THE EFFECTS OF PRAYER ON RECOVERY FROM ILLNESS:

A RANDOMIZED, CONTROLLED CLINICAL TRIAL

THESIS

Presented to the Graduate Council
of Texas State University – San Marcos
in Partial Fullfillment
of the Requirements

for the Degree

Master of ARTS

by

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San Marcos, Texas
August 2004

ACKNOWLEDGEMENTS

First of all, I wish to thank the three members of my thesis committee. I have been fortunate to work with Dr. Christopher Frost, Dr. Paul Raffeld, and Dr. Gus Lumia. I have very much appreciated their support for my study, and I have learned much from all of them, both in their scholarly capacities and in their personal capacities.

I also wish to thank the nursing staff on the Intensive Care Unit of Seton Medical Center in Austin, Texas, for their enthusiastic cooperation. Frances Simpson, clinical manager of the ICU, was helpful and supportive throughout the project, and patiently answered many questions. The nurses on the unit cheerfully took time on their busy shifts to identify patients for the study. My personal thanks go to Mamta Bhakta, Tom Brooks, Linda Dorman, Patrick Everling, Carol Fredrick, Judith Flanagan, Amy Gaddis, Lyn Jay, Patti Laird, Sandy "Superwoman" Larson, Rosanne Lindsey, Mary Marchioni, Melody Meadath, Donna Odem, Traci Packheiser, Kelly Prosser, Cathy Ramoin, Fran Rau, Elizabeth Roberts, Mary Ellen Roche, Shon Ray Sanders, Robin Smedley, and Misti Spradling. I am also grateful to Carol Bales and Dr. Thomas Caven in the Seton Office of Clinical Research as well as Suzanne Beeler, director of the Clinical Outcome Research Team, for their interest in and support with the study.

Most of all, I am indebted to the intercessors who prayed for the patients in the study. I am grateful for the way they welcomed me into their midst, for their compassion, and for the way that they were committed to the daily practice of praying, connecting with something larger than themselves, and reaching out to other people. My heartfelt thanks go to Kathy Akin, Piipar Allen, Brenda Amos, Dennis Bolitho, Nancy Bolitho, Patricia Boon, Janet Carpenter, Vickie Cicchese, Lynn Cook, Elizabeth Craycroft, Helen

Dean, Sandy Godfrey, Joe Hutson, Sandy Lanier, Amanda Masterson, Nancy McCann, Katie Moore, Carolyn Powers, Pam Stephan, Jan Sternenberg, Jill Touchstone, and Jeanne Udall.

Finally, I wish to thank Sarah Bailey and Sheri Goodman for their assistance with library searches and data entry, as well as Christine Haines for her assistance with graphics and formatting.

It has been a pleasure and a privilege to work with all of you, and to get to know you along the way!

This manuscript was submitted on June 7, 2004.

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ABSTRACT

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This study examined the effects of remote, intercessory prayer on a group of hospitalized cardiac patients who were unaware that they were prayed for. The purpose of the study was to conduct an independent replication of the study by W.S. Harris et al. (1999) which found positive effects of prayer. The study found no differences in hospitalization outcomes between the treatment group (N = 26) and the control group (N = 25), as assessed by number of days in the intensive care unit, number of days in the hospital, and overall "hospital course" operationalized as weighted scores on the Mid-America Heart Institute Cardiac Care Unit instrument (a checklist of medications, procedures, and complications). If indeed intercessory prayer can affect recovery from illness, the limitations of the study may in part explain the lack of positive results. These limitations included insufficient statistical power; questionable validity and reliability of the MAHI-CCU scores; a low number of intercessors per patient; a lack of uniquely identifying information targeting the prayer to the patients in the treatment group; and possibly negative effects of the study itself on the quality of the prayers. Recommendations for future studies of prayer are discussed.

CHAPTER I

INTRODUCTION

Now is the time for scientists to be courageous, as well as careful and precise, to help separate truth from hope and fact from myth.

Linda Hawes Clever, MD, Editor
Western Journal of Medicine, Dec. 1998

In recent years, the interest in religion and spirituality has been on the increase in the United States population. The 1998 Gallup poll found that more than 4 out of 5 Americans (82%) expressed a "personal need for spiritual growth" – an increase of 24% from just four years earlier. As many as 60% of those polled reported that religion was "very important" in their lives, while 69% reported being members of a church or synagogue (Gallup & Lindsay, 1999). According to Gallup and Jones (2000), "across the board ... surveys confirm a remarkable rise in spiritual concern."

Recent research has shown an important connection between religion, spirituality and health. One area of research has focused on the health benefits of personal religious practices and beliefs, and a comprehensive review by Powell, Shahabi, and Thoresen (2003) concluded that there is persuasive evidence that regular church/service attendance is associated with living longer. The authors also concluded that there is some evidence

that certain religious/spiritual factors (including attending church regularly, being deeply religious, and finding strength and comfort in religion) are associated with lower risk of cardiovascular disease (p. 41). These findings remain even after controlling statistically for confounding demographic variables such as age, gender, ethnicity, education, health and disability status, and for the effects of the healthier lifestyle, increased social support and lower rate of depression typically found among church-goers (p. 39).

Another area of research has focused on the effects of prayer and other forms of alternative healing on recovery from physical illness. Prayer and healing are, perhaps, the oldest remedy for sickness and ill health, and praying for the sick is still widely accepted and practiced. Many people today pray for their own recovery – and also ask family, friends, and clergy to pray for them – when they fall seriously ill (Astin, 1998; Eisenberg, Davis, & Ettner, 1998). In the words of one author, "Who has not, during a time of illness or pain, cried out to a higher being for help and healing?" (Byrd, 1998, p. 826). The Bible includes several examples of the healing power of prayer (Genesis 20:17, 18; Numbers 12:13; and Acts 28:8), and there is no paucity of anecdotal reports in private as well as public domains attesting to the effectiveness of a multitude of so-called spiritual interventions. However, Francis Galton was the first to subject prayer to scientific scrutiny when he posed the question, "Do sick persons who pray, or are prayed for, recover on the average more rapidly than others?" He examined the longevity of the most-prayed-for group of people, namely royalty and priests, and found no evidence that the prayer had an effect on their ability to overcome illness (Galton, 1872, 1883). Although very simplistic, his method was the first to attempt to quantify and document the effects of prayer on health outcomes.

Recent studies have examined the effects of distant healing and remote, intercessory prayer (that is, prayer on behalf of another person) within an experimental framework. Some argue that the safety and efficacy of these kinds of interventions should be examined just like any other intervention (whether biomedical, psychological, or spiritual), and Angell and Kassirer (1998) called for "the scientific community to stop giving alternative medicine a free ride" (p. 841). The interventions studied have typically been either remote, intercessory prayer (defined as prayer to the Judeo-Christian god on behalf of someone else) or distant healing (defined as a healer-to-patient connection that is speculated to involve some kind of energy flow, channeling, or interaction).

Literature review

The empirical research on this topic has recently been reviewed by Powell, Shahabi, and Thoresen (2003), Roberts, Ahmed, and Hall (2003), Astin, Harkness, and Ernst (2000), and Abbot (2000). All four reviews supported the continued investigation of the effectiveness of intercessory prayer and healing. Powell et al. (2003) concluded that "there is some evidence to support the hypothesis that being prayed for improves recovery from illness" such heart disease and pain-related conditions (p. 48), while Roberts et al. (2003) stated that "this review is too inconclusive to guide those wishing to uphold or refute the effect of intercessory prayer on health care outcomes ... the evidence presented so far is interesting enough to justify further study." This conclusion was echoed by Astin et al. (2000) who also indicated that "the evidence thus far merits further study" (p. 903). Finally, Abbot (2000) concluded that "No firm conclusions about the efficacy or inefficacy of healing can be drawn" (p. 159).

The four reviews also agreed in their encouragement of more rigorous studies of higher methodological quality. Common flaws include inadequate reporting of pertinent details about the patients, the intercessors/healers, and the prayer/healing intervention; lack of a pre-defined outcome measure; no effect size calculations or power analyses; and no adjustments for testing multiple statistical hypotheses. In the words of Abbot (2000), "Too little research has been done, and that which is published is too often ill-conceived, ill-reported, and ill-performed, often by experimenters with more enthusiasm than expertise" (p. 166).

Three of the four reviews included ratings of the methodological quality of the studies included in the reviews. The reviews by Abbot (2000) and Astin et al. (2000) used the rating system developed by Jadad, Moore, Carrol, Jenkinson, Reynolds, Gavaghan, and McQuay (1996). In this rating system, a research study is awarded one point for each of five methodological strengths. To receive a maximum Jadad score of 5, a study must meet the following five criteria, as summarized by Abbot: "1) the study was described by the authors as randomized; 2) the allocation procedure was described and was appropriate; 3) the study was described as double-blind, defined for this review as patient and evaluator/assessor blind; 4) the procedure to ensure double-blinding was described and appropriate; and 5) there was a description of withdrawals and dropouts from the study" (Abbot, 2000, p. 164). The review by Powell et al. (2003) used a rating system that classifies the methodological quality of research studies with one of three letter grades, with A indicating a conclusive study published in a peer-reviewed journal, B indicating a peer-reviewed study that is generally sound, and C indicating an inconclusive study.

