Heliyon 9 (2023) e22411

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

# The remote intercessory prayer, during the clinical evolution of patients with COVID -19, randomized double-blind clinical trial☆

Nathan Valle Soubihe Junior *, Ângela Cristine Bersch-Ferreira, Samira Martins Tokunaga, Luciana Alves Lopes, Alexandre Biasi Cavalcanti **, Sabrina Bernadez-Pereira

*Hcor – Hospital Do Coração, São Paulo, Brazil*

ARTICLE INFO

*Keywords:*
COVID-19
Prayer
Randomized clinical trials
Hospitalization
Faith healing

ABSTRACT

*Objectives:* The objective of this study was to evaluate the effect of intercessory prayer performed by a group of spiritual leaders on the health outcomes of hospitalized patients with Novel Coronavirus (COVID-19) infection, specifically focusing on mortality and hospitalization rates. Design: This was a double-blinded, controlled, and randomized trial conducted at a private hospital in São Paulo, Brazil. Interventions: Both groups continued to receive their usual medical care in accordance with HCor Hospital's institutional patient care protocol for COVID-19 patients. Intervention: Both groups received their regular medical care according to HCor's institutional patient care protocol for COVID-19 patients. The intervention group, in addition to standard treatment, received intercessory prayers performed by a group of spiritual leaders. Main outcome measures: The primary endpoint was in-hospital mortality. Secondary endpoints included the need for mechanical ventilation during hospitalization, duration of mechanical ventilation, length of ICU stay, and length of hospital stay. Results: A total of 199 participants were randomly assigned to the groups. The primary outcome, in-hospital mortality, occurred in 8 out of 100 (8.0 %) patients in the intercessory prayer group and 8 out of 99 (8.1 %) patients in the control group (HR 0.86 [0.32 to 2.31]; p = 0.76). Additionally, there were no significant differences between the groups in terms of secondary outcomes. Conclusion: The study found no evidence of an effect of intercessory prayer on the primary outcome of mortality or on the secondary outcomes of hospitalization time, ICU time, and mechanical ventilation time.

**Sources of support**

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

☆ NVSJ, LAL, SB-P were responsible for conception and design of the study; NVSJ, ACB-F, SMT, ABC and SB-P for analysis and interpretation of data; NVSJ, ACB-F and SMT for drafting the article; ABC and SB-P for revising it critically for important intellectual content; All authors have approved the final version to be submitted.

* Corresponding author. R. Des. Eliseu Guilherme, 200 - 10° Andar - Paraíso, São Paulo - SP, 04004-030. Brazil.

** Corresponding author.

*E-mail addresses:* nathansjunior@gmail.com, abiasi@hcor.com.br (N.V. Soubihe Junior), angelacbferreira@gmail.com (Â.C. Bersch-Ferreira), stokunaga@hcor.com.br (S.M. Tokunaga), lfalves@hcor.com.br (L.A. Lopes), abiasi@hcor.com.br (A.B. Cavalcanti), bernardezsabrina@gmail.com (S. Bernadez-Pereira).

https://doi.org/10.1016/j.heliyon.2023.e22411
Received 20 September 2022; Received in revised form 18 September 2023; Accepted 10 November 2023
Available online 17 November 2023

## 1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic has had a profound impact worldwide. The efforts to contain its spread and the questions surrounding its origin have become global concerns. The effectiveness of proposed treatments remains uncertain. Mass vaccination has proven to be safe and efficient [1,2], but adverse effects, ranging from mild to severe, including cardiac events, have been reported in previously healthy patients [3,4].

The increasing number of deaths and the rapid spread of the disease have intensified the need for comprehensive studies from all possible perspectives. This pandemic is not confined to a specific location; it is a global crisis that demands extensive and unrestricted discussions about its consequences [5–7].

