

Designing and Launching Coronavirus Disease 19 Electronic Registry in Shiraz, Iran: A Brief Report

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Abstract

Introduction: The emergence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has created a global concern for public health. Having sufficient data is the first step to understand the behavior of contagious diseases such as the COVID-19 pandemic. Although various studies have assessed COVID-19 features, there are many limitations about patients' characteristics, complications, and outcomes in different countries including Iran. The present study reported launching an electronic database for COVID-19 patients in Fars province, Iran.

Method: A comprehensive web-based multicenter registry was designed and launched by Shiraz University of Medical Sciences in order to collect all information about COVID-19 hospitalized patients in Fars province, Iran.

Results: In this registry, patients' demographic characteristics, chest computed tomography scan findings, laboratory tests, complications during hospitalization, treatments, and disease course in Intensive Care units are recorded on a web-based electronic database. The virtual statuses of the patient's family are evaluated by telephone calls, and the proceeding will be implemented for quarantine and hospitalization if required.

Conclusion: The registry is hoped to help all scientists to understand the current challenges and be prepared for possible future waves of the epidemic. Finally, this registry is a resource for all researchers who are interested in coronavirus and plays an important role in supporting the scientific community on the frontlines of combating the virus.

Keywords: COVID-19, Severe acute respiratory syndrome coronavirus 2, Registry, Iran

Introduction

According to previous reports from the World Health Organization (WHO), respiratory diseases have represented serious problems for public health over the last twenty years. In December 2019, several cases of pneumonia with unknown etiology were detected in Wuhan, China. Investigations showed that this illness was related to coronavirus family (*Coronaviridae*) thus it was named COVID-19 by the WHO.^{1, 2} This new coronavirus created a big challenge all over the world since it was very contagious and

rapidly-spreading. By the emerging severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as a respiratory disease, the outbreak was defined as a Public Health Emergency of International Concern by the WHO and became a pandemic.^{3,4} One of the most important problems related to this disease is the prolonged incubation period which makes the prediction complicated. Based on different reports, the incubation period seems to be within 5-14 days following exposures thus asymptomatic cases impress all predictions and decisions.⁵ By increasing the number of patients all

over the world, the most effective initial managements are infection control measures which are defined as social distancing and immediate isolation of infected patients.⁶

Exact information about infected individuals, symptoms, and specific characteristics is required in order to clarify the uncertainties and ambiguities of this respiratory syndrome. Thus, a comprehensive database about patients with COVID-19 help specialists and health policymakers to reduce the transmission rate and mortality.⁷ Despite health authorities' efforts, Iran was not an exception to this outbreak. So far (8 April 2020), there has been no specific treatment for COVID-19. To have better management in the prevention, treatment, and diagnosis of patients, it is of utmost importance to conduct high-quality research on COVID-19. Hence, the present study aimed to establish an electronic registration system for suspected and confirmed individuals with COVID-19 at Shiraz University of Medical Sciences, Iran.

Materials and Methods

Study Design and Settings

From the beginning of the COVID-19 outbreak in Fars province, a comprehensive form was designed based on the recommended WHO checklist.⁸ All suspected and confirmed individuals with COVID-19 will be followed during hospitalization and one month afterward. Moreover, family members are screened and hospitalized if required. The current registry is designed in compliance with standard STORBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines, along with the Declaration of Helsinki principles.^{9,10} It should be noted that this registry is approved by Shiraz University of Medical Sciences under the ethical code of IR.SUMS.REC.1399.022

Inclusion and Exclusion Criteria

Initial information was recorded for individuals with COVID-19 symptoms (i.e., fever, cough, and dyspnea) who referred to different centers in Fars province, Iran. To confirm the disease, the chest computed tomography (CT) scan and real-time polymerase chain reaction (RT-PCR) test were performed for all patients. On the other hand, individuals were excluded from the registry if they were not satisfied with information recording and the follow-up.

Bias and Quality Assurance

As it is known, SARS-CoV-2 is a new infection and the disease has an unknown nature thus treatment protocols and guidelines may change during the study. Hence, a committee consisting of specialists in all aspects of this multi-factorial disease is meticulously monitoring data collection procedures. Table 1 provides information about the quality control team and the involved specialists.

