

Cure rate and survival time of COVID-19 patients by family support accompaniment: a semiparametric mixture cure model

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Abstract

Background. Since the first outbreak of COVID-19, most hospitals restricted patients' family support accompaniment during medical treatment of infectious transmission. On the other hand, accompaniment has also been recognized as an essential part of the treatment. Therefore, this study aims to determine the effect of family presence accompanying COVID-19 patients during hospitalization on the recovery rate and survival time. Objective: this

study was conducted in a private hospital designated as a referral hospital for COVID-19 cases in Surabaya, East Java province, Indonesia.

Materials and Methods. There were 541 COVID-19 patients included in the study, consisting of 251 women and 290 men. The requirements set as a sample are patients treated between January 1st 2021 and March 31st 2021. This study used a survival analysis study design. The data used is secondary data and uses total sampling.

Results. The result of this study is that patients who get support from their families can survive longer than patients who do not get family support. Among the 251 female samples, only 34 were accompanied by their families, with 29.411% fatalities recorded. Among 290 male patients, 25.71% fatalities were recorded in 35 accompanying family presence. Furthermore, female patients have a probability of better outcomes than males ($P < 0.001$).

Conclusions. Based on these results, family presence has the benefit of improving outcomes and recovery. So, the authorities are expected to reconsider the restrictions on family presence by maintaining proper safety protocols of isolation and quarantine.

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Introduction

Coronavirus disease -19 (COVID-19) has been a global pandemic since the beginning of 2020 and has affected every country in the world. The disease started spreading from one city to the entire Globe. Furthermore, the first case of the disease was detected in late December 2019 and then announced as a global pandemic by WHO in March 2020.¹ Large-scale disease spread has a huge potential to cause stress, thereby creating additional human needs to feel safe, calm, useful, and socially connected.^{2,3} Negative mood and depression have an undesired effect on the immune system.⁴ Therefore, methods that can be used to improve patients' mood have been included in the holistic approach to COVID-19 treatment.⁵ Family care, as a means to lessen the stress affecting the sufferers, has been one of the hallmarks of healthcare, including their physical presence at the bedside.²

COVID-19 is an infectious disease,^{6,7} hence, physical distancing and restrictions of movement are part of the efforts to mitigate its spread.² Furthermore, its presence has changed the common practice of accompanying family during treatment.⁸ The practice has currently been debated, but it has a great effect on patients' morale.^{2,3} Mental stress and anxiety during the COVID-19 pandemic has been investigated among the general population,⁸ medical staff, including front liners, such as doctors and nurses,⁹⁻¹¹ as well as non-front liners.⁵ The effect of solitary isolation on the outcome of hospitalized COVID-19 patients has not

been widely investigated.^{8,10} Therefore, this study aims to examine the effect of accompanying family care on the final outcome of COVID-19 patients.

Materials and Methods

This study uses a survival analysis study design, which is used to see the effect of the presence of families who accompany COVID-19 patients during hospitalization on the recovery rate and survival time. All COVID-19 patients between January 1st 2021 and March 31st 2021 were included in this study, while patients who were in the Intensive Care Unit were excluded. Censoring will be seen from the beginning of data collection until after the data collection time is complete. If, in the middle of taking data, the patient dies, then the event is counted. Patients who refused further inpatient treatment were excluded. While the results will show the cure rate and survival time. The research facility used is a private hospital designated by the government as a referral hospital for infected patients in Surabaya. The data used is secondary data and uses total sampling. The available data were statistically analyzed using survival analysis, with a statistical assumption of 0.05.

Results

A total of 569 in-hospitalized patients were initially enrolled in this study, of which 27 who were still hospitalized on March 31st, 2021, were excluded along with another three due to technical problems in the computerized medical record. Furthermore, inpatients that needed direct ICU treatment were also excluded due to preexisting protocols. Patients are seen to survive when experiencing COVID-19, which is not measured from time to event in days.

Among 34 female patients accompanied by their families, there were a total of 10 fatalities, while only 3 were recorded among 217 without accompaniment, thereby accounting for 29.411% and 0.013% of the total population, respectively. From the male group, 9 fatalities were recorded among 33 patients with family present, while only 18 were obtained among 255 who were unaccompanied, and they accounted for 27.2% and 0.07% of the population, respectively. The percentage of mortality and worsening of condition seemed to be significantly higher in accompanied female patients, especially during the later stages of hospitalization, compared to the unaccompanied group.

