

# A Randomized, Controlled Trial of the Effects of Remote, Intercessory Prayer on Outcomes in Patients Admitted to the Coronary Care Unit

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**Context:** Intercessory prayer (praying for others) has been a common response to sickness for millennia, but it has received little scientific attention. The positive findings of a previous controlled trial of intercessory prayer have yet to be replicated.

**Objective:** To determine whether remote, intercessory prayer for hospitalized, cardiac patients will reduce overall adverse events and length of stay.

**Design:** Randomized, controlled, double-blind, prospective, parallel-group trial.

**Setting:** Private, university-associated hospital.

**Patients:** Nine hundred ninety consecutive patients who were newly admitted to the coronary care unit (CCU).

**Intervention:** At the time of admission, patients were randomized to receive remote, intercessory prayer (prayer group) or not (usual care group). The first names of patients in the prayer group were given to a team of outside

intercessors who prayed for them daily for 4 weeks. Patients were unaware that they were being prayed for, and the intercessors did not know and never met the patients.

**Main Outcome Measures:** The medical course from CCU admission to hospital discharge was summarized in a CCU course score derived from blinded, retrospective chart review.

**Results:** Compared with the usual care group (n = 524), the prayer group (n = 466) had lower mean  $\pm$  SEM weighted (6.35  $\pm$  0.26 vs 7.13  $\pm$  0.27;  $P = .04$ ) and unweighted (2.7  $\pm$  0.1 vs 3.0  $\pm$  0.1;  $P = .04$ ) CCU course scores. Lengths of CCU and hospital stays were not different.

**Conclusions:** Remote, intercessory prayer was associated with lower CCU course scores. This result suggests that prayer may be an effective adjunct to standard medical care.

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**F**ROM TIME immemorial, prayer for the sick has been a common response to the illness of a loved one. In some societies and among certain religious groups, prayer is believed to be the most important therapy that can be offered to a sick person, superseding even medical intervention. Nevertheless, intercessory prayer (praying for others) has rarely been subjected to scientific scrutiny. In 1988, Byrd<sup>1</sup> published the results of a blinded, controlled trial of 393 patients who had been admitted to a coronary care unit (CCU) at San Francisco General Hospital, San Francisco, Calif. Patients were randomly assigned to either a usual care group, which received no organized prayer, or to an experimental, intercessory prayer group, which received remote (from outside of the hospital) prayer from persons unknown to them. Byrd reported a statistically significant beneficial effect of intercessory prayer as assessed by a summary "hospital course"

score. Three recent books on spirituality and healing<sup>2-4</sup> have noted that the Byrd study is the only published trial of intercessory prayer with clinically significant end points, and that more scientifically valid (prospective, randomized, controlled, blinded, etc) studies of prayer were needed. The purpose of the present study was to attempt to replicate Byrd's findings by testing the hypothesis that patients who are unknowingly and remotely prayed for by blinded intercessors will experience fewer complications and have a shorter hospital stay than patients not receiving such prayer.

## RESULTS

### INTERCESSORS

The intercessors represented a variety of Christian traditions, with 35% listing their affiliations as nondenominational, 27% as Episcopalian, and the remainder as other Protestant groups or Roman Catholic. The

## METHODS

### PATIENTS AND PROTOCOL

All patients admitted to the CCU at the Mid America Heart Institute (MAHI), Kansas City, Mo, over a 12-month period were eligible for the trial (**Figure**). The only exceptions were those admitted for workup and wait-listing prior to cardiac transplantation (because of anticipated prolonged stays). Patients admitted for less than 1 day were subsequently excluded because it took up to 24 hours for intercessors to be contacted and prayer initiated. New admissions were identified in the chaplain's office on a daily basis via computer. The chaplain's secretary randomly assigned all new patients to either the usual care or prayer group based on the last digit of the medical record number; even numbers were assigned to the prayer group and odd numbers to the usual care group. This allocation scheme allowed no opportunity for bias because medical record numbers are assigned on a sequential basis to all new patients entering the hospital, regardless of how sick they are. In addition, since some patients were readmitted (having been assigned their numbers months to years previously) and some were newly admitted, no systematic assignment of the sickest patients to the odd (usual care) group was possible. Once assigned, the secretary called an intercessory prayer team leader and gave him/her the first name of the patient to be prayed for. No other information (eg, diagnosis, prognosis, age, race, socioeconomic status, or family situation) was available to the secretary; thus, it was not passed on to the intercessors. The secretary was the only person with knowledge of the assignment code, and she had no contact with the patients, the CCU staff (she did not even know where the unit was located within the hospital), the data collectors, or the statistician, all of whom were blinded throughout. After receiving the call from the secretary, the prayer team leader called the other 4 persons on his/her team and directed that the name of the new