Among these three reviews, nine studies were identified that met the following criteria: a) A Jadad score of 4 or above and/or a rating of B or above, b) an independent variable described as remote, intercessory prayer or distant healing where the intercessor and the recipient never met face-to-face, and c) a dependent variable measuring a physical health outcome such as cardiac illness, cancer, or AIDS (as opposed to mental health outcomes such as depression, anxiety, self-esteem or substance abuse). As seen in Table 1 on page 6, the nine studies used a variety of methods to examine the hypothesis that remote, intercessory prayer or distant healing affects physical health outcomes in clinical patient populations.

Joyce and Whelldon (1965) examined the effects of intercessory prayer on a range of chronic conditions (such as rheumatoid arthritis and scleroderma) in 48 patients from an out-patient clinic. The patients were matched in pairs for sex, age, and primary clinical diagnosis, and one member of each pair was randomly assigned to the treatment group while the other was assigned to the control group. The patients were not told they were part of a clinical trial. The prayer intervention was carried out by six prayer groups of Christian and Quaker denominations, and the measured outcome was the clinical state of each patient's condition (on a scale from 0 to 4) as assessed at the beginning of the trial and again after six months of prayer by physicians who were unaware of which pair members had been prayed for. The study obtained an unusual "biphasic" result. The pairs were assessed in the chronological sequence in which they completed the trial (since the trial had a rolling enrollment as patients were admitted into the study), and of the first six individuals who showed an improvement in clinical state, five were in the treatment group while only one was in the control group. Of the next six individuals with

Table 1. High-quality studies of intercessory prayer and distant healing.

Authors (year)	Rating by Astin et al. (2000) 1-5	Rating by Abbot (2000) 1-5	Rating by Powell et al. (2003) A/B/C	IV	DV and population	N
Joyce & Welldon (1965)	5	4	–	IP	Clinical state in patients with a range of conditions	48
Collipp (1969)	4	–	–	IP	Survival in leukemia patients	18
Beutler et al. (1988)	–	5	–	DH	Blood pressure in hypertensive patients	120
Wirth et al. (1993)	–	5	–	DH	Post-operative pain in dental surgery patients	21
Sicher et al. (1998)	–	5	B	DH	Illness course in AIDS patients	40
Harkness et al. (2000)	–	5	–	DH	Number and size of warts in healthy subjects	84
Abbot et al. (2001)	–	5	–	DH	Pain ratings in chronic pain patients	120
Byrd (1988)	5	5	B	IP	Hospital course in cardiac patients	393
Harris et al. (1999)	5	5	B	IP	Hospital course in cardiac patients	990

Note. IV = independent variable. IP = intercessory prayer. DH = distant healing. DV = dependent variable. – = not included.

improvement, five were in the control group. Overall, however, the two groups were similar with regard to improvements in clinical state.

The study by Collipp (1969) examined the effects of intercessory prayer on survival in 18 children with leukemia. Neither the children or their families, the intercessors or the physicians supplying the medical data knew they were participating in a study of prayer. The intercessors in this study were families associated with a Protestant church who agreed to pray for the children in the treatment group every day for 15months. At the end of the 15 months, 70% of the children in the treatment group were still alive, as compared to 25% in the control group. This result was statistically significant at the .1 level of significance. The deletion from the analysis of one atypical child in the control group (who survived 11 years) yielded a significant result at the .05 level.

Beutler, Attevelt, Schouten, Faber, Mees, and Geijskes (1988) examined the effects of distant healing on blood pressure in 120 hypertensive patients. The patients in the study were randomly assigned to distant healing or no healing. In the treatment group, the healing treatment took place in a laboratory where patients and healers were separated by a one-way screen. In the control group, patients came to the laboratory, but no actual healing took place. The healers were selected from several societies of paranormal healing, and all sessions lasted 20 minutes and were scheduled once a week for 15 weeks. The study found no significant differences in systolic and diastolic blood pressures or heart rate between the two groups. However, patients in both groups showed a significant fall in blood pressure in the time between the screening phases of the trial to the beginning of the trial, and again between week 1 and week 15 of the trial.

The study by Wirth, Brenlan, Levine, and Rodriquez (1993) examined the effects of distant healing on postoperative pain following dental surgery in 21 participants who were otherwise in good health. Each participant underwent two separate operations to remove both third molar teeth. Prior to the first surgery, the participants were randomly assigned to either the treatment group or the control group. For the second surgery, the participants crossed over to the opposite condition. In this study, patients knew that they were participating in a study of healing, but not what condition they were in during each operation. The healers in the study used either Reiki or Le Shan healing techniques, and performed 20-minute sessions for each participant every hour for six hours (starting three hours postoperatively). The patients in the treatment group reported significantly lower pain intensity following the operations as well as greater pain relief compared to the control group, as assessed with a visual analogue scale (VAS).

Sicher, Targ, Moore, and Smith (1998) examined the effects of distant healing on illness course in 40 patients with advanced AIDS. The patients were pair-matched for age, immune cell count, and number of AIDS-defining illnesses, and the members of the pairs were then randomly assigned to the treatment or control group. The patients knew that they had a 50-50 chance of receiving the healing treatment, but the healers and patients never met. The treatment was carried out from a distance by self-identified healers belonging to many different and varied traditions, and consisted of daily one-hour healing sessions for ten weeks. Over the course of the study, the treatment group made significantly fewer doctors visits, and had fewer hospitalizations, fewer days of hospitalization, fewer new AIDS-related diseases, lower illness severity levels as assessed with a composite score, and greater improvement in psychological functioning.

However, there were no differences between the groups in the number of deaths, the rate of recovery from AIDS-related diseases, change in immune cell counts, change in medical outcome status, or change in physical symptoms.

The study by Harkness, Abbot, and Ernst (2000) examined the effects of distant healing on skin warts in 84 participants who otherwise had no health problems. The participants were randomly assigned to the treatment group or the control group, and knew that they had a 50-50 chance of receiving the healing treatment. The treatment lasted six weeks and was carried out from a distance by a group of experienced healers. The study found no differences between the treatment and control group in terms of number of warts, size of warts, or self-rated depression and anxiety.

Abbot, Harkness, Stevinson, Marshall, Conn, and Ernst (2001) examined the effects of healing on chronic pain in 120 patients who were pair-matched on pain intensity and then randomly assigned to a treatment or a control group. The patients knew they were participating in a study of healing, but not which group they were in. The healers were recruited from local healing groups that were all affiliated with a national confederation of healing organizations. The healing took place in a laboratory where healer and patient were separated by a one-way mirror, and consisted of weekly 30-minute sessions over a period of 8 weeks. The patients in the control group also came to the laboratory for 8 sessions, but no healer was present behind the mirror. The study found no significant differences between the groups in terms of pain intensity ratings on the McGill Pain Questionnaire, quality of life measures, anxiety, depression, or the degree to which the pain symptoms interfered with daily living activities. However, the patients in the treatment group reported significantly more "unusual experiences" than

the patients in the control group. These experiences included body jerking, twitching, seeing colors or lights, and "sensing something strange" from the healer. More importantly, patients in both groups showed a significant fall in pain intensity ratings over the 8-week period of the study, i.e., from baseline to the end of the trial.

Two studies of very high methodological quality have examined the effects of intercessory prayer on outcomes in cardiac patients. The study by Byrd (1988) examined the effects of intercessory prayer on hospitalization course in 393 patients admitted to the coronary care unit (CCU), and randomly assigned to receive standard medical care or standard care plus an experimental, intercessory prayer intervention. The patients knew they were participants in a study of prayer, but were unaware of their group assignment. The intercessors were Christians with an active church life and daily prayer habits who prayed for the patients every day for the entire duration of their hospital stays. The prayers were offered from outside the hospital, and patients and intercessors never met. The study classified each patient's hospital course as good, intermediate, or bad based on a rating system which included the number of new problems developed during the hospitalization as well as the types of medications and procedures needed. The patients in the treatment group fared significantly better than the patients in the control group. For the patients in the treatment group, a good hospital course was observed for 85% (versus 73% in the control group), while an intermediate course was observed for 1% (versus 5%), and a bad course was observed for 14% (versus 22%). The study also examined the differences between the two groups on a number of specific measures, and found that the patients in the treatment group were significantly less likely to develop congestive heart failure, cardiopulmonary arrest, and pneumonia while in the hospital, and also required

fewer diuretics, antibiotics, and intubation/ventilation procedures than the patients in the control group. However, the two groups were similar in terms of the number of days in the CCU, the total number of days in the hospital, the number of discharge medications, and a host of other specific medical problems and procedures.