The practice of praying for the recovery of sick individuals has been observed across cultures and religions throughout history. Numerous studies have been conducted to investigate the effectiveness of prayer, also known as intercessory prayer, for patients suffering from diverse diseases [8–19]. While some researchers have reported positive effects of prayer for the sick [8,10], others are critical of such studies, citing the lack of proper instruments to measure the intervention [20].

However, these studies vary in design and yield different results. Some critics argue that this line of research is fundamentally flawed and should be abandoned [9], while others suggest a growing trend of favorable outcomes for patients receiving intercessory prayer as an intervention [18]. Additionally, the diversity of religious intercessory methods and the varying approaches to spiritual intervention for the ill [18] highlight the importance of establishing standardized parameters for defining spirituality and conducting interventions. This includes specifying the methods to be used and compared, as well as promoting a uniformity of belief among intercessors.

Hypothesizing that intercessory prayer may positively influence clinical outcomes in COVID-19 patients, our study aimed to fill the literature gap by conducting a randomized, controlled, and standardized investigation. The objective was to assess the impact of intercessory prayer, performed by a group of religious leaders, on health outcomes, specifically mortality and hospitalization rates, among hospitalized patients with COVID-19 infection.

## 2. Material and methods

### 2.1. Study design and oversight

This was a double-blinded, controlled and randomized 1:1 (concealed) trial conducted at Hcor Hospital, in São Paulo, Brazil. The protocol was approved by the local research ethics board, and all participants provided written informed consent.

### 2.2. Participants

Adult patients aged 18 years and older who were admitted to a clinical inpatient unit or Intensive Care Unit (ICU) and had a confirmed diagnosis of COVID-19 infection through PCR testing were enrolled. Our study included patients regardless of their religion, faith, or the presence of any other ongoing spiritual intervention. Exclusion criteria consisted of patients who were admitted to the emergency room with a diagnosis of COVID-19 but did not require hospitalization, hospitalized patients receiving palliative care for a terminal illness, and patients who chose not to participate in the study after being presented with the informed consent form.

### 2.3. Randomization and blinding

Eligible participants were randomly assigned (1:1) to the intervention group or the control group. Randomization was performed in blocks of 4 subjects. Allocation concealment was guaranteed through a 24-h, central web-based automated system. This is a double-blinded study where patients and researchers were not made aware of the interventions and the results assessment was blind to the assigned intervention.

### 2.4. Interventions

Participants in both groups received their usual medical care according to the institutional protocol for COVID-19 patients. The only difference was that the intervention group also received intercessory prayers from a group of religious leaders in addition to standard treatment.

To maintain participant anonymity, each patient was assigned a specific research identification number rather than being registered with their name in the system. The identification number was combined with the patient's initials, which were recorded by the data collector. The research data manager reviewed the list of included participants daily and generated a list of patient initials for the intervention group. This list was shared with the group of intercessors, who performed intercessory prayers for the patients from their own homes. All intercessors prayed at different times according to their availability for each patient on the list.

The intercessors consisted of Protestant religious leaders who were selected based on their faith, availability, and commitment to daily prayers for a specific period. They were volunteers from Protestant congregations across various cities and denominations. The theological knowledge of each intercessor could not be objectively evaluated, but their voluntary participation and shared belief in the efficacy of prayer for the sick were significant factors in their selection.

A WhatsApp group was created to facilitate communication among the intercessors, where daily updates on hospitalizations were

shared. Throughout the study, the identity of the patients remained undisclosed to the intercessors. Initially, the intercessors received a list with patient initials for their remote prayers. However, due to changes in data protection regulations in Brazil, even the use of patient initials became prohibited. Instead, the identification number of the hospital bed assigned to each patient was used as the identification method for intercessory prayer.

Each intercessor prayed from their own homes or workplaces, dedicating a total of 240 min per day, divided into three shifts of 80 min each (morning, afternoon, and night). The content of each prayer was not specifically assigned, but it was required to include the following topics: 1) preservation of the patient's life, 2) avoidance of orotracheal intubation or mechanical ventilation for those not yet intubated, 3) shorter duration of intubation and mechanical ventilation for those already in that state, 4) reduced length of stay in the ICU, and 5) reduced total length of hospital stay.

