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# Is home Care a Successful Strategy in COVID-19? A Valuable Experience from Iran

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***Abstract***

***Background***

Coronavirus Disease-2019 (COVID-19) is a recently evolving public health problem. This study aimed to establish home care system for patients with acute respiratory infections in treatment centers and hospitals covered by Mashhad University of Medical Sciences, Mashhad, Iran.

***Materials and Methods***: In this pilot study, which was done as cross-sectional design from February 29, 2020 until May 4, 2020, all the patients with acute respiratory infections suspected of corona and referred to centers of health comprehensive services and outpatient clinics of Mashhad, Iran (referral level 1), were assessed based on protocol developed by Ministry of Health. Then, patients who do not need hospitalization services based on diagnosis of specialized health care team were referred home by prescription of medication and self-care training (home quarantine). Afterward, the required information based on care need, improving and thoroughly improved along with patient home visit and follow-up calling were implemented by physician. In the last phase, patients' and their families' satisfaction regarding health care team was assessed by a researcher-made questionnaire.

***Results:*** In this pilot study, 200 patients (men: 62.9%) with Covid-19 underwent home quarantine and care and treatment by a specialized treatment team comprised of physician, nurses, and psychologist and health experts. The findings showed that 84.5% of patients and family had partial satisfaction regarding the way of treatment of the health care team. Satisfaction on explanations provided regarding disease, diagnosis, and treatment method in 68% of patients was full satisfaction.

***Conclusion***

Home quarantine decreases stress and fear in patients and their family and prevents social labelling for these individuals. Patients were highly satisfied regarding being cared for in their home and by family members.

***Key Words:*** COVID-19, Home care, Iran, Treatment.

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## 1- INTRODUCTION

In late December 2019, a series of unexplained cases regarding pneumonia were reported in Wuhan, China. The government and health researchers performed rapid attempts to control the epidemic, and initiated etiologic research. On January 12, 2020, World Health Organization (WHO) named this virus as novel corona virus 2019, temporarily. On Jan 30, 2020, WHO presented the epidemic of corona virus 19 as a general health emergency with international concern (PHEIC). On February 11, 2020, WHO officially named the disease caused by novel corona virus-2019 as corona virus disease 2019. On that day, corona virus study group (CSG) named its international committee of viruses classification as severe acute respiratory syndrome corona virus-2 (SARS-COV2) (1-7). The virus spreads rapidly in the air through droplets projected from patients' respiratory systems (8). Besides, several studies confirm that transmission and dangers of this deadly virus. The virus has a very high mortality rate and disability, especially in certain individuals, including people with underlying diseases, the elderly, and immune system defects (9-12).

### Prevalence of covid-19 in Iran and World

Up to May 19 2020, the newest global report of corona virus prevalence shows that 200 countries belonging to all the world continents are affected by this virus and covid-19 disease, and 4 million and 894 thousand and 254 cases of covid-19 are recorded in these countries, of which 320 thousand and 186 one died. Out of the affected individuals, 1 million and 908 thousands and 77 individuals were recovered and were able to defeat the disease. America with the most number of affected individuals in the world and an increase of 21 thousand and 693 individuals in last 24 hours, has reached to one million and 550 thousand and 294 affected individuals;

Ninety one thousand and 981 Americans have died to date.

Russia ranks the second country after America; this country reached 290 thousand and 678 individuals with an increase of 8 thousand and 926 individuals in last 24 hours; in this country, two thousand and 722 individuals died of corona.

Spain as the third country in the world, with an increase in 469 affected individuals in last 24 hours, reached 278 thousand and 188 individuals; 27 thousand and 709 Spanish have died to date. The countries of Brazil, England, Italy, France, and Germany were ranked respectively as fourth to eighth in the world with 255 thousand and 368, 246 thousand and 406, 225 thousand and 886, 179 thousand and 927, and 177 thousand and 289 affected ones. Regarding recovered ones, America, Spain, and Germany were ranked as first to third respectively with 356 thousand and 383, 196 thousand and 958 and 154 thousand and 600 recovered individuals (13-24). It should be noted that corona virus was emerged for the first time in Dec 2019 in Wuhan, China, and became "global pandemic" in a short time with prevalence in about 200 countries. With sixty-nine other deaths in past 24 hours in Iran, the number of died individuals reached 7 thousand and 57 individuals. Out of a total number of patients, 122 thousand and 492 individuals and 95 thousand and 661 individuals recovered and discharged, 2 thousand and 712 individuals were also in critical care. More than 75% of the population of Khorasan Razavi (6,400.000) are covered by Mashhad University of Medical Sciences, and the rest of this population is serviced by the faculty and medical universities of Sabzevar, Gonabad, Torbat-Heydariyeh, Torbat-e-Jam, and Neishabour (23-26). Due to the increase and spreading