Harris, Gowda, Kolb, Strychacz, Vacek, Jones, Forker, O'Keefe, and McAllister (1999) replicated the study by Byrd (1988). They examined the effect of intercessory prayer on hospitalization course in 990 patients admitted to the coronary care unit (CCU) and randomly assigned to receive standard medical care or standard care plus remote, intercessory prayer. In this study, patients were not aware that they were participants in a clinical trial. The intercessors were Christians who reported weekly church attendance and daily prayer habits. The prayers were offered from outside the hospital by a team of five intercessors (per patient) who prayed individually every day for the four weeks following each patient's hospital admission. The study assessed each patient's hospital course with the Mid-America Heart Institute Cardiac Care Unit (MAHI-CCU) instrument, a checklist of all new medical problems developed while in the hospital as well as all medications and procedures required. The patients in the treatment group had a significantly better hospitalization course than the patients in the control group, as evidenced by their lower composite MAHI-CCU scores. However, the two groups were similar in terms of the number of days in the CCU and the total number of days in the hospital. An analysis using Byrd's (1988) rating system (in which a patient's hospital course was classified as good, intermediate, or bad) also did not show a significant difference between the two groups in the study.

Problem statement

A critical methodological issue relevant to all of these studies concerns whether the patients knew that they were participants in a research study. In all but three of the studies, the patients knew they were part of a study, but unaware of which group they were assigned to. In other words, the patients gave their informed consent to participate, and knew they had a 50-50 chance of getting the prayer or healing treatment. In the studies by Joyce and Weldon (1965), Collipp (1969), and Harris et al. (1999), the patients were unaware of the existence of the study.

The effects of knowing that one is participating in a study are illustrated by the finding of Abbot et al. (2001) that all of the patients (both in the treatment group and the control group) showed some improvement over the course of the study. In this study, there was a progressive reduction in total pain ratings over the eight weeks of the trial for both the treatment group and the control group (although this improvement represented a statistically significant difference pre-post only for the control group). The study by Beutler et al. (1988) showed a fall in blood pressure in both the treatment group and the control group over the study period that the authors attributed to an "effect of the trial itself" (p. 1491). Together, these findings imply that the knowledge of being part of a study may have been a confounding variable possibly due to the demand characteristics of the situation, and suggest the importance of examining the effects of prayer and healing in patients who are not aware of the study.

In order to address this problem, this study was conducted to examine the effects of intercessory prayer on recovery from physical illness in hospital patients who were unaware of being prayed for. The main purpose of the study was to conduct an

independent replication of the study by Harris et al. (1999) in which patients were unaware of taking part in a clinical trial. As in the study by Harris et al., careful consideration was given to the ethical issues involved in not obtaining informed consent from study participants. The main objection to this, as voiced by critics, is that some potential participants (such as atheists, Buddhists, and Jews) might not want to be prayed for by Christian intercessors and might even find the prospect offensive. This objection is a valid one, and constitutes a challenge and a dilemma in the field of prayer research.

For the purpose of this study, the decision to not seek informed consent and not inform patients that they were participating in a study was based on the following considerations. First of all, the study was designed to examine the question of whether prayer can affect health outcomes in patients who are unaware of being prayed for. Second, in the study by Byrd (1988) in which informed consent was obtained, only 12% of the potential participants declined to take part in the study. Third, as posited by some researchers in the field, putting patients in the situation of having to accept or reject prayer when they are facing potentially fatal illness might cause considerable distress and anxiety, as might the uncertainty of not knowing whether one is in the treatment or control group. The awareness of participating in a study of prayer might also influence patients to ask more of their family members and friends to pray for them. All of these confounding factors might in turn affect the health outcomes of the patients, thus introducing several biases that would make the results impossible to interpret. Finally, the decision to not seek informed consent was deemed ethical since the prayer intervention was assumed to be safe and the procedures to protect the privacy and confidentiality of the patients were designed to be highly effective. Also, no medical tests or procedures in

addition to standard care were required, and no personal health information in addition to standard hospital reports were collected about the patients as part of the study.

A second purpose of the study was to build on the methodological progress made by researchers in this area by correcting many of the procedural and statistical flaws mentioned in the four reviews discussed above. This was done by including checks of the effectiveness of the blinding procedures; examining pre-defined, clinically valid outcome measures designed by medical personnel as opposed to social science researchers; adjusting for multiple hypothesis tests and reporting power analysis results; documenting the implementation of the prayer intervention; and providing frequent updates to the intercessors about the condition of the patients.

A third purpose of the study was to explore some of the more qualitative issues involved in intercessory prayer which are often ignored in large-scale studies. Based on the recommendation by Jonas and Crawford (2003) to integrate qualitative research into controlled, randomized trials, this study included surveys to the intercessors regarding their beliefs about the effects of prayer, their perceptions of any barriers to their prayers presented by the study, their preferences about study procedures, and suggestions for future scientific studies of prayer.

The scope of the study was to test the hypothesis that prayer to the Judeo-Christian god on behalf of hospitalized cardiac patients by intercessors outside the hospital would contribute to a faster recovery with fewer complications for the patients in the treatment group as compared to the patients in the control group. Several interesting questions were outside the scope of the study. First, since the study's hypothesis concerned the effects of prayer in patients who were unaware of being prayed for, the

study did not examine the role of belief in prayer, hope, expectation, placebo or the like in recovery from illness. Second, the study did not attempt to test any hypotheses or make any claims about the mechanism for how or why the intercessory prayer might affect the health outcomes of the patients.

CHAPTER II

METHOD

Participants

The participants of the study were patients admitted to the intensive care unit (ICU) of a major private hospital in Austin, Texas. The patients were 26 males and 25 females from all racial/ethnic groups (mean age = 62.2, SD = 13.1 years). Most of the patients came to the ICU from the hospital's own cardiac care floor, emergency room, or operating room. A few patients were transferred to the ICU from other hospitals in the area. Upon admission, nursing staff on the unit evaluated each patient to determine if he or she satisfied the criteria to be eligible for the study. To be included in the study, patients had to be at least 18 years of age and be admitted to the ICU with major cardiac problems. The most common diagnoses were coronary artery disease, congestive heart failure, acute myocardial infarction, unstable angina, and severe hypertension. Patients admitted to the hospital for a heart transplantation or for implantation of a ventricular assist device (VAD) were excluded from the study. Since these types of patients tend to stay in the hospital much longer and experience significantly more complications than other types of cardiac patients, and since the outcome variables of the study included length of stay and number of complications, it was to decided exclude them. In-service training sessions were conducted before the study began to ensure that nursing staff on the unit knew how

to correctly identify patients for the study. The patients were randomly assigned to a control group (to receive standard medical care) or a treatment group (to receive standard medical care plus a prayer intervention). This was done to ensure that the two groups would be similar in all regards except for the prayer intervention.

The patients were unaware that they were participating in a research study (as were their families), and they had no contact with the prayer intercessors or with the researcher, research assistant, or data analyst. Some of the hospital staff in charge of the care of the patients (nurses, doctors, and chaplains) knew that a study was in progress. Of the ICU's nursing staff, approximately half served as collaborators and thus knew of the study. No doctors or chaplains served as collaborators, but some informally heard about the study. However, all hospital staff were blind to each patient's group assignment and were instructed not to discuss the study with the patients and their families. After the completion of the study, surveys were distributed to the nursing staff to determine the effectiveness of these blinding procedures. (See Appendix A for the nurse survey questions.) Nursing staff who served as collaborators received a financial incentive, as well as "clinical ladder points" required for professional advancement, for assisting with the study.

Intervention

The independent variable of the study was the treatment of each patient. The patients in the control group received standard medical care. The patients in the treatment group received standard medical care plus a prayer intervention consisting of 30 minutes of prayer daily for the entire duration of each patient's hospital stay. The prayer intervention was carried out by members of several local prayer groups, most of which were

associated with one of two local Episcopalian churches. The intercessors were recruited for the study with an initial letter to the reverend of the church or the coordinator of the group, requesting participation in a research study about the healing power of prayer. (See Appendix B for a sample invitation letter.) Information sessions were conducted during which the researcher provided the prayer group members with background information about the study and answered any questions they had. At the end of these sessions, those who were interested signed up to participate. Subsequent meetings with some of the intercessors were used in the planning phases of the study to solicit their input about study procedures.

The intercessors in the study were 2 men and 20 women (mean age = 52, SD = 11 years). All intercessors had previous experience with intercessory prayer, reported praying every day or almost every day (before the onset of the study), and participated in 1-7 church-related activities every week (mean = 3, SD = 1). The intercessors did not need to be of any particular denomination to participate in the study. However, when signing up, they had to confirm their belief in the healing power of prayer by agreeing with the following written statement:

> I believe God's healing power operates within the church, which is the body of Christ on earth, through its membership. I believe that God works through human channels to do His healing. I continue to make myself a fit and willing channel for this work by studying the Gospels and worshiping with the body of Christ. I pray as Jesus taught in the Gospels and in His name, with and for all who suffer in body, mind or spirit.