### 2.5. Data collection and assessment

A standardized case report form was utilized to collect research data. Patients were followed from the time of hospital admission until discharge or death. Demographic information such as age, sex, and pre-existing comorbidities was obtained from digital medical records.

The researcher responsible for data collection underwent training and certification to ensure consistency and standardization in the data collection process. The data management team at Hcor Research Institute received training and certification to identify any inconsistencies, and regular query reports were generated every 15 days to address any issues and update the database. Monthly reports were also shared with all stakeholders involved in data handling, providing information on screening rates, participant inclusion, follow-up, data consistency, and completeness. These reports were essential for understanding the research data and taking necessary actions to address any challenges that arose.

### 2.6. Outcomes

The primary endpoint was the occurrence of in-hospital death. Secondary endpoints were the need for mechanical ventilation during hospitalization; the number of days on mechanical ventilation; length of ICU stay, and length of hospital stay.

### 2.7. Statistical analysis

Given the exploratory nature of this project, limited literature on this new disease, and limited inclusion of patients in the study (single center, HCor patients), no formal sample size calculation was performed. To maintain the benefits of randomization, all

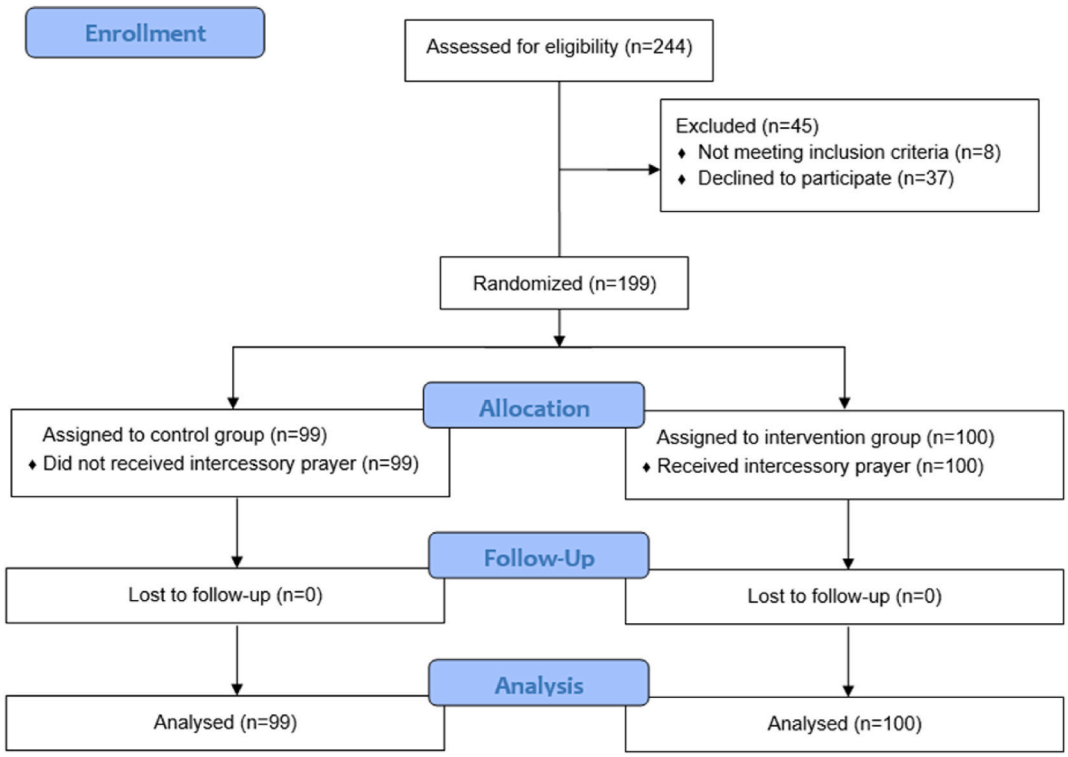


**Fig. 1.** Study flowchart.

analyses followed the intent-to-treat principle. Binary outcomes: death, need for mechanical ventilation, and need for ICU stay were presented with absolute and relative frequencies. Regarding the outcomes of necessary mechanical ventilation and need for ICU stay, both groups were compared by using a logistic regression model. A Cox proportional hazards model was performed to compare the outcome of death between randomized groups, with results presented as hazard ratio and 95 % Confidence Interval. Outcomes: length of intubation (time of mechanical ventilation and time of total ventilation), length of stay in the ICU, and length of stay in the hospital were presented in the median and interquartile range. Comparison among the groups was performed by estimating the differences between the averages through Generalized Additive models with zero-inflated Beta-binomial. In a sensitivity analysis, we evaluated the outcomes before and after the change in participant identification in the Research. The analyses were performed using the R software (R Core Team, Vienna, Austria, 2020) [21] and a significance level of 5 % was adopted.

