Determining The Burden of Notifiable Infectious Diseases at A Public Sector Hospital, Karachi, Pakistan

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ABSTRACT

Background: The onset of emerging infectious diseases possesses a public health concern with increased morbidity and mortality especially in developing countries like Pakistan. The endemic infections in Pakistan like Dengue, Malaria, Influenza, sporadic infections like Crimean Congo hemorrhagic fever, Measles, Diphtheria, Pertussis, and emerging infections like extensively drug-resistant Typhoid and COVID-19 are among some of the priority infections and are declared as notifiable diseases at national level. The objective of the study was to determine the burden of notifiable infectious diseases at a public sector Tertiary care hospital Karachi, Pakistan.

Methods: A retrospective cross-sectional study was conducted in Dr. Ruth KM Pfau Civil Hospital Karachi from 1st May 2022 till 31st May 2023. All the patients admitted with notifiable infectious diseases like Dengue fever, Malaria, Typhoid, Influenza, COVID-19, Crimean Congo Hemorrhagic with laboratory based confirmed diagnosis were included in the study whereas suspected cases of Measles, Diphtheria infections and Pertussis diagnosed on clinical assessment were also included.

Results: Total 662 patients were included in the study whose complete information was available regarding the diagnosis and relevant laboratory reports. The median age of the study participants was 15 years with an IQR of 20 years. 50.8% of all the study participants had Dengue fever, 18.9% (n =125) had XDR Typhoid of the study participants followed by the Malaria and Measles with a frequency of 15.7% (n=104) and 10.3% (n=68), respectively. Median length of hospital stay was 5 days with an IQR of 4 days. 99.7% (n=660) of all the study participants recovered with treatment while only 0.3% (n=02) were died due to disease related complications of the dengue fever.

Conclusion: This study identified a dire need of an effective surveillance system for notifiable infectious diseases. Healthcare facilities should develop a comprehensive health information management system to effectively gather and share the information with relevant authorities in timely manner. The information on common notifiable disease is crucial for better health management as well as control and prevention of diseases.

Introduction

The onset of emerging infectious diseases possesses a public health concern with increased morbidity and mortality especially in developing countries like Pakistan. Therefore having an efficient notifiable diseases surveillance system based on real time data is crucial to build an effective early warning system and for better management of such diseases [1]. The endemic infections in Pakistan like Dengue, Malaria, Influenza, sporadic infections like Crimean Congo hemorrhagic fever, Measles, Diphtheria, Pertussis, and emerging infections like extensively drug resistant Typhoid and COVID-19 are among some of the priority infections and are declared as notifiable diseases at national level [2,3]. In Pakistan, infectious disease surveillance has been affected by the poor governance, weak surveillance infrastructure, inadequate human resource, paper-based reporting and the absence of local laboratory capacity especially in rural settings [4]. These barriers have resulted in poor and incomplete reporting. A study involving 175 doctors working as General Practitioners in Karachi, Pakistan revealed that most of the practitioners were incompliant towards reporting of notifiable

diseases. The study identified that they had poor knowledge of reporting procedures while lack of time and concerns for patient confidentiality as the main reasons for not notifying a notifiable disease. However, situation is a bit better in urban settings where large public sector hospitals serve as a major resource for data related to notifiable diseases [5]. A retrospective data analysis of all infectious diseases (ID) cases, retrieved from medical records over a five-year period by a tertiary-care health facility in Karachi Pakistan assessed 71815 patients. Overall, the six most common infections were malaria, cases of dog bites, tuberculosis, respiratory tract infections, diarrheal diseases, and hepatitis C [6]. However, still there is scarcity of literature reporting notifiable disease data from hospitals which can be very helpful to understand the actual burden and mix of infections faced by the local hospitals. Hence, the objective of the study was to determine the burden of notifiable infectious diseases at a Public sector Tertiary care hospital Karachi, Pakistan. Estimating the burden and understanding the situation in public sector hospital will help in determining the most common infections contributing to mortality and morbidity in the local population and will support preparation for effective health administration and better patient management.