patient be entered on a log sheet provided. The intercessors were asked to pray daily for the next 28 days for "a speedy recovery with no complications" and anything else that seemed appropriate to them. A period of 28 days was chosen to ensure that prayer would continue throughout the entire hospitalization of at least 95% of patients. Some CCU patients (typically fewer than 5%) request prayer from the hospital chaplain's staff upon admission to the hospital. When made, these requests were always honored regardless of and without knowledge of group assignment. This study was approved by the hospital's institutional review board (IRB) and, in order to keep the study blinded, was exempted from the requirement to obtain informed consent (see the "Comment" section).

### INTERCESSORS

The intercessors were recruited by the investigators via contacts in the local community. In order to be an intercessor, an individual did not need to be of any particular denomination, but he/she did need to agree with the following statements: "I believe in God. I believe that He is personal and is concerned with individual lives. I further believe that He is responsive to prayers for healing made on behalf of the sick." Once identified, the intercessors were organized into 15 teams of 5 members (a total of 75), each with 1 person designated as the team leader. Intercessors were randomly assigned to teams; those within a given team did not know the others in the same team, and prayer was offered individually, not in groups.

### DATA COLLECTION

Patient demographics and admission diagnoses were obtained from the hospital computer system. All patient charts were reviewed retrospectively by a blinded physician/investigator to collect information regarding comorbid conditions at the time of admission, length of CCU and hospital

intercessors were predominantly women (87%), and their mean age was 56 years. All reported at least weekly church attendance and daily prayer habits (prior to the study). A review of intercessor log sheets indicated that prayer (by at least 1 intercessor) began within  $1.2 \pm 0.05$  days after admission to the CCU. All intercessors who were ultimately going to pray for a given patient began doing so within  $1.6 \pm 0.16$  days after CCU admission.

### PATIENTS

A total of 1019 patients were admitted to the CCU during the period of the trial. After elimination of 6 patients who were waiting for cardiac transplantation, 1013 were randomized (**Figure**), 484 (48%) to the prayer group and 529 (52%) to the usual care group. This difference in sample sizes was most likely caused by chance ( $P = .18$ ). After subsequent removal of those patients who spent less than 24 hours in the CCU, 524 remained in the usual care group and 466 in the prayer group. Comorbid conditions upon admission were similar for each group (**Table 2**). Men and women were equally represented in the usual care and prayer groups (66% vs

61% men, respectively;  $P = .10$ ), and the mean age was 66 years for both groups.

### OUTCOMES

The primary predefined end point in this trial was the weighted MAHI-CCU score (**Table 4**). We found an 11% reduction in scores in the prayer group ( $6.35 \pm 0.26$ ) compared with the usual care group ( $7.13 \pm 0.27$ ) ( $P = .04$ ). Using the unweighted MAHI-CCU score, which simply counted elements in the original scoring system without assigning point values, the prayer group had 10% fewer elements ( $P = .04$ ) than the usual care group. There were no statistically significant differences between groups for any individual component of the MAHI-CCU score (**Table 3**). Mean lengths of stay in the CCU and in the hospital (after initiation of prayer) were not different (**Table 4**), and median hospital stay was 4.0 days for both groups. There were 2 patients in the prayer group whose hospital stays were approximately twice as long (137 and 161 days) as those of any other patient in the study. Without these 2 patients, length of hospital stay for the prayer group dropped from  $6.48 \pm 0.54$  days to  $5.84 \pm 0.31$  days.

stay, and clinical outcomes. The latter were defined as all new diagnoses, events, or procedures occurring at least 24 hours after admission to the CCU (to allow time for organized prayer to begin) until discharge or death. Thus, if a patient who presented to the emergency department with an acute myocardial infarction was catheterized, revascularized, and then admitted to the CCU, these events/procedures were not recorded as new CCU events. On the other hand, if after the first day in the CCU, a patient developed unstable angina, had a coronary angiogram, and had a subsequent revascularization procedure, all of these were recorded as new events.