All prayers were offered remotely (that is, outside the hospital) in the homes and during group meetings of the intercessors, and patients and intercessors never met. However, all intercessors were located in the same city as the hospital or in its vicinity (with the exception of two intercessors who were temporarily out of the state during part of the

study period). The intercessors were instructed to pray with the intention of "health and well-being" for the patients, including "a fast recovery free of complications." They were told that they could pray any way they usually did, and use any and all techniques that they found most useful, including prayer verses, mental imagery, manipulation of symbolic objects, prayer tapes, and songs. They were also instructed to use the information provided about the patients (initials, age, gender, and cardiac diagnosis) to the extent that they found it helpful. The intercessors were required to start praying the same day of receiving the prayer requests, to pray every day for the patient's hospital stay, and to pray for at least 30 minutes every day. (See Appendix C for the instructions given to the intercessors.) For the duration of the study, the intercessors kept prayer logs in which they recorded the dates, times, and durations of their prayer times. After the study's completion, anonymous surveys were distributed to the intercessors regarding the extent to which they had been able to follow the guidelines of the study and regarding how they had felt about participating in the study. (See Appendix D for the intercessor survey questions.)

Procedure

The researcher received notification from nursing staff twice a day about new patients who were admitted to the ICU and who met the study's eligibility criteria. The researcher randomly assigned each new patient to the treatment group or the control group using a random number table. For each patient in the treatment group, the researcher then called 1-3 intercessors, and provided some basic information about the patient, including a set of fictitious initials, age, gender, diagnoses, and symptoms. The calls to the intercessors were made immediately after the researcher was notified of new patient admissions so

that the prayer intervention could start as soon as possible. Phone calls (as opposed to letters or emails) were used in order to increase the personal contact between the researcher and the intercessors and to facilitate a dialogue where intercessors could ask questions they may have about the patients. The intercessors prayed for 30 minutes daily for the duration of each patient's hospital stay. The researcher called each intercessor with updates about the patient's condition approximately every 2-4 days. As more information was gathered about each patient's medical condition, personal history, marital status, family situation, work/retirement status, place of origin, etc., the researcher updated the intercessors, with the goal of providing them with as much personal information as possible. The researcher also called the intercessors upon each patient's discharge from the hospital (or in the event that he or she passed away). After receiving the final call about a patient (because of death or discharge), each intercessor was again available for prayer requests. As shown in Table 2 on page 21, each intercessor was only assigned to one patient at a time, and the intercessors each received between 1 and 4 prayer requests, although most received 2. Throughout the study, the researcher kept in touch with the intercessors through email updates about the study approximately once every week and through visits to the churches/groups about once every two weeks.

It should be noted that many hospital patients receive support that includes prayer from family, friends, and clergy, and that this study thus examined the effects of the additional prayer offered by the intercessors. The requests for prayer that the patients had, whether they were in the treatment or control group, were always honored by hospital chaplains (who were unaware that a study was in progress).

Table 2. Flowchart of patients and intercessors.

	Day
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
1	#3 ----------
2	#20 -------
3	#5-------- #43 ----- #55 ----------
4	#13 --------
5	#25 ----------
6	#8 ----------
7	#9 ---------- #29 ---------- #51 ----------
8	#7 ----- #33 -------- #39 ---------- #56 ----------
9	#17 - #34---------- #56 ----------
10	#33 -------- #39 ----------
11	#34 ---------- #47 --
12	#16 ---------- #44 ----------
13	#22 ---------- #44 ----------
14	#19 -- #36 ----------
15	#32 ---------- #42 ----------
16	#42 ----------
17	#17 ---------- #42 ----------
18	#39 ---------- #55 ----------
19	#29 ---------- #51 ----------
20	#47 -- #55 ----------
21	#36 ----------
22	#31 ----------

Note. The right-hand column represents the 22 intercessors who participated in the study. The numbers in the flowchart represent the 27 patients who were originally randomized to the treatment group and prayed for by the intercessors (identified by their study ID#). Patient # 55 was still in the hospital at the study's completion, and therefore had to be excluded from the final analysis

Instrument

The primary dependent variable of the study was each patient's weighted score on the Mid-America Heart Institute Cardiac Care Unit (MAHI-CCU) instrument. This instrument was developed by three cardiologists and one internist from the Mid-America Heart Institute in Kansas City and the University of Missouri-Kansas City School of Medicine (Harris et al., 1999). It was modified with input from the nursing staff who were part of the current study. The instrument operationalizes the overall quality of the hospital course of cardiac patients with a checklist that includes the diagnoses that cardiac patients are given, the complications they may develop, and the medical procedures and medications they typically need when hospitalized. The instrument assigns a severity score to each of the items on the checklist, so that the instrument yields a weighted score. For example, after admission to the ICU, one patient may develop atrial fibrillation (2 points), need a temporary pacemaker (3 points), but nevertheless suffer cardiac arrest (5 points) and die (6 points), for a total of 16 points. Another patient may only need anti-anginal medication (1 point) and a left heart catheterization (2 points) and be discharged without needing further intervention, for a total of 3 points. After the completion of the study, a weighted MAHI-CCU score was calculated for each patient through the review of electronic medical records and paper medical charts. Since, for the patients in the treatment group, prayer began the day of ICU admission, all MAHI-CCU scores were calculated with information starting the second day to allow enough time for the prayer to begin. (See Appendix E for the MAHI-CCU instrument, adapted from the study by Harris et al. See Appendix F for a list of the medications that were included in the categories on the instrument.)

The secondary dependent variables of the study were each patient's length of stay in the ICU and length of stay in the hospital. These data were collected through review of electronic medical records. All chart reviews were conducted by a trained ICU nurse, and the data were entered into a computer by two research assistants. All were unaware of the group assignments of the patients in the study.

Data analysis

Before the data analysis was conducted, certain patients had to be excluded from the sample. Out of the 56 patients initially admitted into the study, 29 were randomized to the control group while 27 were randomized to the treatment group (and prayed for by the intercessors). At the study's completion, four patients (one in the treatment group and three in the control group) were still in the hospital and therefore had to be excluded. In addition, one patient in the control group had to be excluded because the medical chart was not available for review. The final sample included 25 patients in the control group and 26 patients in the treatment group.

In order to assess the effectiveness of the study's blinding procedures, descriptive statistics were used to examine the results of the nurse surveys. Descriptive statistics were also used to examine the results of the intercessor surveys in order to assess the implementation of the prayer intervention.

Three independent samples t-tests were conducted to assess whether the process of random assignment had indeed made the two groups similar in all regards at the time of ICU admission (before the onset of prayer for the patients in the treatment group). The t-tests used patient group (treatment or control) as the independent variable, and 1) age, 2) number of cardiac diagnoses at admission, and 3) number of non-cardiac diagnoses at

admission as the dependent variables. Two-tailed tests and an alpha level of 0.01 (to adjust for multiple comparisons) were used for all three tests of statistical significance.

The differences in hospital course (following the onset of prayer) between the patients in the treatment group and the patients in the control group were assessed with three one-way ANOVAs using patient group (treatment or control) as the independent variable and 1) weighted MAHI-CCU scores, 2) number of days in the ICU, and 3) number of days in the hospital as the dependent variables. Two-tailed tests and an alpha level of 0.01 (to adjust for multiple comparisons) were used for all three tests of statistical significance.

The research hypothesis of the study was that the hospital course of the treatment group would be different from those of the control group in directions favoring the treatment group. It was hypothesized that the weighted MAHI-CCU scores, number of days in the ICU, and number of days in the hospital would be lower in the treatment group compared to the control group. All data analysis was conducted by an independent statistician who was unaware of the group assignments of the patients.

CHAPTER III

RESULTS

Effectiveness of blinding procedures

Of the 21 nurses who assisted with the study, 16 returned a completed survey (76% response rate). (See Appendix A for the survey questions and nurse responses.) The responses on the survey confirmed that nursing staff did not know which patients were in the treatment group and which were in the control group, and had not intentionally or accidentally discussed the study with any patients or families. The responses also indicated that no patients had been alerted to the fact that they were participating in a study. Finally, the nurses rated it highly unlikely that either patients or their family members and friends had even overheard conversations on the unit concerning the study. (See tables A1-11 in Appendix A.)

Implementation of prayer intervention

Of the 22 intercessors who participated in the study, 19 returned a completed survey (86% response rate) while 20 returned a prayer log (91% response rate). (See Appendix D for the survey questions and intercessor responses.) Review of surveys and logs confirmed that all the patients in the treatment group were prayed for every day for the entire duration of their hospital stay, and that all intercessors started praying the same day that they received the prayer requests. On the surveys, as many as 18 reported that they

started praying within three hours of receiving the call from the researcher, and it was evident from the prayer logs that many started praying immediately. The surveys and logs also showed that 18 of the intercessors prayed for at least 30 minutes a day (including six who reported praying more than 30 minutes). Only one reported praying less than 30 minutes, and only three reported that they got too busy with other obligations to devote as much time, attention and energy to praying as they had planned, while four reported that other things came up that distracted them somewhat from praying. However, of the 19 intercessors who returned the survey, only two felt that asking intercessors to pray for 30 minutes a day for someone they do not know may be too much to ask, and all in all the prayer intervention was implemented faithfully. (See tables D1-6 in Appendix D.)