Table 1. Members of the COVID-19 Crisis Committee of Shiraz University of Medical Sciences

Name	Affiliation
Akbari, Ali	Anesthesiologist/MD
Emami, Amir	Microbiologist/Ph.D.
Fadakar, Nima	Neurologist/MD
Falahati, Farshad	Treatment Management/MD
Ghasemi, Younes	Pharmaceutical Biotechnologist/MD
Hashemi Zadeh Fard Haghighi, Leila	Nurse/Bachelor
Heidari, Mohammad Reza	Pharmacology/ PhD
Javanmardi, Fatemeh	Biostatistician/M.Sc
Keshavarzi, Abdolkhalegh	Surgeon/ MD
Kojuri, Javad	Cardiologist/MD
Lotfi, Mehrzad	Radiologist/MD
Mansouri, AliReza	Treatment Management/MD
Moghadami, Mohsen	Infectious Disease Specialist/MD
Rezaei, Tahereh	Nurse/M.Sc.
Sharifi, Mehrdad	Emergency Medicine Specialist/MD
Shirazi Yeganeh, Babak	Pathologist/MD

Note. In an alphabetical order/all members are affiliated with Shiraz University of Medical Sciences.

Results

Measures and Outcomes

After initial information gathering, chest CT scan findings, laboratory tests, and complications during hospitalization, treatments, and the intensive care unit course were recorded on a web-based electronic database (ardr.sums.ac.ir). Then, the virtual statues of the patient's family were evaluated by telephone calls, and the proceedings are implemented for quarantine and hospitalization if necessary. Figure 1 displays the diagnostic algorithm for people with respiratory symptoms. In addition, flow charts for assessing the COVID-19 risk in pregnant women and neonates are provided in Figures 2 and 3, respectively.

Further investigations are performed for inpatients during the hospital stay. Table 2 presents related investigations for COVID-19 patients.

Discussion

Since COVID-19 spread across the world, public health has been confronted by a serious crisis. According to clinical manifestations, the severity of the symptoms of this respiratory infection ranges from a common cold-like illness to a severe viral pneumonia that may cause death.¹² The greatest risk of COVID-19 is rapid transmission communities. To date (8 April 2020), COVID-19 has affected 209 countries and territories with 1,491,785 confirmed cases. In Iran, total cases and total death are 64 586, and 3993, respectively (8 April 2020).¹³ According to different works of literature, most victims are susceptible individuals thus special attention is needed for elderly people, medical staff, immunosuppressed patients, pregnant women, and those with other underlying diseases.¹⁴



Figure 1. Algorithm of Patient Care for Individuals Presented With Respiratory Symptoms (Iran Ministry of Health and Medical Education, <http://ird.behdasht.gov.ir>)
Note. *Fever: Temperature $\geq 37.3^{\circ}\text{C}$ and $\geq 37.7^{\circ}\text{C}$ in the morning and evening, respectively; **High-risk groups: Immunocompromised patients including those with malignancy, organ transplant, HIV, cardiovascular diseases, diabetes, cirrhosis, and aged more than 50.