## CLINICAL OUTCOMES

Since prayer was offered for a speedy recovery with no complications, it was anticipated that the effect of prayer was unlikely to be evident in any specific clinical outcome category (eg, the need for antibiotics, the development of pneumonia, or the extension of infarction), but would only be seen in some type of global score. Review of the medical literature revealed no previously validated and standardized statistic to quantitate severity of outcomes in critically ill cardiovascular patients. Severity of illness or comorbidity scales, such as the Acute Physiology and Chronic Health Evaluation (APACHE) score<sup>5</sup> and Charlson scale,<sup>6</sup> do exist, but these are prognostic tools designed to predict major health outcomes for individual patients; they are not designed to summarize a CCU course. Accordingly, before the trial began, 3 experienced cardiologists and 1 internist from MAHI and the University of Missouri–Kansas City School of Medicine developed a weighted and summed scoring system called the MAHI-CCU score (**Table 1**). The MAHI-CCU score is a continuous variable that attempts to describe outcomes from excellent to catastrophic. For example, if, after the first day in the CCU, a patient developed unstable angina (1 point), was treated with antianginal agents (1 point), was sent for heart catheterization (1 point), underwent unsuccessful revascularization by

percutaneous transluminal coronary angioplasty (3 points), and went on to coronary artery bypass graft surgery (4 points), his weighted MAHI-CCU score would be 10. Another patient might have developed a fever and received antibiotic treatment (1 point) but experienced no other problems and been discharged from the hospital with a score of 1. A third patient might have suffered a cardiac arrest (5 points) and died (6 points), for a total weighted score of 11 points. In addition to the weighted MAHI-CCU scores, a nonweighted MAHI-CCU score was calculated that was simply a count of events, procedures, and/or prescriptions after CCU admission. For the examples above, the unweighted MAHI-CCU scores would have been 5, 1, and 2, respectively. To evaluate interrater reproducibility for the MAHI-CCU score, 10 physicians (5 cardiologists and 5 cardiology fellows) blindly scored 11 randomly selected CCU patient charts. The raters were in agreement (mean  $\pm$  SD) 96%  $\pm$  3% of the time. Finally, for comparison, the Hospital Course Score used by Byrd<sup>1</sup> was also calculated. The Byrd score broadly categorizes each patient's progress after CCU admission as good, intermediate, or bad.

## STATISTICAL ANALYSIS

Baseline variables and specific medical outcomes were analyzed by  $\chi^2$  analysis and the Fisher exact test for categorical data. Byrd scores were analyzed by the Cochran-Armitage test for trends<sup>7</sup>; *t* tests were used to compare continuous variables (eg, age, length of stay, and MAHI-CCU scores). A difference with a 2-tailed *P* < .05 was accepted as statistically significant, except for comorbid conditions upon admission (**Table 2**) and individual events/procedures occurring during the CCU stay (**Table 3**). For these 2 data sets, *P* < .005 was required for statistical significance because of the multiple comparisons evaluated.<sup>8</sup> Data are presented as means  $\pm$  SEs. All analyses were carried out blindly on an intention-to-treat basis using SAS, version 6.12 (SAS Institute, Cary, NC).