There was a significant difference in the survival probability between patients accompanied by their families and those without accompaniment (P=0.00). A similar result was also obtained on the survival failure between both groups (P=0.00). Furthermore, the

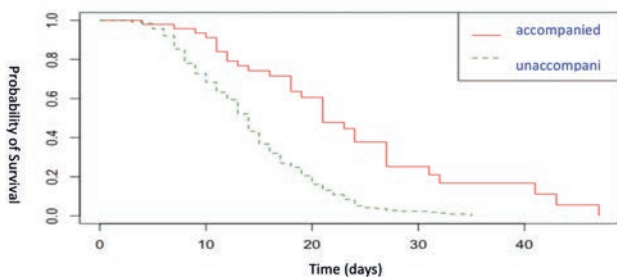


Figure 1. Probability of survival in days, showing accompanied patients having better results than those of non-accompanied patients.

patients with family accompaniment showed more resilience in COVID-19, which was indicated by a reduced number of hospitalization days as well as an improved probability of survival.

The results also showed that females demonstrated overall better results, namely decreased length of hospitalization, both in the family-accompanied and unaccompanied groups, as shown in Figure 2. For information, in Figure 2, the right diagram line is for men, and the left one is for women. There was a significant difference in the survival probability of the female gender as a covariate compared to the males (P=0.00).

Discussion

There have been three global outbreaks of infectious viral disease since 2000, including Severe Acute Respiratory Syndrome, which affected 8,096 people with 774 fatalities in November 2020.¹²⁻¹⁴ The second outbreak was caused by the Middle East Respiratory Syndrome in June 2012, with a total of 2,519 patients as well as 519 deaths.¹⁵ Furthermore, the third infection wave was COVID-19, with approximately 200 million cases on August 5th

Table 1. Data of enrolled patients.

Total patients	539 (100%) (%)
Accompanied by relatives	67 (12.4)
Unaccompanied by relatives	472 (87.6)
Age (accompanied patients)	
10-20 y.o	2 (3)
21-30 y.o	2 (3)
31-40 y.o	2 (3)
41-50 y.o	5 (7)
51-60 y.o	13 (20)
61-70 y.o	30 (45)
71-80 y.o	7 (10)
81-90 y.o	6 (9)
Patients' outcome	
Overall mortality	38 (5.3)
Accompanied mortality	18(26.9)
Unaccompanied mortality	20(4.23)
Female patients	
Accompanied subgroup	9 (26.4)
Unaccompanied subgroup	20 (4.23)
Male patients	
Accompanied subgroup	9 (27.3)
Unaccompanied subgroup	17 (6.67)

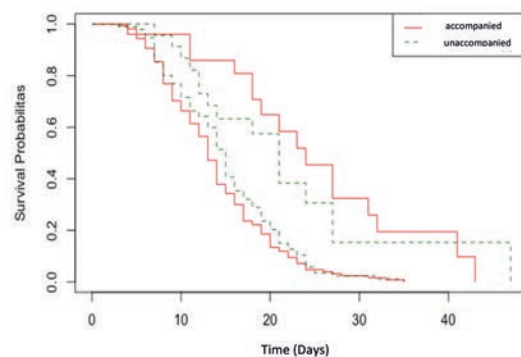


Figure 2. Probability of survival between accompanied and unaccompanied groups based on gender.

2021, which was six months after it infected the first 100 million people.⁶ COVID-19 requires multiple approaches and teamwork from physicians, and nurses to nutritionists.^{14,16} All aspects also need to be considered, including the medication administered, psychological support, and mental side of therapy to improve its outcome.¹⁷ Most of the patients accompanied by their family and admitted to the hospital already have comorbidities or other physically debilitating conditions before admission. Among 67 patients, 43 were accompanied by relatives due to their old age, 8 had frailty, and 5 were immobile and bedridden (low score of activity daily living). From the family-accompanied patients under 51 years, 12 had prevailing heart conditions, including 8 ischemic heart disease cases and 4 heart failures, as well as 4 cerebrovascular diseases, 2 bronchial asthma, 1 lupus, 1 psychological disorder, and 4 were underage requiring parental accompaniments. Since these health problems led to more severe conditions before admission due to COVID-19 infection, the direct comparison of mortality between family-accompanied and -unaccompanied groups can be misleading (Table 1). Some patients without comorbidities were not accompanied by their families because they were deemed not to have a serious health problems. Therefore, the amounts of fatalities recorded can be widely different.

In the unaccompanied female group, 1 fatality occurred under 48 hours after admission, but the remaining two passed away after the 12th and 23rd day due to sepsis at the age of 76 and 73, respectively. Among the males, 17 fatalities were observed, and only 3 of them were under 50 years old, namely 40, 43, and 49. Furthermore, they all had existing comorbidities of unregulated diabetes mellitus, of which only 1 was diagnosed recently during treatment.