Methods

A retrospective cross-sectional study was conducted in Dr. Ruth KM Pfau Civil Hospital Karachi from 1st May 2022 till 31st May 2023. All the patients admitted with notifiable infectious diseases like Dengue fever, Malaria, Typhoid, Influenza, COVID-19, Crimean Congo Hemorrhagic with laboratory based confirmed diagnosis were included in the study whereas suspected cases of Measles, Diphtheria infections and Pertussis diagnosed on clinical assessment were also included.

All samples received at the hospital laboratory for Dengue, Malaria, Typhoid, Congo Hemorrhagic fever, Influenza, COVID 19, Diptheria, Pertusis, Measles from inpatients were reviewed from the laboratory computerized data base and medical records. Those that tested positive for Dengue on immunochromatographic technique (ICT) for recombinant NS1 antigen and/or IgM serology, whereas those tested positive for Malaria for peripheral smear and immunochromatographic test (ICT) for detection of Plasmodium Falciparum HRP 2 antigen and a pan malarial antigen. For the Typhoid diagnosis those tested positive for Salmonella Typhi or Salmonella Paratyphi on blood culture and for influenza, Congo Hemorrhagic fever, COVID 19 Coronavirus diagnosis that tested positive on molecular based detection like Polymerase chain reaction PCR were included. The clinical suspected cases for Measles, Diphtheria and Pertusis infection from inpatients were reviewed from the medical records. The medical records of patients that tested positive were reviewed for their outcome.

All the data was collected using laboratory records with the help of computerized unique medical record identification number; generated at the time of hospital admission. Information was collected using a structured proforma regarding basic demographic and disease related characteristics such as age, sex, outcome of lab investigation and disease or clinical outcome.

All the gathered data was entered and analyzed using Statistical Package for Social Science for windows version SPSS 24. Continuous variable like age were presented as mean and standard deviation whereas frequencies were calculated used for the qualitative variable like sex, diagnosis and clinical outcome were presented in frequency and percentages. Chi-square test was applied to compare the infectious disease diagnosis among male and female patients.

Results

Total 662 patients were included in the study whose complete information was available regarding the diagnosis and relevant laboratory reports. The median age of the study participants was 15 years with an IQR of 20 years.

Among all the infectious disease patients 64.8% (n=429) were male and 35.2% (n=233) were females. Most common infection reported among the study participants was Dengue fever i.e. 50.8% of all the study participants, followed by XDR Typhoid affecting 18.9% (n =125) of the study participants followed by the Malaria and Measles with a frequency of 15.7% (n=104) and 10.3% (n=68), respectively (Table:1).

Only 10.7% (n=71) of all the infectious diseases cases were diagnosed on clinical assessment while 89.3 % of the cases were diagnosed and confirmed through diagnostic laboratory tests.

Median length of hospital stay was 5 days with an IQR of 4 days. 99.7% (n=660) of all the study participants recovered with treatment while only 0.3% (n=02) were died due to disease related complications of the dengue fever.

The study also compared frequency of various infectious diseases among male and female patients. Except dysentery, frequency of all the infections were higher among male as compared to female. For dysentery, the frequency was same for male and female study participants (Table: 2).

Table 1: Demographic and Health Related Characteristics of The Infectious Disease Patients Admitted at Dr. Ruth Pfau Civil Hospital Karachi (n =662)

Age	Median Age 15 years IQR: 20 years	
Sex		
Male	429	64.8
Female	233	35.2
Infectious Diseases		
Congo Hemorrhagic Fever	05	0.8
Dengue Fever	336	50.8
Diphtheria	01	0.2
Dysentery	02	0.3
Malaria	104	15.7
MDR Typhoid	15	2.3
Measles	68	10.3
Neonatal Tetanus	01	0.2
Pertussis	01	0.2
Viral Pneumonia	04	0.6
XDR Typhoid	125	18.9
Clinical Diagnosis	71	10.7

Diagnosis with Laboratory test	591	89.3
Length of hospital Stay	Median: 05 days IQR: 04 days	
Disease Outcome		
Recovered	660	99.7
Died	02	0.3