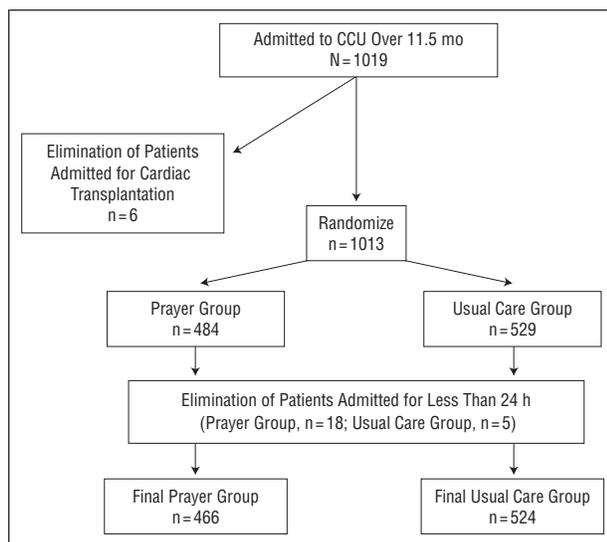
Neither was significantly different from the length of stay in the usual care group (5.97  $\pm$  0.29 days). There was no significant difference between groups using Byrd's hospital course score (**Table 5**).

## COMMENT

Using a severity-adjusted outcomes score, we found lower overall adverse outcomes for CCU patients randomized to the prayer group compared with those randomized to the usual care group. Lengths of CCU stay and hospital stay after initiation of prayer were not affected. These findings are consistent with those of Byrd,<sup>1</sup> who reported that intercessory prayer for hospitalized patients lowered the hospital course score but did not significantly affect length of stay.

Although there was a trend toward better outcomes in the prayer group using the Byrd score, the difference between groups was not statistically significant. Other than the fact that it is a categorical instead of a continuous statistic, we have no explanation as to why the Byrd score did not detect a difference between groups and the MAHI-CCU score did. There were, however, several

important differences between the 2 study designs that may have contributed to this discrepancy. First, the present study was conducted under completely blinded conditions, with neither patients nor medical staff aware that a study was being conducted. In Byrd's trial, the staff and patients were fully aware that the study was in progress, although nobody knew which patients were receiving "study" prayer. Another difference was in the kinds of patients enrolled. In the present trial, informed consent was not sought and thus patients were not prescreened for their willingness to be prayed for. Of the 450 patients invited to participate in the Byrd study, 57 (12.7%) refused to do so "for personal reasons or religious convictions" or were otherwise unwilling to give consent. This indicates that only "prayer-receptive" patients were included in his final cohort. Finally, in Byrd's study, the intercessors were given a considerable amount of information about the patient (eg, diagnoses, general conditions, and updates as their status changed), and they prayed only until the patient left the unit. These factors could have produced a heightened intensity of or commitment to prayer in Byrd's intercessors. In contrast, our intercessors were asked to pray for 28 days re-



Overall distribution of patients.

**Table 1. Mid America Heart Institute–Cardiac Care Unit (MAHI-CCU) Scoring System**

MAHI-CCU Score	Comorbid Conditions
1	Need for antianginal agents, antibiotics, arterial monitoring, or catheterization; development of unstable angina
2	Need for antiarrhythmic, inotropic, diuretic, or vasodilator drugs; development of pneumonia, atrial fibrillation, supraventricular tachycardia, hypotension, or anemia requiring a transfusion
3	Need for a temporary pacemaker, Swan-Ganz catheterization, an implanted cardiac defibrillator, an electrophysiology study, radiofrequency ablation, or an interventional coronary procedure (ie, a percutaneous transluminal coronary angioplasty); development of third-degree heart block, extension of infarct, or gastrointestinal bleed; or readmission to the cardiac care unit
4	Need for a permanent pacemaker, an intra-aortic balloon pump, major surgery (of any kind), percutaneous transluminal coronary angioplasty with stent placement and/or rotablator, or intubation/ventilation; development of congestive heart failure, ventricular tachycardia, ventricular fibrillation, or sepsis
5	Cardiac arrest
6	Death

ardless of what happened to the patient, and our intercessors received no feedback regarding patient progress during this time. Whether this affected their commitment to continued prayer is not known.