epidemic of this disease in our country, decrease in hospitalization costs, prevention of tiredness of hospital health care team, decrease in hospitalization costs, decrease of stress and fear in society and freeing hospital beds for critical patients, this study aimed to establish home care system for patients with acute respiratory infections in treatment centers and hospitals covered by Mashhad University of Medical Sciences, in Mashhad, Iran.

## 2- MATERIALS AND METHODS

### 2-1. Method

In this study, which was done as cross-sectional design from February 29 2020 until May 4 2020, all the patients with acute respiratory infections suspected of corona and referred to centers of health comprehensive services and outpatient clinics of Mashhad (referral level 1), were assessed based on protocol developed by Ministry of Health, Treatment and Medical Training and standard checklists. In this regard, process of treatment of patients with acute respiratory infection who are suspected of corona virus were followed, and assessed at the referral level 1, and in case of having symptoms of covid-19 were referred to level 2.

### 2-2. Description of disease suspected cases

 A history of dry cough, or shivering, or sore-throat along with dyspnea with or without fever which is not justifiable by other factors.

 Patient with fever and/or respiratory symptoms (with any severity).

 History of close contact with an absolute/probable case with COVID-19 in 14 years prior to initiation of disease symptoms.

In referral system, patients referred to level 2 centers (**Table.1**) were examined by specialist physicians aware of treatment protocols of Health Ministry and underwent paraclinical and imagery according to diagnostic-treatment protocols, and in case of having acute respiratory symptoms and problems were guided to determined specialized hospitals which are at the third level of referral system (**Appendix.1**). The patients with mild grade of disease by diagnosis of treatment team underwent home care. The routine was such that patients were assessed by health care team according to flowcharts of Health Ministry and were classified in two levels.

**Level A** (with mild symptoms of disease which were under home health care and were visited on the first day and then every three days by health care team and health staff).

**Level B** (with mild-to-moderate disease symptoms which were treated in home and were visited every day by specialist physicians).

It should be noted that consultation by phone was performed for these patients by physicians of Health care team and whenever the disease symptoms became severe, they were immediately referred to determined hospitals with previous coordination.

**Appendix-1:** Diagnosis of Covid-19 based on paraclinical findings.

| Vital Signs |
|---|
| ▪ Respiratory Rate >24 |
| ▪ Heart Rate>125 beats/min |
| ▪ SpO2<90% on ambient air |
| **Laboratory findings** |
| ▪ D-dimer>1000 ng/ml |
| ▪ CPK>twic upper limit of normal |
| ▪ CRP>100 |
| ▪ LDH>245 U/l |
| ▪ Elevated troponin |
| ▪ Progressive lymphopenia |
| ▪ High ferritin (Ferritin >300 ug/L). |

SpO2: Oxygen saturation, CPK: Creatine-phosphokinase, LDH: lactate dehydrogenase.

**2-3. Hospitalization indication is as follow:**

Patients who had one/several cases of following symptoms in addition to acute respiratory infection are indicated for hospitalization:

- RR>30
- PO2<93%
- Pulmonary infiltration in chest graph
- Clinical judgment of specialist physician

In this program, patients who do not need hospitalization services based on diagnosis of specialized health care team (according to flowcharts developed by Health Ministry) were referred to the home by prescription of medication and self-care training (home quarantine) and in case of need to third grade level by referring system were transferred to reference hospitals.

Patients hospitalized in treatment centers covered by the university, or those that were referred to second grade services centers, were provided imagery at the place (chest CT scan), and four imagery centers were considered for the patients who referred directly to clinics and offices (**Figure.1**). Then, the required information based on care need, improving and thoroughly improved along with in home patient visits and telephone follow-up were implemented by physician.

It should be noted that medication required by patients for treatment was provided to patients freely. In the last phase, patients' and their family satisfaction regarding health care team was assessed by a researcher-made questionnaire.

