendations by the corona department heads in Israel.*Isr Med Assoc J.* 2020 May;22(5):275-277.
3. Fauci AS, Lane HC, Redfield RR. Covid-19 – navigating the uncharted.*N Engl J Med* 2020; 382(13): 12689.
4. Itelman E, Wasserman Y, Segev A et al. Clinical characterization of 162 COVID-19 patients in Israel: preliminary report from a large tertiary center. *Isr Med Assoc J* . 2020 May; 22:271-274.
5. Norton D, Mclaren R, Exton-smith A.N. An investigation of geriatric nursing problems in the hospital. Edinburgh: Churchill Livingtone; 1975: 193-238.
6. Leshem RE, Vaknin A, Sherman S, Justo D. Norton scale, hospitalization length, complications, and mortality in elderly patients admitted to internal medicine departments. *Gerentology* 2013; 59: 507-513.
7. Silber H, Shiyuvich A, Gilutz H, Zidenberg H, Abu-Tailach M, Plakht Ygal. Decreased Norton's functional score is an independent long-term prognostic marker in hospital survivors of acute myocardial infarction. *International Journal of Cardiology* 2017; 228: 694-699.
8. Mungmunpuntipantip R, Winanitkit V. A coronavirus disease 2019 (COVID-19) outbreak in a hospital and hospital closure: a note.*Infect Control Hosp Epidemiol* 2020 May 4:1.
9. de Vos A, Asmus-Stepesi K, Bakker T, de Vreede P, van Wijngaarden J, Steyerberg E, Machenbach J, Nieboer A. Integrated approach to prevent functional decline in hospitalized elderly: the prevention and reactivation care program (PReCaP). *BMC Geriatrics* 2012, 12:7.
10. Spar M, Nicosia F, Steinman M, Brown R. Current approaches to measuring functional status among older patients in VA primary care clinics. *Fed Pract* 2017; 34 (9): 26-31.
11. Johnson K, Wen H, Hockenberry J, Joynt M. Association between patient cognitive and functional status and medicare total annual cost of care implications for value-based payment. *Jama Intern Med* 2018; 178 (11): 1489-1497.
12. Werner R, Hoffman A, Coe N. Long-term care policy after Covid-19 — solving the nursing home crisis [published online ahead of print, 2020 May 27]. *N Engl J Med* . 2020.
13. Solomon MD, McNulty EJ, Rana JS, et al. The COVID-19 pandemic and the incidence of acute myocardial infarction [published online ahead of print, 2020 May 19]. *N Engl J Med* . 2020;10.

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