As noted above, both patients and staff were completely blinded not only to assignment of treatment groups, but to the very existence of the trial. This was possible because the hospital's IRB granted the study an exemption from the requirement to obtain informed consent. Since this may be viewed as problematic by some, the reasons supporting this decision will be discussed in some detail. First, it was agreed that there was no known risk associated with receiving remote, intercessory prayer, and no known risk for the patients in the usual care group

**Table 2. Comorbid Conditions at Time of Cardiac Care Unit Admission**

Comorbid Condition	No. (%) of Patients		P
	Usual Care Group (n = 524)	Prayer Group (n = 466)	
Coronary artery disease	319 (60.9)	282 (60.5)	.96
Congestive heart failure	82 (15.6)	68 (14.6)	.71
Cardiomegaly	3 (0.6)	5 (1.1)	.49
Prior myocardial infarction	91 (17.4)	69 (14.8)	.31
Acute myocardial infarction	234 (44.7)	215 (46.1)	.69
Unstable angina	134 (25.6)	110 (23.6)	.52
Chest pain	14 (2.7)	16 (3.4)	.61
Acute pulmonary edema	22 (4.2)	12 (2.6)	.22
Syncope	10 (1.9)	9 (1.9)	.84
Cardiomyopathy	67 (12.8)	63 (13.5)	.81
Supraventricular tachycardia	8 (1.5)	3 (0.6)	.31
Ventricular tachycardia	22 (4.2)	22 (4.7)	.81
Valvular disease	31 (5.9)	21 (4.5)	.40
Hypertension	297 (56.7)	253 (54.3)	.49
Hypotension	11 (2.1)	20 (4.3)	.07
Cardiac arrest	25 (4.8)	20 (4.3)	.83
Heart block	5 (1.0)	9 (1.9)	.30
Diabetes	115 (22.0)	93 (20.0)	.49
Chronic obstructive pulmonary disease	81 (15.5)	85 (18.2)	.28
Gastrointestinal disease	22 (4.2)	22 (4.7)	.81
Pneumonia	12 (2.3)	14 (3.0)	.62
Chronic renal failure	62 (11.8)	50 (10.7)	.66
Cardiac trauma	3 (0.6)	3 (0.6)	.99
Cerebrovascular accident	22 (4.2)	18 (3.9)	.92
Drug toxic effects	1 (0.2)	3 (0.6)	.35
Sepsis	5 (1.0)	8 (1.7)	.44
Cirrhosis	1 (0.2)	1 (0.2)	.99
Pulmonary embolism	2 (0.4)	2 (0.4)	.99
Liver disease	2 (0.4)	0 (0.0)	.50
Hypothyroidism	28 (5.3)	32 (6.9)	.38
Atrial fibrillation	45 (8.6)	41 (8.8)	.99

associated with not receiving extra prayer. Second, no additional data were collected on the patients in this study beyond those that are normally collected for all patients in the hospital. Third, and perhaps most important, the very process of obtaining informed consent could conceivably have caused increased anxiety in some patients. For example, had they known about the study, the possibility of not being in the prayer group might have greatly distressed some patients. For nonreligious or antireligious patients, having to accept or reject the offer of prayer (especially considering the gravity of their illness) might have been very challenging. The policy of the US Department of Health and Human Services for the protection of human subjects states that the

IRB may waive the requirement for the investigator to obtain a signed consent form for some or all subjects if it finds . . . that the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context.<sup>9</sup>

Scientifically, a study design with complete blinding was preferred because it eliminated any possibility of bias, and enrolling all patients in the study increased its generalizability. In light of all these factors, an exemption was granted.

**Table 3. Effects of Intercessory Prayer on Individual Components of the Mid America Heart Institute–Cardiac Care Unit (MAHI-CCU) Score\***