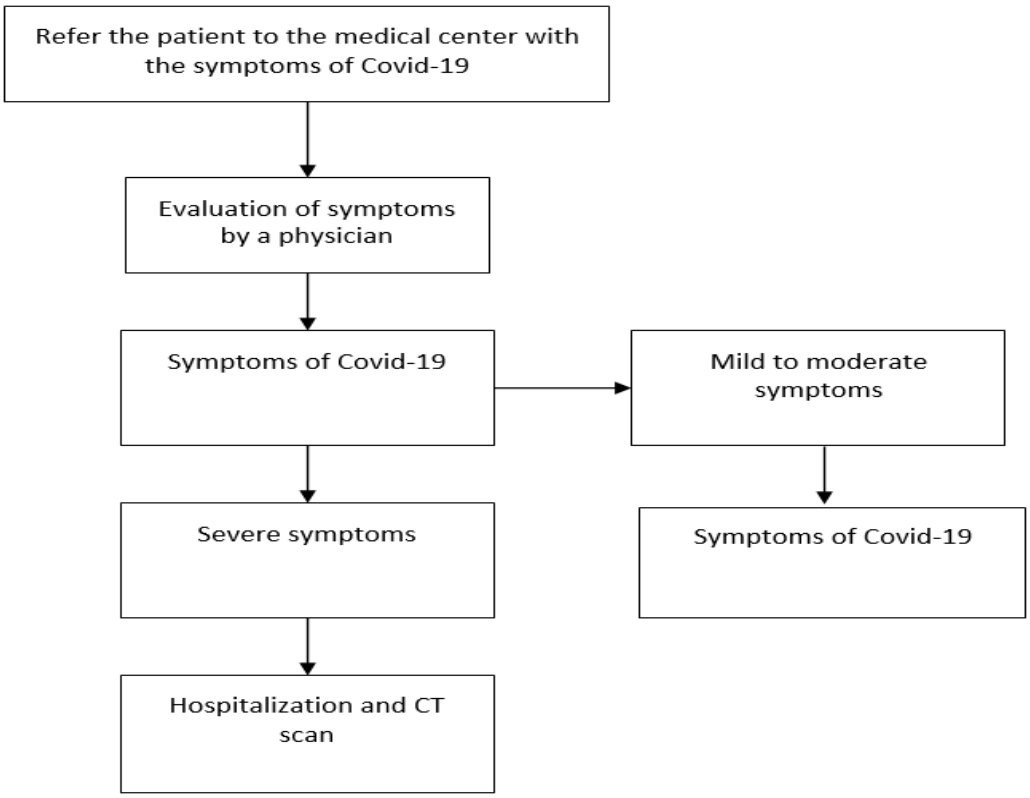


**Fig.1**: The process of visiting and CT scan of the lungs of people suspected of having Covid-19.

### 2-4. Ethical considerations

The Research Ethics Committee of Mashhad University of Medical Sciences approved the study protocol (ID-code: 99/66384).

### 2-5. Data analysis

Data analysis was done by SPSS software version 16.0 and using appropriate statistical tests. P<0.05 was considered as significance level.

## 3- RESULTS

### 3-1. Demographic information

Two hundred individuals participated in the study. One hundred and seventeen men (62.9%), and 69 individuals (37.1) were women. Entrance to study in 96.5% was done by lung scan and 3.5% by the physicians (**Table.1**). Regarding insurance, 43.6% had social security insurance, 28.5% had health insurance, and 26.7% had treatment services insurance. 35.5% were related to Mashhad 1, 30.1% were related to Mashhad 2, and 34.3% were also related to countryside of Mashhad. Educational level of participants was as follow: diploma and lesser (72.1%/124), Associate degree and Bachelor's degree (20.3%/35), higher than Bachelor's degree (7.6%/13). 31.5% of participants were housewife (56), 35.4% were self-employed and 30.3% were employee (54), and 2.8% were students (5) (**Table. 1**).

### 2-6. Access to personal hygiene facilities-quarantine

Regarding treatment-health facilities: 45% of followed individuals had access to clean gloves, and 47% had access to hand sanitizer, and 14% had access to thermometer, and 44.5% had access to clean mask. Possibility of quarantine in home was provided for 67% (134 individuals). 72% of them had home care (144). Besides, 14% of followed individuals had physician, nurse and health care staff in their family (28 individuals) (**Table. 1**).