## 3. Results

Between September 2020 and December 2020, a total of 199 participants (out of 244 that were screened) were randomly assigned to either the Intervention group (n = 100) or the control group (n = 99, Fig. 1). Baseline characteristics, presented in Table 1, were well balanced between the two groups. The study population consisted of 34 % women, with a mean age of 61 years. Additionally, 44 % of participants had hypertension, and 6 % had obesity.

At the end of the study, no significant difference in the primary outcome of mortality was observed between the intervention and control groups. Among the 99 subjects in the control group, there were 8 deaths, and the same number of deaths [8] occurred in the intervention group (HR 0.86, 95 % CI 0.32 to 2.31; p = 0.76).

Similarly, there were no statistically significant differences in the secondary outcomes between the two groups. The need for ICU admission (p = 0.471), length of stay in the ICU (mean difference −0.77, 95 % CI -4.13 to 3.20; p = 0.70), need for mechanical ventilation (p = 0.457), duration of mechanical ventilation (mean difference 3.89 days, 95 % CI -7.09 to 14.71; p = 0.54), and length of hospital stay (mean difference 1.96, 95 % CI -2.78 to 7.85; p = 0.45) were all similar between the two groups, as shown in Table 2.

Due to the necessary change in participant identification during the study, we also evaluated the outcomes among participants who were identified by initials and received direct prayers (Table 3) and among participants who were identified by the number of the hospital beds (Table 4). Similarly, we did not observe any changes in the primary or secondary outcome.

## 4. Discussion

The present study aimed to evaluate the effect of intercessory prayer as an adjunct intervention to standard therapy in hospitalized patients with COVID-19. To the best of our knowledge, this is the first study investigating prayer for this indication. However, our findings do not demonstrate any significant effect of intercession on the primary outcome of mortality, as well as the secondary outcomes of hospitalization time, ICU time, and mechanical ventilation time.

Intercessory prayer, which involves praying for others, has been a common practice in response to illness for centuries and is rooted in various religious traditions [16]. However, it has received limited scientific attention, and previous positive findings from controlled trials on intercessory prayer have yet to be consistently replicated [19]. Some studies have suggested that remote intercessory prayer may be associated with lower ICU course scores, indicating a potential benefit when used alongside standard medical care [19].

