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LETTER TO EDITOR

Establishment of Covid-19 Hospital-Based Registry in a Referral Hospital Through the World Health Organization Platform

Atefeh Esfandiari [1], Batool Amiri [2], Jamileh Kiani [2], Hedayat Salari [1*]

[1] Department of Health Policy & Management, School of Medicine, Bushehr University of Medical Sciences, Bushehr, Iran
[2] Clinical Research Development Center, "The Persian Gulf Martyrs" Hospital, Bushehr University of Medical Sciences, Bushehr, Iran

Covid-19 is an emerging disease with an increased risk of acute respiratory distress syndrome (ARDS) (1). On December 31, 2019, coronavirus appeared in Wuhan, China, and spread rapidly worldwide. On March 29, 2020, the World Health Organization (WHO) declared the Covid-19 pandemic in more than 100 countries (1). The first confirmed cases of Covid-19 in Iran were reported on February 19, 2020, in Qom. After a short period, Covid-19 widely spread all other provinces of Iran. Although the outbreak quickly spread everywhere, Bushehr was the last infected province in the third week of the outbreak (March 5, 2020). The number of confirmed cases increased in the following months such that on 13 June, 2020, it was declared that the province was included at "red category" of Covid-19 prevalence. Bushehr is located in southwestern Iran with a long coastline with the Persian Gulf (2).

Covid-19 is a respiratory disease that causes a wide range of symptoms from asymptomatic to severe pneumonia and even death. The average incubation period is 6.4 days. It is a form of human-to-human transmission (2). Based on the available evidence, the transmission of the virus can occur through direct contact with infected patients and indirect contact with surfaces in the immediate vicinity or objects used by the infected person, as well as airborne transmission (3).

The purpose of the registration system is to collect epidemiological and clinical data based on the individual and the treatment. This is to ensure the quality and evolution of health care and identify regional differences (4). The unpredictable nature of Covid-19 pandemic highlights the need for a hospital registry. This hospital registry monitors demographic characteristics, initial clinical findings, diagnostic tests, treatments, hospital period, main effects and measures, and clinical results during hospitalization, such as invasive mechanical ventilation, kidney replacement therapy, and death. This registration system helps identify Electronic Health Record (EHR) tools to support clinical care. The need for crisis management in the treatment of patients requires identifying native epidemiological pattern of the disease, especially cases that lead to hospitalization. The point is that, so far only a few hospital registries have been implemented to evaluate the care of patients with Covid-19 in Iran with different variables and goals and databases (5-11). Furthermore, the registration system is the main tool of disease management and control, which is especially true for emerging diseases and public health emergency preparedness. Therefore, we have conducted the first Covid-19 hospital-based registration system in Bushehr province.

This was a retrospective Covid-19 hospital-based registry study. All cases of Covid-19 were admitted to "The Persian Gulf Martyrs" hospital in Bushehr province for about 7 months after the beginning of the pandemic. "The Persian Gulf Martyrs" hospital is a teaching and medical hospital affiliated with Bushehr University of

Corresponding Author: Hedayat Salari
Email: Salarihedayat@gmail.com
Tel: +98 912 936 0483
Department of Health Policy & Management, School of Medicine, Bushehr University of Medical Sciences, Bushehr, Iran

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Medical Sciences (BPUMS), located in Bushehr province in Iran. Ministry of Health and Medical Education (MOHME) is the main organization responsible and for provision of health care services, medical education, research, and supervision and regulations. All the public Universities of Medical Sciences (UMS) are affiliated with the MOHME, and the teaching hospitals are affiliated with the UMS (12, 13).

Bushehr province is one of the southern provinces of Iran with a long coastline with the Persian Gulf and a population of over one million people. It was the last province in Iran hit by Covid-19. Hence, by the end of March 2020, the cumulative number of reported cases was below 100 patients. Later, as a result of the reduction of social distancing measures, cases increased in Bushehr. On June 13, 2020, the province entered the second peak of Covid-19 epidemic (2). From the beginning of the epidemic, "The Persian Gulf Martyrs" hospital was considered the reference hospital of Covid-19 in Bushehr province. It received all the critically ill patients who needed possible hospitalization in the intensive care unit from all over the province just before the end of summer. After the announcement of the "The Persian Gulf Martyrs" hospital as a referral center for Covid-19 in Bushehr province, the first suspected case was registered on 22 February, 2020 and the first definite case was detected on 29 February, 2020. He was a military man with a travel history to the infected area (14).

The inclusion criterion was all the suspected or confirmed cases of Covid-19 admitted to the hospital according to the national protocols from February 22, 2020, to September 21, 2020. The patients whose information was incomplete were excluded. At first, the list of patients was extracted from the merging hospital Health Information System (HIS) and the Medical Care Monitoring Center (MCMC) system lists. Data were extracted from patient records. The demographic and general information was retrieved by trained nurses and physicians and researchers into a printed checklist, and then to Excel sheet. Data have been gathered from various sources: Patients files in the hospital archives unit, phone contact with the patient (family), test results from the hospital laboratory department, standard report from any patient who had surgery, pathological and immune histological results from the pathology department of the hospital. In this program, information related to the patient mortality and morbidity outcomes was actively collected and recorded. It was conducted using active follow-up through telephone or by reviewing various databases such as mortality records.