The intercessors were told that they could pray alone, with family and friends, or with their regular prayer groups. The requirement for daily prayer made a group prayer intervention unrealistic; however, the intercessors were encouraged to pray with others and to share the prayer requests by phone or email with any prayer chains that they were part of. Review of the prayer logs showed great variability with some intercessors offering all prayer alone and others sharing the prayer requests with up to 40-50 people. Some prayer logs did not include enough detail to determine whether the intercessor prayed alone, with others, or shared the prayer request (or with how many). During informal conversations, many of the intercessors mentioned that they had been keeping the study in their prayers throughout the study period, even when they were not praying for any one patient in particular. In summary, it was not possible to assess how many people prayed for the patients in addition to the 1-3 intercessors specifically assigned to each patient.

On the surveys, the intercessors reported feeling very comfortable with participating in a scientific study and with the instructions and guidelines of the study. They indicated a strong belief that prayer may have an effect even though the person prayed for does not know that he or she is being prayed for. They also reported that not being able to meet and pray face-to-face with the patients was not a barrier for them, and that they felt the same way about not knowing whether the patients were Christian or even religious, and about praying for someone who had not given consent to be prayed for. The instructions they were given as part of the study did not get in the way of their prayers, and their knowledge of a control group (patients who were not prayed for) was also not a barrier, according to the survey responses. Finally, the intercessors felt that their connection to God was as close as usual when they were praying as part of the study. (See tables D7-15 in Appendix D.)

The surveys showed that the intercessors were generally very positive about participating in the study. At the same time, the responses revealed a few areas of potential problems. First, although most of the intercessors reported that the medical and personal information and the frequency of the updates they received was sufficient, some indicated that they would have preferred more information, especially personal information, as well as more frequent updates. A few intercessors reported that not knowing the patient (or not knowing more about him or her) was a slight barrier to them. (See tables D16-19 in Appendix D.)

The survey responses also indicated that a few intercessors felt a slight pressure to "prove that prayer works" and that the requirement to record their prayer times in the prayer log was a barrier to some of them. Regarding the quality of their prayers, a few

intercessors reported that their prayers felt slightly artificial and not quite as spontaneous or strong as usual. Some intercessors also indicated that their connection to the person they were praying for was not as strong as usual (when offering intercessory prayer). Finally, a few intercessors expressed some doubt that prayer can be studied scientifically. Whether this affected their prayers is unknown. (See tables D20-25 in Appendix D.)

Similarity of groups before onset of prayer

A t-test for independent samples showed no difference in age between the patients in the treatment group ($M = 62.5$, $SD = 11.9$) and the patients in the control group ($M = 61.9$, $SD = 14.4$), $t(1, 49) = .178$, $p = .860$. A t-test for independent samples found no difference in the number of cardiac diagnoses at ICU admission between the treatment group ($M = 2.96$, $SD = 1.73$) and the control group ($M = 2.80$, $SD = 1.12$), $t(1, 49) = .394$, $p = .695$. A t-test for independent samples revealed no difference in the number of noncardiac diagnoses at ICU admission between the treatment group ($M = 1.85$, $SD = 1.35$) and the control group ($M = 1.48$, $SD = 1.16$), $t(1, 49) = 1.039$, $p = .304$. Table 3 on page 29 shows the demographics and diagnoses of the patients in the two groups upon admission to the ICU (before the prayer intervention began for the patients in the treatment group).

Table 3. Similarity of groups at ICU admission before onset of prayer.

Patient Characteristics	Control Group N = 25 # (%)	Treatment Group N = 26 # (%)
Demographics		
Females	11 (44)	14 (54)
Males	14 (56)	12 (46)
Caucasian	17 (68)	18 (69)
African-American	1 (4)	3 (12)
Hispanic	6 (24)	4 (15)
Asian	1 (4)	1 (4)
Total minority	8 (32)	8 (31)
Age (M and SD)*	61.9 years (14.4)	62.5 years (11.9)
Diagnoses		
Coronary artery disease	16 (64)	16 (62)
Congestive heart failure (CHF)	7 (28)	8 (31)
Cardiomegaly	2 (8)	0 (0)
Prior myocardial infarction	6 (24)	5 (19)
Acute myocardial infarction	4 (16)	8 (31)
Unstable angina	10 (40)	3 (12)
Chest pain, cause unknown	5 (20)	2 (8)
Acute pulmonary edema	2 (8)	2 (8)
Cardiomyopathy	2 (8)	6 (23)
Supraventricular tachyarrhythmia	1 (4)	1 (4)
Ventricular tachycardia or fibrillation	1 (4)	3 (12)
Atrial fibrillation	2 (8)	6 (23)
Intubation/ventilation	4 (16)	7 (27)
Valvular heart disease	2 (8)	6 (23)
Hypotension	4 (16)	2 (8)
Cardiopulmonary arrest	2 (8)	2 (8)
Cardiac diagnoses (M and SD)*	2.80 (1.12)	2.96 (1.73)
Diabetes mellitus	11 (44)	15 (58)
Chronic obstructive pulmonary disease (COPD)	8 (32)	4 (15)
Hypertension – severe	7 (28)	11 (42)
Gastrointestinal disease or bleeding	2 (8)	3 (12)
Pneumonia	2 (8)	4 (15)
Chronic renal failure	5 (20)	5 (19)
Cerebrovascular accident	1 (4)	2 (8)
Sepsis	1 (4)	0 (0)
Cirrhosis of the liver or other liver disease	0 (0)	1 (4)
Hypothyroidism	0 (0)	2 (8)
Hepatitis	0 (0)	1 (4)
Noncardiac diagnoses (M and SD)*	1.48 (1.16)	1.85 (1.35)

Note. *) Two-tailed t-tests for independent samples indicated no significant differences between the two groups at ICU admission, i.e. before prayer began for the patients in the treatment group. The percentages in the table may not sum to 100% due to rounding

Comparisons of hospital course following onset of prayer

A one-way analysis of variance of the weighted composite MAHI-CCU scores showed no difference in the overall quality of the hospital course for the patients in the treatment group ($M = 16.1$, $SD = 9.9$) and the patients in the control group ($M = 15.3$, $SD = 11.9$), $F(1, 49) = .067$, $p = .796$. Table 4 on page 31 shows the individual components of the composite MAHI-CCU scores. A one-way analysis of variance of the number of days each patient spent in the ICU found no difference in length of stay between the patients in the treatment group ($M = 3.3$, $SD = 3.4$) and the patients in the control group ($M = 4.1$, $SD = 2.6$), $F(1, 49) = .833$, $p = .366$. A one-way analysis of variance of the number of days each patient spent in the hospital revealed no difference in length of stay between the patients in the treatment group ($M = 5.9$, $SD = 3.5$) compared to the patients in the control group ($M = 7.8$, $SD = 4.8$), $F(1, 49) = 2.671$, $p = .109$.

A power analysis based on an effect size of .3 sigma showed that the number of participants in the two groups (25 and 26, respectively) resulted in insufficient statistical power for the study. Thus, the study had only an 18% chance of detecting a population difference in hospital course between the groups of this magnitude (a Cohen's d of .3 indicates a small-to-medium effect size). The analysis indicated that a much larger number of participants (approximately 180-200 in each group) would be required to detect an effect of this size. However, this was not practical or feasible for this study.

Table 4. Comparisons of hospital course following onset of prayer.

Medications, Procedures, and Complications	Control Group N = 25 # (%)	Treatment Group N = 26 # (%)
Need for		
Anti-anginal medication	18 (72)	15 (58)
Antibiotic medication	15 (60)	13 (50)
Anti-arrhythmic medication	5 (20)	11 (42)
Inotropic medication	2 (8)	4 (15)
Diuretic medication	12 (48)	18 (69)
Anti-hypertensive medication	23 (92)	23 (88)
Anti-coagulant medication	23 (92)	26 (100)
Vasopressor medication	5 (20)	4 (15)
Arterial pressure monitoring	9 (36)	11 (42)
2D-echo	3 (12)	5 (19)
Stress test	1 (4)	1 (4)
Gastrointestinal procedure	2 (8)	1 (4)
Coronary catheterization/angiography	3 (12)	1 (4)
Temporary pacemaker	1 (4)	1 (4)
An electrophysiology study	1 (4)	1 (4)
Radiofrequency ablation	1 (4)	0 (0)
PTCA + stent/rotablator	2 (8)	2 (8)
Swan-Ganz catheterization	7 (28)	4 (15)
Central pressure monitoring/CVP	8 (32)	9 (35)
Re-admission to the ICU	2 (8)	0 (0)
Permanent pacemaker	0 (0)	3 (12)
Intra-aortic balloon pump	0 (0)	2 (8)
Intubation/ventilation	6 (24)	4 (15)
Implanted cardiac defibrillator	1 (4)	1 (4)
Development of		
Unstable angina	2 (8)	0 (0)
Atrial fibrillation	4 (16)	4 (15)
Supraventricular tachycardia	6 (24)	2 (8)
Hypotension	8 (32)	6 (23)
Pneumonia	3 (12)	1 (4)
New onset renal failure	5 (20)	1 (4)
Anemia requiring blood transfusion	6 (24)	2 (8)
Third degree heart block	0 (0)	1 (4)
Gastrointestinal bleed	2 (8)	2 (8)
TIA or cerebrovascular accident	1 (4)	0 (0)
Extension of infarction	0 (0)	1 (4)
Congestive heart failure (CHF)	0 (0)	2 (8)
Ventricular tachycardia or fibrillation	0 (0)	3 (12)
Cardiac or cardiopulmonary arrest	0 (0)	2 (8)
Death	2 (8)	5 (19)

Note. A one-way ANOVA showed no significant difference in overall hospitalization course between the two groups, as assessed with the Mid-America Heart Institute Cardiac Care Unit instrument The percentages in the table may not sum to 100% due to rounding.