In this particular study, we recognize that the change in the "patient identification method" during the course of the study may have introduced inconsistencies and confusion in creating the control and intervention groups, potentially impacting the results. The list of

**Table 1**
Baseline participants characteristics.

| | Control (n = 99) | Intervention (n = 100) | Total (n = 199) |
|---|---|---|---|
| Age; Mean ± sd | 62.8 ± 15.1 | 59.9 ± 14.1 | 61.3 ± 14.7 |
| Gender (Female) | 34/99 (34.3 %) | 34/100 (34 %) | 68/199 (34.2 %) |
| **Admission Signs and Symptoms** | | | |
| Fever | 51/99 (51.5 %) | 54/100 (54 %) | 105/199 (52.8 %) |
| Cough | 40/99 (40.4 %) | 42/100 (42 %) | 82/199 (41.2 %) |
| Dyspnea | 29/99 (29.3 %) | 30/100 (30 %) | 59/199 (29.6 %) |
| Headache | 14/99 (14.1 %) | 7/100 (7 %) | 21/199 (10.6 %) |
| Diarrhea | 12/99 (12.1 %) | 8/100 (8 %) | 20/199 (10.1 %) |
| Parosmia | 8/99 (8.1 %) | 10/100 (10 %) | 18/199 (9 %) |
| Dysgeusia | 9/99 (9.1 %) | 5/100 (5 %) | 14/199 (7 %) |
| Fatigue | 22/99 (22.2 %) | 20/100 (20 %) | 42/199 (21.1 %) |
| **Comorbidities** | | | |
| Hypertension | 44/99 (44.4 %) | 44/100 (44 %) | 88/199 (44.2 %) |
| Diabetes | 17/99 (17.2 %) | 20/100 (20 %) | 37/199 (18.6 %) |
| Current Smoking | 2/99 (2 %) | 0/100 (0 %) | 2/199 (1 %) |
| Obesity | 3/99 (3 %) | 9/100 (9 %) | 12/199 (6 %) |
| **Treatment** | | | |
| Corticosteroid | 53/99 (53.5 %) | 48/100 (48 %) | 101/199 (50.8 %) |
| Antibiotics | 95/99 (96 %) | 88/100 (88 %) | 183/199 (92 %) |

Sd: standard deviation.

**Table 2**
Primary and secondary outcomes.

| | Control (n = 99) | Intervention (n = 100) | Total (n = 199) | Effect Size (CI 95 %) | p |
|---|---|---|---|---|---|
| **Primary Outcome** | | | | | |
| Death - n/N (%) | 8/99 (8.1 %) | 8/100 (8 %) | 16/199 (8 %) | 0.86 [0.32 to 2.31][a] | 0.760 |
| **Secondary Outcome** | | | | | |
| Mechanical Ventilation - n/N (%) | 11/99 (11.1 %) | 8/100 (8 %) | 19/199 (9.5 %) | 0.70 [0.27 to 1.81][b] | 0.457 |
| Mechanical Ventilation Time (days); median [IQR] | 9 [5.5–16] (n = 11) | 8.5 [6–15.75] (n = 8) | 9 [6–16.5] (n = 19) | 3.89 [-7.09 to 14.71][c] | 0.54 |
| ICU Admission - n/N (%) | 28/99 (28.3 %) | 33/100 (33 %) | 61/199 (30.7 %) | 1.25 [0.68 to 2.29][b] | 0.471 |
| ICU length of stay (days); median [IQR] | 4 [2–7] (n = 28) | 4 [2−11] (n = 33) | 4 [2−11] (n = 61) | −0.77 [-4.13 to 3.20][c] | 0.70 |
| Length of hospital stay (days); median [IQR] | 11 [7−14] (n = 99) | 9.5 [7–17.2] (n = 100) | 10 [7–15.5] (n = 199) | 1.96 [-2.78 to 7.85][c] | 0.45 |

Sd: standard deviation; IQR: Interquartile Range; a: hazard ratio; b: Odds ratio; c Means difference.