MAHI-CCU Score Component	No. (%) of Patients		P
	Usual Care Group (n = 524)	Prayer Group (n = 466)	
Antianginal agents	59 (11.3)	47 (10.1)	.62
Antibiotics	82 (15.6)	77 (16.5)	.77
Unstable angina	4 (0.8)	1 (0.2)	.38
Arterial monitor	42 (8.0)	32 (6.9)	.57
Catheterization	180 (34.4)	162 (34.8)	.94
Antiarrhythmics	56 (10.7)	50 (10.7)	.94
Inotropes	76 (14.5)	69 (14.8)	.96
Vasodilation	78 (14.9)	59 (12.7)	.36
Diuretics	112 (21.4)	97 (20.8)	.89
Pneumonia	10 (1.9)	12 (2.6)	.62
Atrial fibrillation	17 (3.2)	12 (2.6)	.66
Supraventricular tachycardia	6 (1.1)	2 (0.4)	.29
Hypotension	7 (1.3)	8 (1.7)	.82
Anemia/transfusion	66 (12.6)	50 (10.7)	.42
Temporary pacer	16 (3.0)	13 (2.8)	.95
Third-degree heart block	1 (0.2)	2 (0.4)	.60
Readmit to cardiac care unit	22 (4.2)	25 (5.4)	.48
Swan-Ganz catheter	172 (32.8)	123 (26.4)	.03
Implanted cardiac defibrillator	6 (1.1)	10 (2.1)	.32
Electrophysiology study	15 (2.9)	10 (2.1)	.61
Radiofrequency ablation	8 (1.5)	2 (0.4)	.11
Extension of infarct	2 (0.4)	0 (0.0)	.50
Gastrointestinal bleed	12 (2.3)	5 (1.1)	.22
Interventional coronary procedure	155 (29.6)	121 (26.0)	.21
PTCA alone	69 (13.2)	62 (13.3)	.95
PTCA with stent and/or rotablator	86 (16.4)	59 (12.7)	.10
Permanent pacer	21 (4.0)	12 (2.6)	.28
Congestive heart failure	17 (3.2)	19 (4.1)	.60
Ventricular fibrillation/tachycardia	12 (2.3)	10 (2.1)	.95
Intra-aortic balloon pump	20 (3.8)	12 (2.6)	.36
Major surgery	76 (14.5)	51 (10.9)	.11
Sepsis	7 (1.3)	7 (1.5)	.96
Intubation/ventilation	27 (5.2)	26 (5.6)	.88
Cardiac arrest	6 (1.1)	5 (1.1)	.84
Death	46 (8.8)	42 (9.0)	.99

\*PTCA indicates percutaneous transluminal coronary angioplasty.

In evaluating the results of this trial, it is important to note that we were most likely studying the effects of supplementary intercessory prayer. Since at least 50% of patients admitted to this hospital state that they have a religious preference, it is probable that many if not most patients in both groups were already receiving intercessory and/or direct prayer from friends, family, and clergy during their hospitalization. Thus, there was an unknowable and uncontrollable (but presumed similar) level of “background” prayer being offered for patients in both groups; whatever impact that group assignment had on healing was over and above any influence background prayer may have had.

Neither this study nor that of Byrd provided any mechanistic explanation for the possible benefits of intercessory prayer. However, others have speculated as to what they might be<sup>10</sup>; they generally fall into 2 broad categories: natural or supernatural explanations. The former explanation would attribute the beneficial effects of intercessory prayer to “real” but currently unknown physi-

**Table 4. Effects of Intercessory Prayer on Mid America Heart Institute–Cardiac Care Unit (MAHI-CCU) Scores and Length of Stay in the CCU and in the Hospital\***

	Mean ± SEM		Percentage Change	P
	Usual Care Group (n = 52)	Prayer Group (n = 466)		
MAHI-CCU score	7.13 ± 0.27	6.35 ± 0.26	-11	.04
Unweighted MAHI-CCU score†	3.00 ± 0.10	2.70 ± 0.10	-10	.04
Length of CCU stay, d‡	1.23 ± 0.09	1.12 ± 0.08	-9	.28
Length of hospital stay, d‡	5.97 ± 0.29	6.48 ± 0.54	+9	.41

\*CCU indicates cardiac care unit.

†A simple count of events (diagnoses, drugs prescribed, and procedures) from the MAHI-CCU score (Table 1), presented as events per patient.

‡Length of stay was determined for a period beginning 1 day after admission to the CCU (ie, the day prayer began) until CCU/hospital discharge.