**Table-1**: Demographic information of patients participating in the study.

| Variables | Mean ± Standard deviation | Ranged |
|---|---|---|
| Number of people living in the house | 3.23+1.36 | |
| Oldest age | 57.28+1.28 | |
| Youngest age | 27.97+2.08 | |
| Other patients at home | Yes: 34(17) | |
| Job | Housewife | |
| | Self-employment | |
| | Governmental Job | |
| | Others | |
| Age patient, year | Mean± Standard deviation | Ranged |
| | 51.85+1.54 | 15-83 |
| Gender | Men | Women |
| | 117(62.9) | 69(37.1) |
| Level of Education | Diploma and less | 124(72.1) |
| | Bachelor | 35(20.3) |
| | Higher than a bachelor's degree | 13(7.6) |
| Insurance status | Tamin-ejtemaei | 75(43.6) |
| | Salamat | 49(28.5) |
| | Health Service | 46(26.7) |
| | Others | 2(1.2) |

| | | |
|---|---|---|
| Individual residence | Uptown | 59(29.5) |
| | In the middle of the city | 50(25) |
| | Down town | 57(28.5) |
| Group category | A | 80(40) |
| | B | 120 (60) |
| Home health facilities | Yes | No |
| Family doctor or nurse | 27(13.5) | 173(86.5) |
| Having a caregiver at home | 144(72) | 56(28) |
| Possibility of quarantine | 134(67) | 66(23) |
| Thermometer | 28(14) | 172(86) |
| Hand disinfectant | 94(47) | 106(53) |
| Mask | 89(44.5) | 111(55.5) |
| Single-use glove | 90 (45) | 110(55.5) |
| Sickness period | Improving | 75(54.7) |
| | Improved | 49(35.8) |
| | Unchanged | 13(9.5) |
| How to enter the study | CT-scan | 191(95.5) |
| | Diagnosis of the doctor | 7(3.5) |

### 2-7. History of medication use

Regarding medication use: 47.5% consumed antibiotics, 13.5% consumed antipyretic, 10.5% consumed anti-inflammatory, and 51% consumed hydroxychloroquine, and 4.5% consumed Tamiflu, 31% consumed other medications (hypertension, cardiac, pulmonary, etc.) (**Table. 2**).

### 2-8. Disease symptoms

Regarding disease symptoms: 13% of patients reported fever, 39.5% had cough, 27.5% dyspnea, 13% body pain, 11% shivering, 18% fatigue, 7% sore-throat, 12% gastrointestinal problems, 12% nausea and vomiting, 4.5% chest pain, 2% lack of olfaction, 3% decline in olfaction, and 0.5% smelling strange odor (**Table. 2**).

### 2-9. History of chronic disease

Regarding having chronic disease: 3.5% respiratory diseases, 0.5% hepatic disease, 4% renal disease, 17% diabetes, 18% hypertension, 6.5% cardiac disease, 0.5% epilepsy, 0.5% cancer, 0.5% organ transplant, 2.5% autoimmune disease, and 25.5% other diseases (asthma, anemia, etc.) (**Table. 2**). After assessment they were classified in special teams into three groups of A (40%/80), B (605%/120) and the follow-up and treatment was progressed based on protocol. At last, disease trend in 54.7% was toward improvement, 35.8% partial improvement, and 9.5% of individuals were reported without any changes, which were referred to specialized hospital (**Table. 2**).

### 2-10. Satisfactory on health care team

The findings showed that 84.5% of patients and family had partial satisfaction regarding treatment approach of health care team, and 15.5% had full satisfaction. Satisfaction on explanations provided regarding disease, diagnosis, and treatment method in 68% of patients was full satisfaction. The findings showed 68% of patients had partial satisfaction on access to health care team, and 32% had full satisfaction. General satisfaction on receiving services was full in 71.5% and partial in 28.5% (**Table. 3**).