**Table 3**
Primary and secondary outcomes among participants identified by name initial.

| | Control (n = 62) | Intervention (n = 62) | Total (n = 124) | Effect Size (CI 95 %) | p |
|---|---|---|---|---|---|
| Primary Outcome | | | | | |
| Death - n/N (%) | 5/62 (8.1 %) | 4/62 (6.5 %) | 9/124 (7.3 %) | 0.67 [0.18–2.54]a | 0.56 |
| Secondary Outcome | | | | | |
| Mechanical Ventilation - n/N (%) | 6/62 (9.7 %) | 4/62 (6.5 %) | 10/124 (8.1 %) | 0.64 [0.17 to 2.4]b | 0.512 |
| Mechanical Ventilation Time (days); median [IQR] | 10.5 [4.2–17.5] (n = 6) | 6 [5–7] (n = 4) | 7 [3.8–12.2] (n = 10) | −0.51 [-1.85 to 0.11] c | 0.23 |
| ICU Admission - n/N (%) | 18/62 (29 %) | 21/62 (33.9 %) | 39/124 (31.5 %) | 1.25 [0.59 to 2.68]b | 0.562 |
| ICU length of stay (days); median [IQR] | 3 [1.2–10] (n = 18) | 5 [2−11] (n = 21) | 4 [2−11] (n = 39) | 0.32 [-1.49 to 1.93]c | 0.73 |
| Length of hospital stay (days); median [IQR] | 11 [7−14] (n = 62) | 10 [7−19] (n = 62) | 10.5 [7–15.2] (n = 124) | 2.52 [-3.30 to 9.47]c | 0.42 |

Sd: standard deviation; IQR: Interquartile Range; a: hazard ratio; b: Odds ratio; c Means difference.

**Table 4**
Primary and secondary outcomes among participants identified by bed nuber

| | Control (n = 37) | Intervention (n = 38) | Total (n = 75) | Effect Size (CI 95 %) | p |
|---|---|---|---|---|---|
| Primary Outcome | | | | | |
| Death - n/N (%) | 3/37 (8.1 %) | 4/38 (10.5 %) | 7/75 (9.3 %) | 1.19 [0.23–6.04]a | 0.83 |
| Secondary Outcome | | | | | |
| Mechanical Ventilation - n/N (%) | 5/37 (13.5 %) | 4/38 (10.5 %) | 9/75 (12 %) | 0.75 [0.19 to 3.06]b | 0.691 |
| Mechanical Ventilation Time (days); median [IQR] | 9 [6−10] (n = 5) | 16.5 [13–23.5] (n = 4) | 10 [7−18] (n = 9) | 0.49 [-2.48 to 2.43]c | 0.81 |
| ICU Admission - n/N (%) | 10/37 (27 %) | 12/38 (31.6 %) | 22/75 (29.3 %) | 1.25 [0.46 to 3.38]b | 0.665 |
| ICU length of stay (days); median [IQR] | 4 [3.2–5] (n = 10) | 2.5 [1–10.5] (n = 12) | 4 [1.2–5.8] (n = 22) | 0.45 [-0.61 to 1.18]c | 0.79 |
| Length of hospital stay (days); median [IQR] | 10 [7−15] (n = 37) | 9 [6–16.8] (n = 38) | 9 [6–15.5] (n = 75) | 0.14 [-4.27 to 5.07]c | 0.92 |

Sd: standard deviation; IQR: Interquartile Range; a: hazard ratio; b: Odds ratio; c Means difference.

beds was often found to be outdated during the overnight shift due to patient relocations, as the hospital needed to manage and allocate beds for COVID-19 patients. Hcor Hospital, where the study took place, is a general hospital that continued to provide care for patients with other medical conditions during the pandemic. As a result, the availability of beds for COVID-19 patients fluctuated significantly as infection rates varied throughout the study period.

We believe that these fluctuations in bed availability created instability in maintaining accurate lists using bed identification for remote prayers. In our study, intercessory prayers were conducted for a large list of patients, rather than focusing on individual or a limited number of known recipients, as done in other studies [22,23]. This broader approach may have diluted the intervention's impact, potentially limiting the trial's ability to demonstrate a significant effect of intercessory prayer. To understand if identification could have affected the outcome, we conducted a sensitivity analysis with individuals identified by name initials and individuals identified by hospital bed numbers. Both analyses showed that regardless of the identification method, the primary and secondary outcomes were negative. However, we emphasize that for both analyses, the sample size may not have been sufficient to detect any impact of the intervention. Additionally, some of the prayers in our study were phrased negatively, such as "not die" or "reduction in ICU." Therefore, a strict interpretation of our study indicates no significant effects on clinical outcomes with the specific intercessory prayers used. However, it is important to note that conclusions cannot be extrapolated to differently phrased prayers.