CHAPTER IV

DISCUSSION

This study found no differences in hospital course between a group of hospitalized cardiac patients who were prayed for and a group who were not prayed for. On average, the patients in the two groups required the same level of care and intervention and developed complications with the same level of severity, as summarized by the composite MAHI-CCU scores. The patients in the two groups also required approximately the same number of days in the intensive care unit and in the hospital, respectively.

The most obvious explanation for these results may be that remote, intercessory prayer on behalf of another person who is unaware of being prayed for has no effect as measured in this study. Indeed, the study had several strengths that suggest that the opportunity for prayer to have an impact was present, but that it did not occur.

The strengths of the study included a faithful implementation of the prayer intervention. Review of the prayer logs and intercessor surveys showed that the intercessors followed the study's guidelines to begin praying the same day that they received the prayer requests and to pray for at least 30 minutes every day for the entire duration of each patient's hospital stay. Several intercessors even reported praying more than the required 30 minutes, and many started praying immediately. There were only

very few exceptions to the above, and overall the intercessors showed great commitment to praying for the patients in the study. During informal conversations, some indicated that praying as part of the study had enriched their prayer life. The positive responses on the survey also showed that the intercessors felt very comfortable with participating in a scientific study and with the instructions and guidelines of the study. The intercessors reported that most of the restrictions of the study were not barriers to them, such as not knowing whether the patients they were praying for were Christian.

In spite of these strengths, the study had several limitations. First, the study included a relatively small number of participants, which resulted in insufficient statistical power and increased the likelihood of erroneously concluding that there was no effect of the prayer on the hospital course of the patients, that is, making a statistical Type II error. Indeed, the studies by Byrd (1988) and Harris et al. (1999), both of which found a positive effect of prayer, included 393 and 990 patients, respectively. Review of the study by Harris et al. (1999) allowed for calculation of an effect size which was estimated to be very small (Cohen's d = .13). If indeed prayer does have an effect, but a subtle one, a very large number of participants is required to detect it. (Of course, it is debatable whether such tiny effects are worth investigating.)

Second, the MAHI-CCU instrument, which constituted the study's primary dependent variable, was of questionable validity and reliability. The MAHI-CCU instrument, adapted from the study by Harris et al. (1999), operationalizes information about the procedures and medications that are required for the care of hospitalized cardiac patients, and about the complications that these patients typically develop, obtained through reviews of electronic and paper medical charts. Harris et al. (1999)

themselves acknowledged that the criterion-related validity of the instrument had not been examined. Of course, as stated by the authors, it is not clear how this might be done given that there is no universally agreed-upon criterion assessing the "quality" of a patient's hospital course with which the MAHI-CCU scores could be compared. Similarly, the construct validity of the instrument cannot been examined given that no medical theories exist regarding precisely why the development of one complication indicates a more "severe" hospital course than another complication, or why the need for one medication or procedure should be assigned a higher severity value than another medication or procedure.

More importantly, several problems were encountered in this study which may have decreased the content validity and the reliability of the MAHI-CCU scores. For example, the medical charts sometimes showed a difference in opinion between two doctors about whether a patient had indeed developed a particular complication, such as congestive heart failure for which no objective definition exists. In others words, it was sometimes subject to interpretation whether some complications should count toward a patient's total MAHI-CCU score. Also, since some medications were prescribed as standing orders (in case a patient might need them), the review of the medical charts at times did not indicate whether the patient actually received the medication. The inconsistent use of medical terms by doctors also presented a challenge. For example, some doctors used the terms "supraventricular tachyarrhythmia" and "ventricular tachycardia" interchangeably even though the terms represent very different medical conditions that are assigned different severity values on the MAHI-CCU instrument. Since only one nurse participated in the review of the medical charts, interrater-reliability

was not a potential source of error. However, although great effort was made to be consistent, some instrument decay may have occurred because the process of reviewing the medical charts for all patients in the study was fairly long. A final problem with the MAHI-CCU instrument may be that it summarizes too much information into a composite score (i.e., each patient's medications, procedures, complications, and survival/death) with consequent loss of detail. This was illustrated by the fact that a significant difference between the two groups in the study was found in terms of one of the components of the MAHI-CCU instrument, but not in terms of the total composite score.

A third limitation may have been that the study included a relatively small number of intercessors per patient. In the study by Harris et al. (1999), each patient was assigned to a team of five intercessors, with each team praying for more than one patient at a time. In the study by Byrd (1988), each patient was assigned to at least three and up to seven intercessors (but the report included no mention of whether the intercessors were praying for more than one patient at any given point).

In this study, each patient was assigned to only 1-3 intercessors, all of whom prayed for only one patient at a time. The intercessors were very much encouraged to pray with others and to share the prayer requests with others by phone or email. However, review of the prayer logs showed great variability with some intercessors offering all prayer alone and others sharing the prayer requests with up to 40-50 other people. Some prayer logs also did not include enough detail to determine whether the intercessor prayed alone, with others, or shared the prayer request (or with how many).

This study required the intercessors to pray for at least 30 minutes every day; in contrast, the reports by Byrd (1988) and Harris et al. (1999) did not include any mention of a daily time requirement. On the survey distributed after the completion of the study, one of the intercessors pondered, "Would 15 minutes of prayer daily be as effective?" As speculated by Jonas and Crawford (2003), "it may be that prayer works best with more intercessors praying more often and more fervently." However, it is unknown whether the specific "amount" of prayer makes a difference, or whether the number of intercessors and the 30 minutes of daily prayer in this study was sufficient to be expected to make an impact.

A fourth limitation of the study may have been that very little identifying information about the patients could be given to the intercessors due to the need to protect the patients' privacy and confidentiality. This was especially important because they were unaware of being research participants and had not given informed consent. Although the usual requirement for researchers to obtain informed consent was waived for this study by the Institutional Review Board of the hospital network, the IRB would not allow the researcher to share much identifying information with the intercessors. This raised the question of whether there was sufficient information to "target" or "direct" the prayer toward the patients in the treatment group (as opposed to toward the control group). The distinction between the treatment group and the control group is, of course, an essential feature of any experimental design. Given that the patients in the two groups were in the hospital at the same time, how was the prayer to be "targeted" or "directed" toward the patients in the treatment group?

Each intercessor was initially given the gender, age, date/time of admission to the ICU, cardiac and noncardiac diagnoses of the patient he or she was to pray for (as well as a set of fictitious initials). If the information was available, the intercessors also learned about the patients' city of residence, marital status, family situation, and work/retirement status. As time passed and as the information was available, the intercessors were updated about which procedures the patients had undergone, what complications had developed, and when the patients might have been transferred from intensive care to the regular cardiac floor in the hospital. However, in principle, the control group could have contained a patient with exactly the same characteristics. In other words, no *uniquely identifying information* (such as hospital room number) was given about the patients in the treatment group. As a comparison, the intercessors in the study by Harris et al. (1999) were given only each patient's first name and date of admission (and no updates in the condition of the patient), while the intercessors in Byrd's (1988) study were given the first name and diagnosis of each patient as well as updates in his or her condition.

Of course, those who believe that prayer may work via divine intervention might present the argument that "God knew who those patients were." However, others might argue that prayer works via a more direct person-to-person mechanism that may require some kind of connection or information between the two persons involved. In summary, it is unknown whether such uniquely identifying information is necessary for prayer to have an effect (on the right patients) and whether the lack of this information contributed to the lack of positive results for the patients in the treatment group in this study.

On a related note, it may have been a limitation that more information (especially personal information) and more frequent updates about the patients could not be given to

the intercessors. This was the case both because of the need to protect the privacy and confidentiality of the patients, and because of practical restrictions. Some of the intercessors indicated that they would have preferred more information and updates, that not knowing more about the patients they were praying for was a barrier, and that they did not feel quite as close to the person prayed for as usual (when offering intercessory prayer). Still, the number of intercessors who reported this was small, and the impact of this limitation is unknown.

A final limitation may have been the negative effects that the research study itself had on the intercessors and on the quality of their prayers. These effects included a pressure to "prove" that prayer works and the requirement to record prayers in a prayer log that may have affected the intensity and spontaneity of the prayers. Since only some of the intercessors reported struggling with these issues, it is unknown whether they contributed to the study's lack of positive findings.