Among the accompanied patients, 9 male patients passed away after 4 to 33 days of treatments, and it ranged from 1 to 26 days in the female group. Statistical analysis using survival analysis was then used to evaluate the days of disease progression before the fatalities due to the disparity between the family-accompanied and unaccompanied groups (Figure 1).

There is a significant difference in the probability of mortality between the 2 groups. The result also showed that gender as a covariate has a big influence over the probability ($P=0.00$), where females have higher clinical recovery than males (Figure 2). This condition affected both accompanied and unaccompanied patients. This finding is in line with Ortolan *et al.* (2020), who reported that males are slightly more prone to COVID-19 infection with a ratio of 1:0.9. They also have a higher chance of suffering from a more severe form of the disease. Their mortality rate is two times greater. However, this study did not consider the presence of family support during patients' treatment.¹⁸ This current study showed that patients under treatment with accompaniment had a better probability of clinical recovery.

The effect of depression on the onset, course, progression, and outcome of disease was identified in 1991, in a study on people infected with Human Immunodeficiency Virus (HIV). However, the results were inconclusive, and a previous study connected human alterations in the immunological system with depression, stress, HIV, immune-related disease, cancer, infections, and autoimmune disease.⁴ In 2018, Masih and Verbeke (2018) reported that acute depression of <2 weeks or chronic of > 2 years increased the level of eosinophil, neutrophil, and basophil, with an increase in monocyte level, which was observed only in patients with chronic depressive disorder. Depression also increases the level of pro-inflammatory cytokines (IL-1, IL-6, TNF- α) through the secretion from the innate immunity cell system (Masih and Verbeke 2018). Similar observations were found in a study of depressed patients, in comparison to people with schizophrenia, with further investigation of lymphopenia.²⁰⁻²²

COVID-19 has a great effect on the mental health of patients and other element section of society.^{5,8,23,24} Previous studies showed that approximately 16-18% of the society demonstrated stress and depression, including young people, women, and those with poor quality of sleep.²⁵ This indicates that depressive disorder and stress can affect the immune system. All efforts to avoid these conditions must be avoided, which include the presence of family during treatment, and their role in accompanying parents.²⁶

However, this view is still argued due to the high level of pathogenicity of COVID-19. Family accompaniment in the form of basic daily necessities, including personal protective materials. Institutions, such as the Institute for Patient And Patient Family Care (IPAPFC), have supported family involvement in patients' treatment¹⁶. Several health institutions have restricted accompaniment, thereby depriving patients of their basic needs, including the feeling of security.²⁷

Benefits of family presence in a patient's hospitalization include more anamnesis information about clinical conditions, and maintaining a high degree of professionalism and accountability for health care providers, while socialization can improve outcomes and recovery.²⁸ At the beginning of the pandemic, it was quite understandable that several hospitals and institutions felt the need to strictly curtail the family presence.^{8,29} Although some physicians referred to this policy as a dark decision,^{9,26,30} The unintended isolation inhibits the valuable support of family in the patient's care. A previous study revealed that relative presence could be used to ease the depression of the patients, in the patients' recovery and outcomes.^{16,19}

Patients with family accompaniment have an additional advantage compared to those in the intensive monitoring and patients' condition, including quick medical assistance during such incidence.^{26,30} It is important to note that the practice of accompaniment, which was proven beneficial to the patients, must follow the preexisting protocols.³¹ This study suggests a review of common and current practices in most health institutions to curtail accompaniments to prevent possible transmissions.

Conclusions

Based on this study, there were significant differences in the probability of mortality between COVID-19 patients with and without accompanying family presence. Gender has no effect on the treatment process, where both males and females have a better possibility of an outcome. The groups with accompanying family presence showed a better probability of clinical recovery.

The possibility of human factor affection in COVID-19 patients cannot be underestimated. Furthermore, mental health can also support the recovery and prognosis of the patient's outcome.

Family presence is beneficial in providing information regarding the illness, especially when verbal contact is not available. It can also be highly supportive in other non-COVID patients who are suffering from other diseases. The unintended isolation of COVID-19 patients by curtailing accompaniment during hospitalization is highly inadvisable and must be reconsidered.

References

1. Sohrabi C, Alsafi Z, O'Neill N, et al. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *Int J Surg* 2020;76:71-6.
2. Hart JL, Turnbull AE, Oppenheim IM, et al. Family-Centered Care During the COVID-19 Era.