Another important limitation of our study is the small sample size. Nonetheless, we were pleasantly surprised by the high level of patient acceptance and willingness to participate.

Overall, these factors, including the change in patient identification method, fluctuations in bed availability, the broad scope of

intercessory prayer, and the small sample size, should be taken into consideration when interpreting the results of our study.

## 5. Conclusion

The study findings indicate that intercessory prayer had no significant effect on the primary outcome of mortality or the secondary outcomes, including the length of hospitalization, ICU stay, and the need for and duration of mechanical ventilation.

## Clinical trial registration

URL-https://clinicaltrials.gov. Unique Identifier: NCT04631380.

## Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGTP in order to improve language. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgments

We acknowledge the support received from Hcor Researcher Support Center (NAPe).

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e22411.

## References

[1] N. Dagan, N. Barda, E. Kepten, et al., BNT162b2 mRNA COVID-19 vaccine in a nationwide mass vaccination setting, N. Engl. J. Med. 384 (15) (2021) 1412–1423, https://doi.org/10.1056/NEJMoa2101765.
[2] E.J. Haas, F.J. Angulo, J.M. McLaughlin, et al., Impact and effectiveness of mRNA BNT162b2 vaccine against SARS-CoV-2 infections and COVID-19 cases, hospitalisations, and deaths following a nationwide vaccination campaign in Israel: an observational study using national surveillance data, Lancet 397 (10287) (2021) 1819–1829, https://doi.org/10.1016/S0140-6736(21)00947-8.
[3] J. Chapin-Bardales, J. Gee, T. Myers, Reactogenicity following receipt of mRNA-based COVID-19 vaccines, JAMA 325 (21) (2021) 2201–2202, https://doi.org/10.1001/jama.2021.5374. PMID: 33818592.
[4] N.F. Freise, M. Kivel, O. Grebe, C. Meyer, B. Wafaisade, M. Peiper, T. Zeus, J. Schmidt, J. Neuwahl, D. Jazmati, T. Luedde, E. Bölke, T. Feldt, B.E.O. Jensen, J. Bode, V. Keitel, J. Haussmann, B. Tamaskovics, W. Budach, J.C. Fischer, W.T. Knoefel, M. Schneider, P.A. Gerber, A. Pedoto, D. Häussinger, M. van Griensven, A. Rezazadeh, Y. Flaig, J. Kirchner, G. Antoch, H. Schelzig, C. Matuschek, Acute cardiac side effects after COVID-19 mRNA vaccination: a case series, Eur. J. Med. Res. 27 (1) (2022) 80, https://doi.org/10.1186/s40001-022-00695-y. PMID: 35655235; PMCID: PMC9160507.
[5] B. Pfefferbaum, C.S. North, Mental health and the COVID-19 pandemic, N. Engl. J. Med. 383 (6) (2020) 510–512, https://doi.org/10.1056/NEJMp2008017.
[6] A. Remuzzi, G. Remuzzi, COVID-19 and Italy: what next? Lancet 395 (10231) (2020) 1225–1228, https://doi.org/10.1016/S0140-6736(20)30627-9.
[7] S. Galea, R.M. Merchant, N. Lurie, The mental health consequences of COVID-19 and physical distancing: the need for prevention and early intervention, JAMA Intern. Med. 180 (6) (2020) 817–818, https://doi.org/10.1001/jamainternmed.2020.1562.
[8] L. Leibovici, Effects of remote, retroactive intercessory prayer on outcomes in patients with bloodstream infection: randomized controlled trial, BMJ 323 (2001) 1450, https://doi.org/10.1136/bmj.323.7327.1450.
[9] L. Roberts, I. Ahmed, S. Hall, A. Davison, Intercessory prayer for the alleviation of ill health, Cochrane Database Syst. Rev. 2009 (2) (2009), CD000368, https://doi.org/10.1002/14651858.CD000368.pub3. PMID: 19370557; PMCID: PMC7034220.
[10] R. Ludtke, A randomized, controlled trial of the effects of remote, intercessory prayer on outcomes in patients admitted to the coronary care unit, Arch. Intern. Med. 159 (1999) 2273–2278.
[11] 4. S. Hettiaratchy, C. Hemsley, Effect of retroactive intercessory prayer. Paper proves the power of statistics, not prayer BMJ 324 (7344) (2002) 1037. author reply 1038-9. PMID: 11977259
[12] D. Radin, M. Schlitz, C. Baur, Distant healing intention therapies: an overview of the scientific evidence, Glob. Adv. Health Med. 4 (Suppl) (2015) 67–71, https://doi.org/10.7453/gahmj.2015.012.suppl. Epub 2015 Nov 1. PMID: 26665044; PMCID: PMC4654780.
[13] A.M. Thornett, Effect of retroactive intercessory prayer. A cautious approach is needed, BMJ 324 (7344) (2002) 1037, author reply 1038-9. PMID: 11976252; PMCID: PMC1122963.
[14] D. O'Mathúna, Intercessory prayer for healing: looking at the studies, Alternative Med. Alert 13 (2010).
[15] A. Bleich, Intercessory prayer for health: a matter of faith, science, or both, Harefuah 141 (6) (2002) 522–523.
[16] C. Andrade, R. Radhakrishnan, Prayer and healing: a medical and scientific perspective on randomized controlled trials, Indian J. Psychiatr. 51 (4) (2009) 247–253, https://doi.org/10.4103/0019-5545.58288.
[17] D. Oman, C.E. Thoresen, 'Does religion cause health?': differing interpretations and diverse meanings, J. Health Psychol. 7 (4) (2002) 365–380, https://doi.org/10.1177/135910530200700432 6.
[18] L.L. Rath, Scientific ways to study intercessory prayer as an intervention in clinical research, J. Perinat. Neonatal Nurs. 23 (1) (2009) 71–77, https://doi.org/10.1097/JPN.0b013e3181968673. PMID: 19209063.