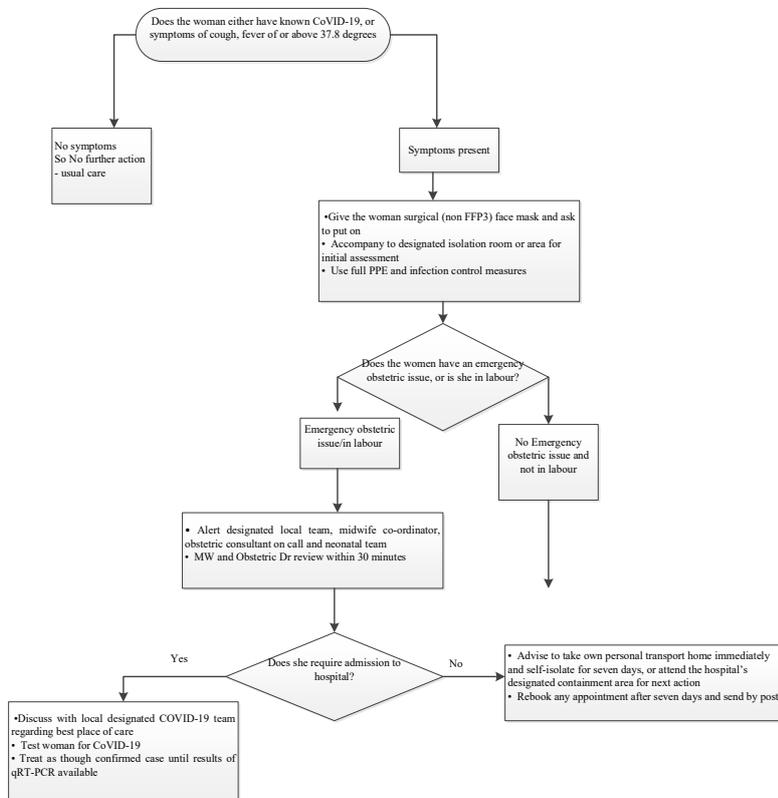


Figure 2. Flow Chart for Assessing COVID19- Risk in Maternity Unit Attendees
Note. Adapted from Ortiz et al.¹¹ PPE: Personal equipment protective; MW: Midwife.