**Table-2**: History of symptoms, chronic disease and drug use in patients participating in the study.

| Signs and Symptoms | Yes | No |
|---|---|---|
| Fever | 28(14) | 172(86) |
| Cough | 79(39.5) | 121(60.5) |
| Respiratory problems | 55(27.5) | 145(72.5) |
| Body aches | 26(13) | 174(87) |
| Trembling | 22(11) | 178(89) |
| Weakness | 36(18) | 164(82) |
| Sore throat | 14(7) | 186(93) |
| Digestive problems | 24(12) | 176(88) |
| Chest pain | 9(4.5) | 191(95.5) |
| Lack of smell | 4(2) | 196(98) |
| Decreased olfactory | 6(3) | 194(97) |
| Chronic disease | 1(0.5) | 199(99.5) |
| Pulmonary | 7(3.5) | 193(96.5) |
| Liver | 1(0.5) | 99(99.5) |
| Kidney | 8(4) | 192(196) |
| Diabetes | 34(17) | 166(83) |
| Blood pressure | 36(18) | 164(82) |
| Heart disease | 13(6.5) | 187(93.5) |
| Epilepsy | 1(0.5) | 199(99.5) |
| Cancer | 1(0.5) | 199(99.5) |
| Organ transplants | 1(0.5) | 199(99.5) |
| Automation | 5(2.5) | 195(97.5) |
| Other diseases | 51(25.5) | 149(74.5) |
| Drug | Yes | No |
| Hydroxychloroquine | 102(51) | 98(49) |
| Flu Thought | 9(4.5) | 191(95.5) |
| Anti-inflammatory | 21(10.5) | 179(89.5) |
| Antipyretic | 27(13.5) | 173(86.5) |
| Antibiotics | 95(47.5) | 105(52.5) |
| Other drugs | 62(31) | 139(69) |

**Table-3:** Patient and family satisfaction with the treatment team.

| Variables | Medium satisfaction, Number (%) | High satisfaction, Number (%) |
|---|---|---|
| Access to the treatment team | 136 (68) | 64 (32) |
| Satisfaction with the description received | 64 (32) | 136(68) |
| Satisfaction with the treatment team | 169 (84.5) | 31 (15.5) |
| Overall satisfaction with the services received | 57 (28.5) | 143 (71.5) |

## 2-11. Economics of treatment- rotation of hospital beds

In this pilot study, 200 patients with covid-19 underwent home quarantine and care and treatment by specialized treatment team of physician, nurses, and psychologist and health experts. This issue had numerous benefits for patients, their family, and also other society individuals, and also Mashhad University of Medical Sciences as health and treatment trustee in society. Home quarantine decreases stress and fear in patients and their family and prevents social labelling of these individuals. Patients were highly satisfied regarding being cared for in their home and by family members. In home care with home quarantine, patients and their family

suffered lesser economic costs, since cost of hospitalization in hospital and receiving specialized services requires high expenses, but in home care, the patients received the same specialized and consulting services with much less costs, since they were freely visited and also received free psychological and health consults by health care team. This issue decreases relocation and commuting of patients in society, which in turn leads to decrease in contamination cases and contact with social healthy individuals. In this program, the occupation of 200 hospital beds was prevented by patients with covid-19 who had mild to moderate symptoms, which can decrease hospitalized cases, decrease occupational exhaustion, and prevent fatigue of health care team in hospitals.

## 4- DISCUSSION

The outbreak of Coronavirus 2019 (COVID-19) on January 30, 2020 was declared by the World Health Organization (WHO) as an emergency health problem, with infections in all 34 regions of China and the total number went beyond acute acute respiratory syndrome. It is believed to have originated in late December 2019 from the wholesale food market in the city of Wuhan, Hubei Province, and has spread widely around the world (27).

The COVID-19 pandemic in Iran is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). On 19 February 2020, Iran reported its first confirmed cases of infections in Qom (25). The virus may have been brought to the country by a merchant from Qom who had travelled to China (26).

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. The best way to prevent and slow down transmission is to be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands or using an alcohol based rub frequently and not touching your face. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow). At this time, there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments. WHO will continue to provide updated information as soon as clinical findings become available (3-12).

The main goal of COVID19 prevention is public health measures to prevent the spread of the disease from person to person by isolating individuals to stop transmission by isolation, quarantine and social distance. "Quarantine" is one of the oldest and most effective tools for controlling the spread of infectious diseases (28). COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization. Most common symptoms are fever, dry cough and tiredness. Serious symptoms are difficulty breathing or shortness of breath, chest pain or pressure and loss of speech or movement. Seek immediate medical attention if you have serious symptoms. Always call before visiting your doctor or health facility. People with mild symptoms who are otherwise healthy should manage their symptoms at home. On average it takes 5–6 days from when someone is

infected with the virus for symptoms to show, however it can take up to 14 days (4-8).

According to the World Health Organization's guidelines, any patient with an acute respiratory infection should be hospitalized. However, people with mild symptoms do not need to be hospitalized and can be referred to centers for treatment and home care.