[19] W.S. Harris, M. Gowda, J.W. Kolb, C.P. Strychacz, J.L. Vacek, P.G. Jones, A. Forker, J.H. O'Keefe, B.D. McCallister, A randomized, controlled trial of the effects of remote, intercessory prayer on outcomes in patients admitted to the coronary care unit, Arch. Intern. Med. 159 (19) (1999) 2273–2278, https://doi.org/10.1001/archinte.159.19.2273.

[20] G. Lucchetti, A.L.G. Lucchetti, H. Vallada, Measuring spirituality and religiosity in clinical research: a systematic review of instruments available in the Portuguese language, Sao Paulo Med. J. 131 (2) (2013) 112–122 [Internet].

[21] R Core Team, R: A Language and Environment for Statistical Computing, R Foundation for Statistical Computing, Vienna, Austria, 2020. URL, https://www.R-project.org/.

[22] P.R.D.C. de Aguiar, T.P. Tatton-Ramos, L.O. Alminhana, Research on intercessory prayer: theoretical and methodological considerations, J. Relig. Health 56 (6) (2017) 1930–1936, https://doi.org/10.1007/s10943-015-0172-9. PMID: 26743876.

[23] F. Sicher, E. Targ, D. Moore 2nd, H.S. Smith, A randomized double-blind study of the effect of distant healing in a population with advanced AIDS. Report of a small scale study, West. J. Med. 169 (6) (1998) 356–363. PMID: 9866433; PMCID: PMC1305403.