In sum, the study had both strengths and limitations that leave open the interpretation of the results. As such, no final conclusion about the effect or lack of effect of prayer on recovery from illness can be made at this time. Future studies must continue to build on the methodological progress already made by including a larger number of participants; improving the validity and reliability of outcome measures; assigning larger numbers of intercessors to pray for each patient; giving intercessors as much personal and uniquely identifying information about the patients as possible; updating intercessors more frequently about changes in the condition of the patients; and limiting the effects of the "research atmosphere" on the intercessors because it may affect the quality of their

prayers. However, even as scientific progress is made, questions will no doubt continue to emerge about whether and how prayer works.

APPENDICES

Appendix A
Nurse Survey Questions and Results

Appendix B
Sample Invitation Letter to Prayer Groups

Appendix C
Instructions to Intercessors

Appendix D
Intercessor Survey Questions and Results

Appendix E
Mid-America Heart Institute Cardiac Care Unit (MAHI-CCU) Instrument

Appendix F
Medications Included on the MAHI-CCU Instrument

APPENDIX A

Nurse Survey Questions And Results

Prayer Study Survey

Over the course of the study, were you aware of which patients on the unit were in the treatment group and which patients were in the control group? Yes No

On a scale of 0-100%, what is the chance that a patient might have overheard conversations on the unit about the prayer study? _____

On a scale of 0-100%, what is the chance that a patient's family or friends might have overheard conversations on the unit about the prayer study? _____

Did you, intentionally or accidentally, discuss the prayer study with any patients? Yes No

Did you, intentionally or accidentally, discuss the prayer study with any family members or friends of patients? Yes No

Do you know of any patients who inquired about the prayer study? Yes No

Do you know of any family members or friends of patients who inquired about the prayer study? Yes No

Do you know of any patients who *might have had some idea* that he or she was a participant in a research study? Yes No

Do you know of any family members or friends of patients who *might have had some idea* that the patient was a participant in a research study? Yes No

Do you know of any patients who *somehow became alerted to the fact* that he or she was a participant in a research study? Yes No

Do you know of any family members or friends of patients who *somehow became alerted to the fact* that the patient was a participant in a study? Yes No

Nurse Survey Results

Table A1. Over the course of the study, were you aware of which patients were in the treatment group and which patients were in the control group?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

Table A2. On a scale of 0-100%, what is the chance that a patient might have overheard conversations on the unit about the prayer study?

Responses	Frequency	Percent	Cumulative Percent		
0.00	8	50.0	50.0		
1.00	2	12.5	62.5		
5.00	3	18.8	81.3		
10.00	2	12.5	93.8		
15.00	1	6.3	100.0	Mean	SD
Total	16	100.0		3.2500	4.71169

Table A3. On a scale of 0-100%, what is the chance that a patient's family members or friends might have overheard conversations on the unit about the prayer study?

Responses	Frequency	Percent	Cumulative Percent		
0.00	9	56.3	56.3		
1.00	1	6.3	62.5		
5.00	1	6.3	68.8		
10.00	3	18.8	87.5		
15.00	2	12.5	100.0	Mean	SD
Total	16	100.0		4.1250	5.79511

Table A4. Did you, intentionally or accidentally, discuss the prayer study with any patients?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

Table A5. Did you, intentionally or accidentally, discuss the prayer study with any family members or friends of patients?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

Table A6. Do you know of any patients who inquired about the prayer study?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

Table A7. Do you know of any family members or friends of patients who inquired about the prayer study?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

Table A8. Do you know of any patients who *might have had some idea* that he or she was a participant in a research study?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

Table A9. Do you know of any family members or friends of patients who *might have had some idea* that the patient was a participant in a research study?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

Table A10. Do you know of any patients who *somehow became alerted to the fact* that he or she was a participant in a research study?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

Table A11. Do you know of any family members or friends of patients who *somehow became alerted to the fact* that the patient was a participant in a research study?

Responses	Frequency	Percent	Valid Percent	Cumulative Percent
No	16	100.0	100.0	100.0

APPENDIX B

Sample Invitation Letter to Prayer Groups

Lotte Smith-Hansen
2901 Barton Skyway #2206
Austin, Texas 78746

January 9, 2003

Rev. Parker Jameson
St. Luke's on the Lake Episcopal Church
5600 Ranch Road 620 N
Austin, Texas 78732

Dear Parker Jameson,

I am contacting you about an upcoming research study about the healing power of prayer that researchers in the Seton Healthcare System and at Texas State University are about to undertake. The study will examine the effects of prayer on recovery from physical illness. It will be conducted at Seton Medical Center in Austin, and will include patients admitted to the hospital for serious cardiac problems. The study is scheduled to begin this spring.

I am a graduate student in health psychology and the study's coordinator. I am conducting this study for my master's thesis in collaboration with hospital staff in the Seton Healthcare System and under the supervision of my thesis advisors at Texas State University in San Marcos.

We are currently looking for church members in the Austin community to participate in the study. Each participant will be assigned one patient for whom to pray every day for the duration of the patient's hospital stay. We believe that the patients in the study may recover faster and with fewer complications because of the prayer. The results will be made public this summer, and will be submitted for publication in scientific medical journals. Each participant will receive a complimentary copy of the research report.

We are inviting you and other members of your church to participate in the study along with members of other congregations in the Austin area.

Please contact me at your convenience if you or other members of your church are interested in participating or learning more about the study. I'd be happy to talk to you on the phone or meet with you in person to discuss the details of the study. I can be reached by phone at 799-9495 or by email at Lottesh@hotmail.com.

Thank you for giving this your consideration. I look forward to talking with you.

Sincerely,
Lotte Smith-Hansen

APPENDIX C

Instructions to Intercessors

Dear Prayer Study participant,

Thank you for your interest in the study! The study will examine the effects of prayer on recovery from physical illness. It will be conducted at a major hospital in Austin, and will include patients admitted to the hospital for serious cardiac problems.

I am a graduate student in health psychology at Texas State University in San Marcos, and the study's coordinator. I am conducting this study for my master's thesis in collaboration with nursing staff at the hospital and under the supervision of my thesis advisors at Texas State University. We believe that the patients in the study may recover faster and with fewer complications because of the prayer. The results will be made public this summer, and will be submitted for publication in scientific medical journals.

The study will begin this month. As new patients are admitted to the hospital, each patient will be assigned to one prayer participant. When your name is selected, you will receive a call from me. You will be given some basic information about the patient (initials, age, gender, and cardiac diagnosis).

Please pray for the health and well-being of the patient, with the goal of a fast recovery free of complications. You can pray the way you usually do, and you can pray alone, with your family and friends, or with your prayer groups. In fact, you are encouraged to pray with others and to share the prayer request by phone or email with any prayer chains that you may be part of.

We ask that you start praying the same day that you receive the prayer request, and that you pray every day while the patient is in the hospital. We also ask that you pray for at least 30 minutes each day. This can be all at once or spread out throughout the day.

In your prayer log, please write down the dates and times that you prayed. This can be something simple like "Starting around 9am, prayed throughout the day" or "Prayed 15 minutes at 12noon and again at 7pm" or anything in between. Also note if you prayed with others or shared the prayer request with others (and approx. how many). You can also record any special thoughts or feelings that you feel are noteworthy in the prayer logs.

You will receive another call from me when the patient has been discharged from the hospital, usually within 3-7 days. If the patient is in the hospital for more than five days, I will call to let you know how he or she is doing. I will also notify you in the event that he or she passes away. Depending on how many prayer participants sign up for the study, you may receive additional prayer requests later.

Please contact me at any point if you have questions about the study. I can be reached by phone at 799-9495 or by email at Lottesh@hotmail.com. Thank you!

Sincerely,
Lotte Smith-Hansen

APPENDIX D

Intercessor Survey Questions and Results

Prayer Study Survey

Please take a moment to answer the questions below. Your feedback about the study is important for the planning of future scientific studies of prayer.

STEP 1

Please answer these questions about the information and updates you received about the patient(s).

In regard to the medical information you received (diagnoses, procedures, etc.), would you prefer more or less information?	Less	Same	More
In regard to the personal information you received (initials, gender, age, race/ethnicity, marital and family status, etc.), would you prefer more or less information?	Less	Same	More
Would you prefer more or less frequent updates?	Less	Same	More
Would you prefer updates by email instead of phone?		Yes	No

STEP 2

Please answer these questions about the extent to which you were able to follow the guidelines of the study.

I started praying for the patient(s) the same day that I received the prayer request	Yes	No
I started praying within 12 hours of receiving the prayer request	Yes	No
I started praying within 6 hours of receiving the prayer request	Yes	No
I started praying within 3 hours of receiving the prayer request	Yes	No
I prayed for the patient(s) approx. 30 minutes a day	Yes	No
I prayed for the patient(s) more than 30 minutes a day	Yes	No
I prayed for the patient(s) less than 30 minutes a day	Yes	No
I got too busy with other obligations to devote as much time, attention, and energy to praying for the patient(s) as I had planned to	Yes	No
Other things came up that distracted me somewhat from praying	Yes	No
Asking intercessors to pray for 30 minutes a day for someone they do not know may be too much to ask	Yes	No

STEP 3

Please answer these questions about how you felt about participating in the study. Indicate your agreement with each statement by circling a number between 1 (not at all) and 6 (very much).