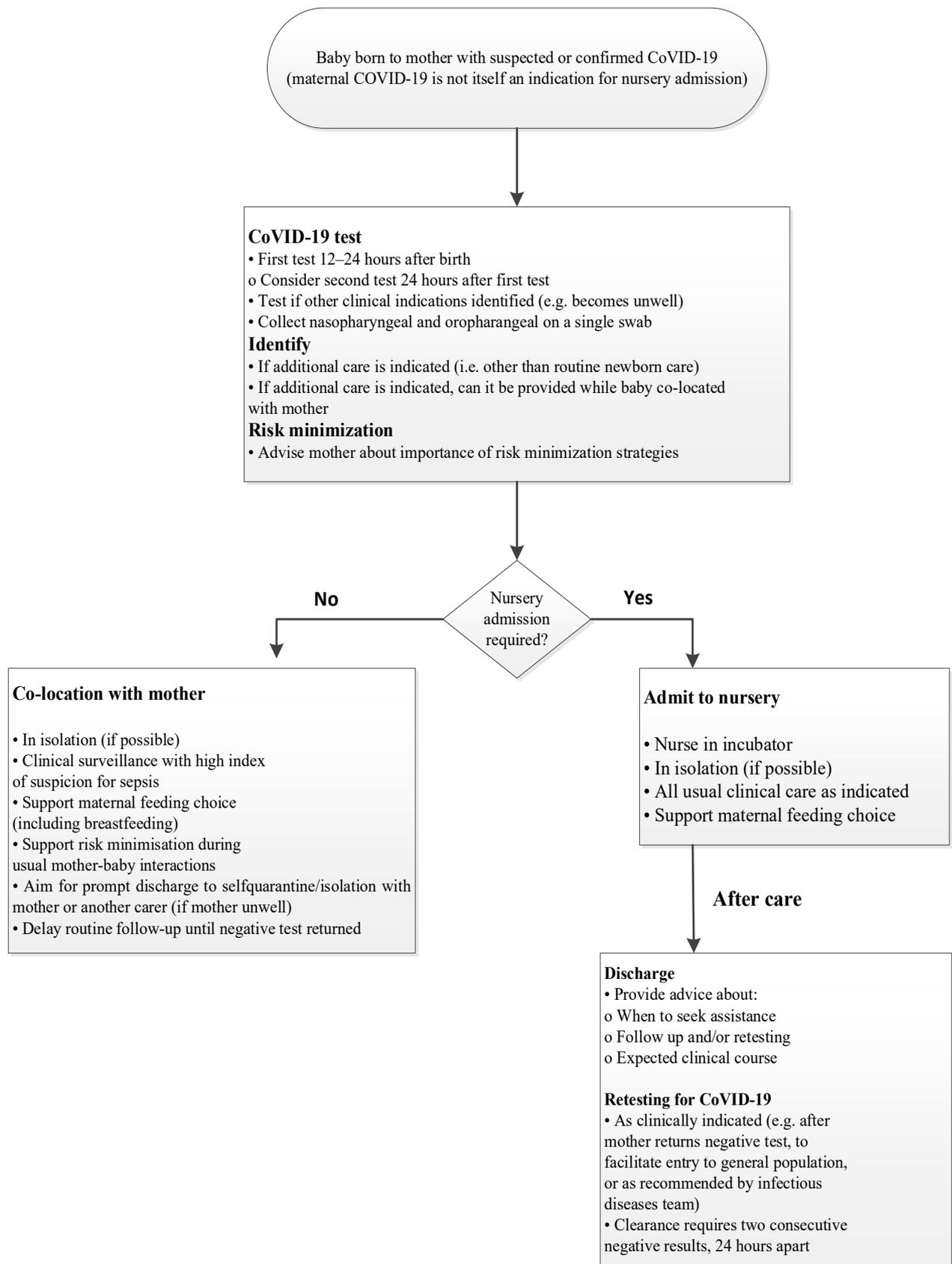


Figure 3. Neonates of Suspected or Confirmed COVID-19 Mothers.

Note. Adapted from <https://www.health.qld.gov.au/qcg>. Risk minimization strategies: 1. Hand hygiene before and after contact; 2. Cough or sneeze into elbow; 3. Face mask during baby care; 4. Visitor restrictions; 5. Cleaning/sterilizing equipment and surfaces.

Table 2. Complementary Investigations in Patients With COVID-19

All Patients	
Laboratory tests	Complete blood count with differential
	CRP
	Serum creatinine
	Liver function tests
	Ferritin
	Blood group
	Myoglobin
	Creatinine kinase
Chest CT scan	Na, K, Mg, and vitamin D
	Density (i.e., ground-glass opacity, consolidative opacity, and mixed)
	Internal characteristics of the lesion (i.e., crazy-paving and reversed halo sign)
	Axial location and lobar location
ICU admitted patients	Shape (i.e., patchy, round-nodular, and confluent)
	Other findings (i.e., tree-in-bud opacities, predominantly nodular opacities, predominantly reticular opacities, cavitation, mediastinal lymphadenopathy, and pleural effusion)
	Laboratory tests
ICU course sheet	PT, PTT, INR
	D-dimer
	APACHE score, SOFA score
	Types of oxygen therapy (i.e., reservoir bag, CPAP, NIV, and intubation)
	Oxygen statuses (i.e., SPO ₂ , PAO ₂ /FiO ₂ , and PAO ₂ during and after intubation)
If sepsis suspected	Lung dynamics (compliance and resistance)
	Advanced hemodynamic parameters with USCOM
	Complication and outcomes
Laboratory test	Arterial blood gas
	Procalcitonin
	Blood culture

Note. CRP: C-reactive protein; Na: Sodium; K: Potassium; Mg: Magnesium; CT scan: Computed tomography scan; ICU: Intensive Care units; PT: Prothrombin time; PTT: Partial thromboplastin time; INR: International normalized ratio; APACHE: Acute physiology and chronic health evaluation; SOFA: Sequential organ failure assessment; CPAP: Continuous positive airway pressure; NIV: Non-invasive ventilation; USCOM: Ultrasonic cardiac output monitor; SPO₂: Peripheral oxygen saturation; PAO₂/FiO₂: Fraction of inspired oxygen/Fraction of inspiratory oxygen.

Although this new virus is from the same family of SARS-CoV, various ambiguous points exist, and prior recommendations are insufficient to confine the disease. To block the routes of transmission, epidemiological changes should be monitored carefully and further studies are essential, especially since no one is assured of SARS-CoV-2 immunity.¹⁵ Accordingly, a comprehensive database is helpful to support medical researchers and healthcare professionals in their efforts regarding better understanding and combating the disease associated with this novel coronavirus. In this manuscript introduced our electronic web-based registry, which was designed and launched by Shiraz University of Medical Sciences. In this system, monitoring patients and frequently checking back for additional content could be implemented with detail. According to laboratory tests, we could also find a cut-off to predict the disease in suspicious individuals.¹⁶ A similar registry has been set up to support rapid evidence synthesis in Europe and Tehran.^{17,18} It is hoped that this valuable database provides extensive knowledge about different aspects of this disease such as demographic characteristics, comorbidities, laboratory findings, risk

factors, and the safety and efficacy of various treatments.