3. University of Pittsburgh. Effects of Covid-19 on Family Caregivers. 2020;1-26.
4. Stein M, Miller AH, Trestman RL. Depression, the immune system, and health and illness: Findings in search of meaning. *Arch Gen Psychiatry* 1991;48:171-7.
5. Noor NM, Yusof RC, Yacob MA. Anxiety in frontline and non-frontline healthcare providers in kelantan, malaysia. *Int J Environ Res Public Health* 2021;18:1-10.
6. World Health Organization. COVID-19 Weekly Epidemiological Update. *World Heal Organ* 2021;52:1-3.
7. Chang MC, Park Y, Kim B, et al. Risk factors for disease progression in COVID-19 patients. *BMC Infectious Diseases* 2020;4-9.
8. Wang LQ, Zhang M, Liu GM, et al. Psychological impact of coronavirus disease (2019) (COVID-19) epidemic on medical staff in different posts in China: A multicenter study. *J Psychiatr Res* 2020;129:198-205.
9. Sun N, Wei L, Shi S, et al. Qualitative study: Experienced of caregivers during Covid19. *Am J Infect Control* 2020;48:592-298.
10. Gupta S, Sahoo S. Pandemic and mental health of the front-line healthcare workers: a review and implications in the Indian context amidst COVID-19. *Gen Psychiatry* 2020;33: e100284.
11. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open* 2020;3:1-12.
12. Bi Q, Wu Y, Mei S, et al. Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China : a retrospective cohort study. *Lancet* 911-9.
13. Chen R, Liang W, Jiang M, et al. Risk Factors of Fatal Outcome in Hospitalized Subjects With Coronavirus Disease 2019 From a Nationwide Analysis in China. 2020;97-105.
14. Susilo A, Rumende CM, Pitoyo CW, et al. Coronavirus Disease 2019: Tinjauan Literatur Terkini Coronavirus Disease 2019: Review of Current Literatures. *Jurnal Penyakit Dalam Indonesia* 2020;7:45-67.
15. Xiao J, Fang M, Chen Q, et al. SARS, MERS and COVID-19 among healthcare workers: A narrative review. *J Infect Public Health* 2020;13:843-8.
16. Dokken DL, Johnson BH, Markwell HJ. Family Presence During a Pandemic: Guidance for Decision-Making. *Inst Patient-And Fam Care [IPAFCC]*.
17. Trougakos JP, Chawla N, McCarthy JM. Working in a pandemic: Exploring the impact of COVID-19 health anxiety on work, family, and health outcomes. *J Appl Psychol* 2020;105:1234-45.
18. Ortolan A, Lorenzin M, Felicetti M, et al. Does gender influence clinical expression and disease outcomes in COVID-19? A systematic review and meta-analysis. *Int J Infect Dis* 2020;99:496-504.
19. Masih J, Verbeke W. Immune System Function and its Relation to Depression: How Exercise can Alter the Immune System-Depression Dynamics. *J Depress Anxiety* 2018;07:1-7.
20. Kronfol Z. Immune dysregulation in major depression: A critical review of existing evidence. *Int J Neuropsychopharmacol* 2002;5:333-43.
21. Zorrilla EP, Luborsky L, McKay JR, et al. The relationship of depression and stressors to immunological assays: A meta-analytic review. *Brain Behav Immun* 2001;15:199-226.
22. Herbert TB, Cohen S. Depression and Immunity: A Meta-Analytic Review. *Psychol Bull* 1993;113:472-486.
23. Geoffroy PA, Le Goanvic V, Sabbagh O, et al. Psychological Support System for Hospital Workers During the Covid-19 Outbreak: Rapid Design and Implementation of the Covid-Psy Hotline. *Front Psychiatry* 2020;11:1-8.
24. Pouralizadeh M, Bostani Z, Maroufizadeh S, et al. Knowledge and attitude towards COVID-19 and associated factors among health care providers in Northwest Ethiopia. *PLoS One* 2020;4:1-12.
25. Schäfer SK, Sopp MR, Schanz CG, et al. Impact of COVID-19 on Public Mental Health and the Buffering Effect of a Sense of Coherence. *Psychother Psychosom* 2020;89:386-92.
26. Alnazly E, Khraisat OM, Al-Bashaireh AM, et al. Anxiety, depression, stress, fear and social support during COVID-19 pandemic among Jordanian healthcare workers. *PLoS One* 2021;16.
27. Tian S, Hu N, Lou J, et al. Characteristics of COVID-19 infection in Beijing. *J Infect* 2020;80:401-6.
28. McCabe M. FAMILY PRESENCE 2 Acceptance of Senior Honors Thesis. 2014;1-32.
29. International P, Foundation AN, May R. Decision-making toolkit family presence policy decision-making toolkit.
30. Juan Y, Yuanyuan C, Qiuxiang Y, et al. Psychological distress surveillance and related impact analysis of hospital staff during the COVID-19 epidemic in Chongqing, China. *Compr Psychiatry* 2020;103:152198.
31. Harapan H, Itoh N, Yufika A, et al. Coronavirus disease 2019 (COVID-19): A literature review. *J Infect Public Health* 2020;13:667-73.