**Table 5. Effects of Remote, Intercessory Prayer on Byrd Scores\***

	No. (%) of Patients	
	Usual Care Group (n = 524)	Prayer Group (n = 466)
Good	338 (64.5)	314 (67.4)
Intermediate	71 (13.5)	63 (13.5)
Bad	115 (21.9)	89 (19.1)

\*P = .29 by Cochran-Armitage trend test.

cal forces that are “generated” by the intercessors and “received” by the patients; the latter explanation would be, by definition, beyond the ken of science. However, this trial was designed to explore not a mechanism but a phenomenon. Clearly, proof of the latter must precede exploration of the former. By analogy, when James Lind, by clinical trial, determined that lemons and limes cured scurvy aboard the HMS Salisbury in 1753, he not only did not know about ascorbic acid, he did not even understand the concept of a “nutrient.” There was a natural explanation for his findings that would be clarified centuries later, but his inability to articulate it did not invalidate his observations.

Although we cannot know why we obtained the results we did, we can comment on what our data do not show. For example, we have not proven that God answers prayer or that God even exists. It was intercessory prayer, not the existence of God, that was tested here. All we have observed is that when individuals outside of the hospital speak (or think) the first names of hospitalized patients with an attitude of prayer, the latter appeared to have a “better” CCU experience. Although our findings would be expected to occur by chance alone only 1 out of 25 times that such an experiment was conducted, chance still remains a possible explanation of our results.

Interest in alternative or complementary medicine is growing rapidly in this country,<sup>11,12</sup> and prayer “therapy” falls into this category. Two recent books<sup>3,4</sup> have fo-

cused on the health benefits of a patient's own spiritual orientation. Each has documented that church membership/attendance is associated with improved medical outcomes.<sup>13-15</sup> People who believe in God and pray during illness have been reported to have better health outcomes than people who do not.<sup>16-18</sup> For some, faith is an effective means of stress reduction, which has itself been shown to reduce cardiac morbidity.<sup>19</sup> Some of these benefits may derive from favorable hormonal, autonomic, and immunologic<sup>20,21</sup> responses to the emotional reassurance that belief can provide. Nevertheless, the present trial was designed to study the impact not of personal spirituality, but of prayer offered for patients regardless of their spiritual orientation.

Other studies besides Byrd's have explored the impact of intercessory prayer on health outcomes. O'Laoire<sup>22</sup> examined the effects of intercessory prayer on self-esteem, anxiety, and depression in 406 subjects (who received either no prayer, directed prayer, or nondirected prayer) and in the 90 intercessors. There were no specific benefits detected for the prayer groups. A pilot study of the effects of intercessory prayer on 40 recovering alcoholics likewise reported no clinical benefit.<sup>23</sup> Finally, in a 6-month trial of "distant healing" in patients with acquired immune deficiency syndrome, Sicher et al<sup>24</sup> found statistically significant benefits for the intervention group (fewer new illnesses, physician visits, hospitalizations, and days of hospitalization; lower illness severity scores; and improved mood scores). These studies illustrate the broadening scope of interest in remote therapies and suggest that scientifically valid, properly controlled studies can be carried out in this emerging arena.

The principal limitation of this study was defining the end point measure (ie, determining some way to quantify how well a patient did during a CCU stay). The score we devised, although intuitive and evenly applied to both groups, has not been validated. (It should be noted that the Byrd score is likewise an unvalidated measure of CCU outcomes.) It is not immediately obvious how any score could be validated given the fact that there is no known criterion standard summary statistic with which we could compare the MAHI-CCU score. The fact that there were significantly fewer total events in the prayer group suggests that the observed difference between groups was not an artifact of the scoring system. Another limitation lies in interpreting the clinical significance of a 10% difference in MAHI-CCU scores. Since the score itself is only an estimate of overall CCU course, there is no known way to ascribe a clinical significance to it, other than to say that as a group, the patients in the prayer group "did 10% better." The score should be viewed only as a summary statistic designed to detect the impact of a mild global intervention on overall health in large groups, not in individual patients.

In conclusion, using the MAHI-CCU scoring system, we found that supplementary, remote, blinded, intercessory prayer produced a measurable improvement in the medical outcomes of critically ill patients. Our findings support Byrd's conclusions despite the fact that we could not document an effect of prayer using his scoring method. With 2 randomized, controlled trials now suggesting the possible benefits of intercessory prayer,

further studies using validated and standardized outcome measures and variations in prayer strategy are warranted to explore the potential role of prayer as an adjunct to standard medical care.