Patients with mild symptoms are candidates for hospitalization and home care:

- Patients who have no safe place to stay.
- The person is reluctant to be hospitalized.
- Patients with mild symptoms who do not have an underlying disease, such as an immune system defect, cardiovascular disease, or the possibility of developing complications.
- The patient and family should be able to follow the treatment, including home isolation, hand washing, respiratory hygiene (sneezing, coughing, etc.), cleaning the environment and restrictions on movement, and be able to deal with safety issues (for example, prevention).
- There should be communication between home and patient care providers and the patient throughout the patient's inpatient stay until the patient is free of symptoms.
- In order to comply with all the standards and precautions of the standards at home, comprehensive information and training should be provided to the patient and family on how Covid-19 is transmitted so that they can be cared for by a person not suspected of having the infection (29, 30).

As there are no approved treatments for COVID- 19 till now, prevention is of paramount importance. However, many difficulties face the preventive strategies; prolonged incubation period of SARS-CoV-2, and duration of the illness, the virus is infective within the incubation period and even after clinical recovery, features of the disease are non- specific, and it has an affinity for mucosal surfaces like nose, mouth, and conjunctiva.

Home isolation of confirmed or suspected cases with mild illness is usually recommended. Good ventilation and exposure to sunlight should be considered during home isolation. Patients should wear a surgical mask with cough hygiene. Also, caregivers should wear a surgical mask when in close contact with the patient and use frequent hand hygiene every 15–20 min (31).

Healthcare workers are at highest risk of infection and will be protected to confirm continuity of health care and forestall further transmission of infection. Patients should be isolated in separate rooms (negative pressure rooms do not seem to be generally needed) or cohort together. Regular decontamination of rooms, handles, tables, doorknobs, desks, toilets, surfaces, and equipment should be done. Although China National Health Commission, infection control places SARS-CoV-2 (droplet pathogen) in Category B of infectious agents, infection control measures recommended are those for category A agents.

Personal protective equipment (PPE) should be available for healthcare workers including fit-tested N95 respirators, gowns, gloves, and goggles. Precautions for transmission mechanisms should be considered during aerosol-generating procedures like intubation and suction. All contacts healthcare workers should be monitored for the development of any symptoms of COVID-19. Patients are often discharged from isolation as long as they are afebrile for a minimum of 3 days and have two consecutive negative PCR tests with at least one-day interval (32).

## 5- CONCLUSION

Prevalence of COVID-19 is a clinical threat to the general population and health care personnel worldwide. However, knowledge at this time is limited. Effective option of anti-viral treatment and vaccination is now under assessment and developing. We can prevent the spread of novel Corona virus-19 through humans by performing invasive attempts of infection control. The findings of the current study showed that pilot performance of home care leads to full satisfaction by 71.5% of patients and their families, and no case of dissatisfaction was recorded. In order to perform home care, the patient was supervised and cared for by a specialized treatment team and the questions of patient and their attendants were responded to by a specialized team including specialist physicians, nurses, health experts and psychologists. Patient referral to specialized centers was done rapidly and with coordination. Decrease in hospitalized cases in hospitals, decrease in job exhaustion in health staff of hospitals, decrease in costs borne by patients, decrease in referrals, and transformation of patients in city, and subsequently prevention of infection spreading in city, increase in rotation of hospital beds, peace and welfare for patients and their family, and decrease in stress and depression for patients are among the benefits of the mentioned project. More knowledge regarding this new virus and its prevalence is available and hence a better way of dealing with this issue has become possible. The recent emergence of COVID-19 remains severe everywhere in the globe. WHO has designated COVID-19 as a Public Health Emergency of international concern. So, here it is urgent to increase public awareness, reinforce infection control policies, and perform proper health management within the families.

## 6- RECOMMENDATIONS

Due to source of the COVID-23 disease which was pointed to previously, the nutritional and health advice by Islam, specifically Halal food and adhering to hygiene should be further considered and it should be attempted to introduce them to the world.

Not inducing stress and anxiety to people along with advice and training for people on health and hygiene principals, inducing and preserving peace is also of utmost importance to defeat this disease.

Finally, although internet communications, specifically social networks in social media increase access and spread knowledge greatly, this platform has the potential to spread and share incorrect information or fake news. The governments are responsible to provide accurate knowledge and clarification of incorrect information to help people in facing this new infection.

Since calumniating and frightening people and the increase in stress and anxiety level among patients impairs heath and treatment services.

## 7- CONFLICT OF INTEREST: None.

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