The data collection tool was the global clinical platform of Covid-19, i.e. the rapid core Case Report Form (CRF) of the World Health Organization (14). CRF is designed to collect data obtained through examination, interview, and review of hospital records. CRF had 3 modules. Module 1 was completed on the first day of hospital admission; module 2 was completed during the hospital days and following patients moving between wards; and module 3 was completed in the event of discharge or death. Data was gathered in 4 sections: Demographic data included name, age, level of education, marital status, employment status, and place of residence. Module 1 included the date of admission, vital signs, comorbidity, pre-admission medication list and chronic disease medications, clinical symptoms at admission, medication on the admission day, intensive supportive care including ventilator and ICU on admission day, and the laboratory results. Module 2 included daily follow-up during the hospital stay, vital and daily clinical signs, laboratory results, medications received during hospitalization, and intensive care. Module 3 included diagnostic/pathogen test, problems at the time of hospitalization, medication on admission or discharge, intensive care, and the outcome.

Continuous variables were described as mean ± standard deviation or median (interquartile range), when appropriate. Categorical variables were described in numbers (percentages).

Results would be provided within about 7 months from the start of the registry. According to the hospital health information system report, 3482

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suspected or confirmed cases daily were registered from February 29 to September 21, 2020. 2251. Figure 1 shows the frequency of suspected Covid-19 cases reported by MCMC system between February 22, 2020, and September 21, 2020. Figure 2 shows the outcome of hospital patients with Covid-19 by age group and sex, which was reported by MCMC system between February 22, 2020, and September 21, 2020.

Development and implementation of Covid-19 registries in different regions are essential. Isfahan, Shiraz, Tehran, Ilam, Khuzestan Universities of Medical Sciences have reported implementation of Covid-19 registries (5-11). Despite many barriers to launch a hospital-based registry such as costs, lack of human resources and organizational coordination, we implemented the best way feasible and applicable for our context in Bushehr. Furthermore, a Covid-19 biobank was designed in the hospital that was linked to our registry. Since the registry's checklist is based on WHO Global Covid-19 clinical platform, it facilitates sharing data and cooperation with other scientific centers.

The inclusion of only laboratory-positive cases and coverage of the pandemic crisis case for half a year were major strengths of this study. However, these results must consider some limitations: Recall bias of self-reported pre-hospitalization information, missing data on some variables, and the absence of data regarding Covid-19 patients who were not admitted. Furthermore, the retrospective nature of retrieving information from medical records may produce incomplete data or reminder bias. However, the use of a pre-designed Covid-19 form and active tracking reduces the amount of data loss and bias. Also, due to the unknown nature of the disease, national guidelines and protocols may change during the study. Hence, a committee of physicians regularly monitors national recommendations, data collection issues, and the accuracy of data entry.

This study was approved by the Ethical Committee of Bushehr University of Medical Sciences with the ethical approval code: IR.BPUMS.REC.1399.005 (approval date 2020-04-05). We assured data protection and confidentiality according to the principles of medical ethics. Once data were received, they were closely checked for completeness and accuracy. Then, it was computerized and check for consistency.

WHO: World Health Organization
Covid-19: Coronaviruses Disease 2019
BPUMS: Bushehr University of Medical Sciences
MCMC: Medical Care Monitoring Center
CRF: Case Report Form

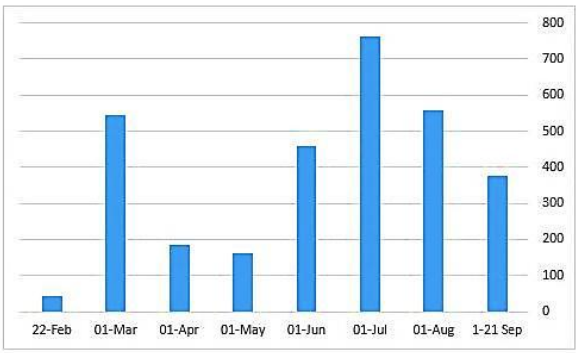

Figure 1. Frequency of suspected Covid-19 cases in terms of months, in 2020

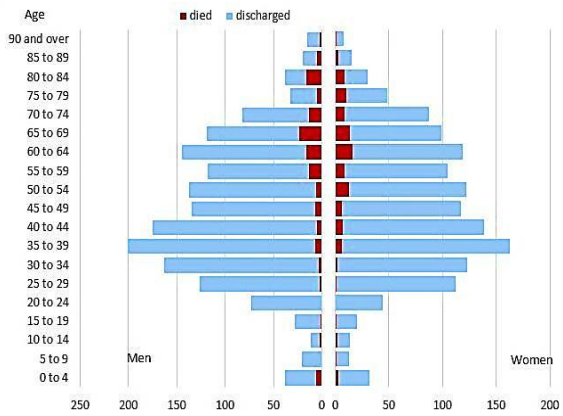

Figure 2. The outcome of hospital patients with Covid-19 by age group and sex

Key words
COVID-19, Disease registry, Implementation, Iran, Bushehr.

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"The Persian Gulf Martyrs" hospital, Bushehr University of Medical Sciences, Bushehr, Iran and also research and innovation deputy of Busher University of Medical Sciences.

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