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cluded as an event in the score calculation but was omitted from Tables 1 and 3 in our article.

### See Correction below

Smith and Fisher are correct in noting that an even-odd medical record number randomization scheme is less than optimal; in future trials, we would use, as they suggest, a system that is more impervious to detection. Nevertheless, there is little room for subjectivity in a chart review method that simply records the presence or absence of a set of predetermined events. Thus, we do not believe that our findings were biased by this approach. These writers also raise the issue of "file-drawer bias," ie, the reluctance of some investigators to publish no-effect studies. We clearly have no control over what others may have done, and while this charge can be leveled at any field of inquiry, the fact that in this very young field several studies with negative findings have been published<sup>3-5</sup> argues against such bias. We hope that most investigators, in addressing an important question and having designed their study to the best of their abilities, would make (as we did) an a priori commitment to publish their results regardless of outcome for the good of the overall scientific enterprise.

Several letters raised questions regarding the theological implications of our study. As we noted in our article, we cannot draw any conclusions regarding the existence or nature of God from this trial.

A critically important attribute of any scientist is open-mindedness, the willingness to objectively consider new or alternative concepts and hypotheses. There is a growing demand among patients that we acknowledge their need to be treated

as whole persons who have not only physical but emotional and spiritual needs as well. Practicing as we do in a large metropolitan hospital among a wide variety of religious traditions, we are acutely sensitive to the need for a nonsectarian approach to addressing spiritual issues. This diversity is mirrored in the spectrum of religious practices among our authors, which ranged from a variety of Protestant and Roman Catholic traditions to Hinduism. Since spiritual factors may play some role in healing, additional studies are needed to clarify the place of intercessory prayer in maintaining and restoring health.

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### Correction

**Errors in Results.** In the Original Investigation titled "A Randomized, Controlled Trial of the Effects of Remote, Intercessory Prayer on Outcomes in Patients Admitted to the Coronary Care Unit," published in the October 25, 1999, issue of the ARCHIVES (1999;159:2273-2278), the authors, Harris et al, were prompted by questions raised in postpublication correspondence to reevaluate their calculations and feel that 2 points need to be clarified. In Table 3 of their article, a percutaneous transluminal coronary angioplasty procedure (PTCA) with a stent and/or a rotablator appeared to count as one event. However, when they calculated the unweighted score, they gave one point for PTCA and an additional point for stent and one for rotablator when these occurred in the same patient. Thus, a patient receiving all 3 procedures was given 3 points, not 1, as was implied in Table 3. Second, the need for a cardiovascular stress test (such as a thallium test or an echocardiogram) was included in the calculation of the Mid American Heart Institute-Cardiac Care Unit (MAHI-CCU) scores but was omitted from Tables 1 and 3 of their article. There were 44 of these events in the usual care group (8.4%) and 26 (5.6%) in the prayer group ( $P=.11$ ). The following tabulation clarifies how Harris et al arrived at the scores reported in Table 4:

	Usual Care Group	Prayer Group
Sum of points from Table 3 as published	1436	1173
Extra points for PTCA + stent	79	59
Extra points for PTCA + rotablator	5	0
Extra points for PTCA + stent + rotablator	4*	0
Cardiovascular stress test	44	26
Total events	1568	1258
No. of patients	524	466
Unweighted MAHI-CCU score as published	3.0	2.7†

\*Two patients  $\times$  2 extra points each.  
† $P=.04$ .

In the calculation of the weighted MAHI-CCU score, the need for cardiovascular stress tests was ranked as a category 4 event; if reclassified as a category 2 event, the mean  $\pm$  SEM scores become  $6.97 \pm 0.26$  for the usual care group and  $6.24 \pm 0.26$  for the prayer group ( $P=.05$ ); the effect size remains 10% to 11%.

In Table 4, the number of patients in the Usual Care Group was incorrectly reported as "(n = 52)"; it should have been "(n = 524)."