Table 2: Sex Distribution of Infectious Disease Patients Admitted at Dr. Ruth Pfau Civil Hospital Karachi (n =662)

Infectious Diseases	Male n (%)	Female n (%)
Congo Hemorrhagic Fever	5 (100.0)	0
Dengue Fever	230 (68.5)	106(31.5)
Diphtheria	0	1(100.0)
Dysentery	1(50.0)	1(50.0)
Malaria	66(63.5)	38(36.5)
MDR Typhoid	10 (66.7)	5(33.3)
Measles	36(52.9)	32(47.1)
Neonatal Tetanus	0	1(100.0)
Pertussis	1(100.0)	0
Viral Pneumonia	3(75.0)	1(25.0)
XDR Typhoid	77(61.6)	48(38.4)

Discussion

This study is a unique effort providing estimates for cases admitted in infectious disease department from a busy tertiary care hospital. The study included all the laboratory confirmed cases of Dengue, Malaria, Influenza, sporadic infections like Crimean Congo hemorrhagic fever, and emerging infections like extensively drug resistant Typhoid and COVID-19. Study also included cases of diseases diagnosed and confirmed through clinical assessment such as Measles and Diphtheria. The average age of the patients was relatively low indicating that most of the patients were children and youth. This finding is also in line with literature which reports higher burden of infections in younger age groups [7,8]. This study also observed higher frequency of infections among males as compared to females which is well supported by the previous studies reporting increased natural risk of infection and related morbidity and mortality among male sex as compared to female [7]. This is believed to be due to hormonal differences among male and female which affects the immune responses against a foreign body including viruses as well as bacteria [9,10]. Moreover, higher rates of infection among male in our study can be further explained by the differences in health seeking behaviour of the communities especially in South-Asian context where male gender owns a higher social status leading to more frequent healthcare seeking hence resulting in over reporting as compared to female [7,11].

The commonest infection reported in this study was Dengue fever, XDR Typhoid, Malaria and Measles. This finding is in contrast to a similar study from Karachi Pakistan reporting a five-year audit for infectious disease cases identifying malaria, cases of dog bites, tuberculosis, respiratory tract infections, diarrheal diseases, and hepatitis C as the commonest infections received in a duration of five-years [6]. The differences in the estimates can be explained by the differences in study time, methodology,

sample size and study duration as well as seasonal variations in the incidence of certain infections. The current study reported only two mortalities i.e. among patients with dengue fever which shows that the facility was capable and well managed to take care of cases with notifiable infectious diseases.

This study is a retrospective data analysis from one tertiary care facility, hence it has some in-built limitations. At first, the findings of this study cannot be generalized as at was conducted only one tertiary care facility in Karachi, Pakistan; hence cannot represent overall situation at large. Secondly, this study collected data from infectious disease department hence missed out the respiratory infection cases presenting to the same hospital and admitted to designated care areas i.e. TB ward and chest ward as per hospital protocol. Therefore, this study could not report the burden of pulmonary tuberculosis, influenza and COVID-19. Third, as this study only included in-patients therefore it missed out information on infectious disease cases presented at the Out-Patient-Department (OPD) Furthermore, as this study retrieved data using medical record number or unique ID provided at admission and didn't audit detailed clinical records hence; data on disease complications was not available for the analysis. However, this stud maintains its own worth as it adds scarce literature of notifiable disease burden in local scenario. It represents findings from one of the biggest tertiary care hospital from Mega city of Karachi, Pakistan. Despite limitations it gives us information about the disease burden and its sex based distribution. However large scale multicenter studies are required with inclusion of cases specialized units such as Tuberculosis treatment units and specified COVID-19 units to have a holistic picture of the situation.

Conclusion

This study identified a dire need of an effective surveillance system for notifiable infectious diseases. Healthcare facilities should develop a comprehensive health information management system to effectively gather and share the information with relevant authorities in timely manner. The information on common notifiable disease is crucial for better health management as well as control and prevention of diseases.

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