Conclusion

The current study provided a brief report about our electronic registry system for patients with COVID-19 in Fars province, Iran. For those researchers who are interested in the field and wish to follow the last updates on SARS-CoV-2 in particular, this registry helps them collect reliable and especially up-to-date information on this issue.

Ethical Approval

This study was approved by the ethical committee code of IR.SUMS.REC.1399.022.

Conflict of Interest Disclosure

The authors declare that they have no conflict of interests.

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Authors' Contributions

All authors drafted part of the manuscript and approved the final version.

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References

- Wang L, Wang Y, Ye D, Liu Q. Review of the 2019 novel coronavirus (SARS-CoV-2) based on current evidence. *Int J Antimicrob Agents*. 2020;55(6):105948. doi:10.1016/j.ijantimicag.2020.105948
- Jiang F, Deng L, Zhang L, Cai Y, Cheung CW, Xia Z. Review of the clinical characteristics of coronavirus disease 2019 (COVID-19). *J Gen Intern Med*. 2020;35(5):1545-1549. doi:10.1007/s11606-020-05762-w
- World Health Organization (WHO). Coronavirus Disease 2019 (COVID-19): Situation Report, 67. WHO; 2020.
- Liu H, Wang LL, Zhao SJ, Kwak-Kim J, Mor G, Liao AH. Why are pregnant women susceptible to COVID-19? an immunological viewpoint. *J Reprod Immunol*. 2020;139:103122. doi:10.1016/j.jri.2020.103122
- Lauer SA, Grantz KH, Bi Q, et al. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Ann Intern Med*. 2020;172(9):577-582. doi:10.7326/m20-0504
- Wu CI, Postema PG, Arbelo E, et al. SARS-CoV-2, COVID-19, and inherited arrhythmia syndromes. *Heart Rhythm*. 2020. doi:10.1016/j.hrthm.2020.03.024.
- Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020;382(18):1708-1720. doi:10.1056/NEJMoa2002032
- World Health Organization (WHO). Hospital Readiness Checklist for CoVID-19. WHO; 2020.
- Vandenbroucke JP, von Elm E, Altman DG, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. *Ann Intern Med*. 2007;147(8):W163-194. doi:10.7326/0003-4819-147-8-200710160-00010-w1
- World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA*. 2013;310(20):2191-2194. doi:10.1001/jama.2013.281053
- Ortiz EI, Castañeda EH, De La Torre A. Coronavirus (COVID 19) infection in pregnancy. *Colomb Med*. 2020;51(2):e4271. doi:10.25100/cm.v51i2.4366
- Şahin AR, Erdogan A, Ağaoğlu PM, et al. 2019 novel coronavirus (COVID-19) outbreak: a review of the current literature. *Eurasian J Med Oncol*. 2020;4(1):1-7. doi:10.14744/ejmo.2020.12220
- Lin CY, Cheng CH, Lu PL, et al. Active surveillance for suspected COVID-19 cases in inpatients with information technology. *J Hosp Infect*. 2020;105(2):197-199. doi:10.1016/j.jhin.2020.03.027
- Emami A, Javanmardi F, Pirbonyeh N, Akbari A. Prevalence of underlying diseases in hospitalized patients with COVID-19: a systematic review and meta-analysis. *Arch Acad Emerg Med*. 2020;8(1):e35.
- Zhou P, Yang XL, Wang XG, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*. 2020;579(7798):270-273. doi:10.1038/s41586-020-2012-7
- Zheng Y, Zhang Y, Chi H, et al. The hemocyte counts as a potential biomarker for predicting disease progression in COVID-19: a retrospective study. *Clin Chem Lab Med*. 2020;58(7):1106-1115. doi:10.1515/cclm-2020-0377
- Eular CoVID-19 database. https://www.eular.org/eular_covid19_database.cfm.
- Talebpour M, Hadadi A, Oraii A, Ashraf H. Rationale and design of a registry in a referral and educational medical center in Tehran, Iran: Sina Hospital Covid-19 Registry (SHCo-19R). *Advanced Journal of Emergency Medicine*. 2020;4(2S). doi:10.22114/ajem.v4i2s.361