Not being able to meet and pray with the patient(s) face-to-face was a barrier	1 2 3 4 5 6
Not knowing the patient I was praying for (or not knowing more about him or her) was a barrier	1 2 3 4 5 6
My knowledge of the existence of a control group (patients who were not being prayed for) was a barrier	1 2 3 4 5 6
I was uncomfortable praying for someone who had not given his or her consent to be prayed for	1 2 3 4 5 6
I was uncomfortable not knowing whether the patient(s) I was praying for was Christian or even religious	1 2 3 4 5 6
I felt pressured to "prove" that prayer works	1 2 3 4 5 6
I felt comfortable being part of a scientific study	1 2 3 4 5 6
The instructions I was given as part of the study made it hard for me to really "get into it" when I was praying for the patient(s)	1 2 3 4 5 6
The requirement to record my prayer times in the prayer log was a barrier	1 2 3 4 5 6
I felt comfortable with the instructions and guidelines of the study	1 2 3 4 5 6
My prayers felt artificial and not as spontaneous as usual	1 2 3 4 5 6
My prayers were as strong as usual	1 2 3 4 5 6
My connection to God was as close as usual	1 2 3 4 5 6
My connection to the person I was praying for was as close as when I usually offer intercessory prayer	1 2 3 4 5 6
I believe that prayer may have an effect even if the person prayed fordoes not know that he or she is being prayed for	1 2 3 4 5 6
I believe that prayer can be studied scientifically	1 2 3 4 5 6

STEP 4

Please indicate whether you were aware of which hospital and which unit within the hospital the study was being conducted at.

Hospital? Yes No If yes, list name of the hospital _____

Unit? Yes No If yes, list name of the unit _____

Please indicate whether you had any contact (other than a "prayer connection") with the patient(s) that you prayed for, including cards, letters, phone calls, or visits.

☐ I did not have any such contact with the patient(s) that I prayed for

☐ I was not aware that I could not contact the patient(s) I was praying for

STEP 5

Please discuss any suggestions or recommendations you have for future scientific studies of prayer, or provide any other comments you may have.

Thank You!

Intercessor Survey Results

Table D1. I started praying for the patient the same day I received the prayer request

Responses	Frequency	Percent
Yes	19	100.0

Table D2. I started praying within 3/6/12 hours of receiving the prayer request

Responses	Frequency	Percent
3	18	94.7
12	1	5.3
Total	19	100.0

Table D3. I prayed for less than 30 minutes/30 minutes/more than 30 minutes a day

	Frequency	Percent	Cumulative Percent
LESS	1	5.3	5.3
30	12	63.2	68.5
MORE	6	31.5	100.0
Total	19	100.0	

Table D4. I got too busy with other obligations to devote as much time, attention, and energy to praying for the patient as I had planned to

Responses	Frequency	Percent
No	16	84.2
Yes	3	15.8
Total	19	100.0

Table D5. Other things came up that distracted me somewhat from praying

Responses	Frequency	Percent
No	15	78.9
Yes	4	21.1
Total	19	100.0

Table D6. Asking intercessors to pray for 30 minutes a day for someone they do not know may be too much to ask

Responses	Frequency	Percent
No	17	89.5
Yes	2	10.5
Total	19	100.0

Table D7. I felt comfortable being part of a scientific study

Responses	Frequency	Percent	Cumulative Percent		
4	2	10.5	10.5		
5	2	10.5	21.1		
6	15	78.9	100.0	Mean	SD
Total	1	100.0		5.68	.671

Responses: 1 = Not at all, 6 = Very much

Table D8. I felt comfortable with the instructions and guidelines of the study

Responses	Frequency	Percent	Cumulative Percent		
2	1	5.3	5.3		
3	1	5.3	10.5		
4	1	5.3	15.8		
5	3	15.8	31.6		
6	13	68.4	100.0	Mean	SD
Total	19	100.0		5.37	1.165

Responses: 1 = Not at all, 6 = Very much

Table D9. I believe that prayer may have an effect even if the person prayed for does not know that he or she is being prayed for

Responses	Frequency	Percent	Cumulative Percent		
4	1	5.3	5.3		
5	1	5.3	10.5		
6	17	89.5	100.0	Mean	SD
Total	19	100.0		5.84	.501

Responses: 1 = Not at all, 6 = Very much

Table D10. Not being able to meet and pray with the patient face-to-face was a barrier

Responses	Frequency	Percent	Cumulative Percent		
1	17	89.5	89.5		
2	1	5.3	94.7		
4	1	5.3	100.0	Mean	SD
Total	19	100.0		1.21	.713

Responses: 1 = Not at all, 6 = Very much

Table D11. I was uncomfortable not knowing whether the patient I was praying for was Christian or even religious

Responses	Frequency	Percent	Cumulative Percent		
1	17	89.5	89.5		
2	1	5.3	94.7		
3	1	5.3	100.0	Mean	SD
Total	19	100.0		1.16	.501

Responses: 1 = Not at all, 6 = Very much

Table D12. I was uncomfortable praying for someone who had not given his or her consent to be prayed for

Responses	Frequency	Percent	Cumulative Percent		
1	18	94.7	94.7		
2	1	5.3	100.0	Mean	SD
Total	19	100.0		1.05	.229

Responses: 1 = Not at all, 6 = Very much

Table D13. The instructions I was given as part of the study made it hard for me to really "get into it" when I was praying for the patient

Responses	Frequency	Percent	Cumulative Percent		
1	17	89.5	89.5		
2	2	10.5	100.0	Mean	SD
Total	19	100.0		1.11	.315

Responses: 1 = Not at all, 6 = Very much

Table D14. My knowledge of a control group (patients who were not being prayed for) was a barrier

Responses	Frequency	Percent	Cumulative Percent	Mean	Std. Deviation
1	19	100.0	100.0	1.00	.000

Responses: 1 = Not at all, 6 = Very much

Table D15. My connection to God was as close as usual

Responses	Frequency	Percent	Cumulative Percent		
3	1	5.3	5.3		
4	1	5.3	10.5		
5	4	21.1	31.6		
6	13	68.4	100.0	Mean	SD
Total		100.0		5.53	.841

Responses: 1 = Not at all, 6 = Very much

Table D16. I would prefer less/same/more medical information about the patient

Responses	Frequency	Percent
More	3	15.8
Same	16	84.2
Total	19	100.0

Table D17. I would prefer less/same/more personal information about the patient

Responses	Frequency	Percent
More	9	47.4
Same	10	52.6
Total	19	100.0

Table D18. I would prefer less/same/more frequent updates about the patient

Responses	Frequency	Percent
More	5	26.3
Same	14	73.7
Total	19	100.0

Table D19. Not knowing the patient I was praying for (or not knowing more about him or her) was a barrier

Responses	Frequency	Percent	Cumulative Percent		
1	15	78.9	78.9		
2	2	10.5	89.5		
3	2	10.5	100.0	Mean	SD
Total	19	100.0		1.32	.671

Responses: 1 = Not at all, 6 = Very much

Table D20. I felt pressured to "prove" that prayer works

Responses	Frequency	Percent	Cumulative Percent		
1	15	78.9	78.9		
2	1	5.3	84.2		
3	2	10.5	94.7		
4	1	5.3	100.0	Mean	SD
Total	19	100.0		1.42	.902

Responses: 1 = Not at all, 6 = Very much

Table D21. The requirement to record my prayer times in the prayer log was a barrier

Responses	Frequency	Percent	Cumulative Percent		
1	13	68.4	68.4		
2	3	15.8	84.2		
3	1	5.3	89.5		
6	2	10.5	100.0	Mean	SD
Total		100.0		1.79	1.584

Responses: 1 = Not at all, 6 = Very much

Table D22. My prayers felt artificial and not as spontaneous as usual

Responses	Frequency	Percent	Cumulative Percent		
1	15	78.9	78.9		
2	2	10.5	89.5		
3	1	5.3	94.7		
4	1	5.3	100.0	Mean	SD
Total	19	100.0		1.37	.831

Responses: 1 = Not at all, 6 = Very much

Table D23. My prayers were as strong as usual

Responses	Frequency	Percent	Cumulative Percent		
3	3	15.8	15.8		
4	1	5.3	21.1		
5	2	10.5	31.6		
6	13	68.4	100.0	Mean	SD
Total	19	100.0		5.32	1.157

Responses: 1 = Not at all, 6 = Very much

Table D24. My connection to the person I was praying for was as close as when I usually offer intercessory prayer

Responses	Frequency	Percent	Cumulative Percent		
2	2	10.5	10.5		
3	2	10.5	21.1		
4	2	10.5	31.6		
5	2	10.5	42.1		
6	11	57.9	100.0	Mean	SD
Total	19	100.0		4.95	1.471

Responses: 1 = Not at all, 6 = Very much

Table D25. I believe that prayer can be studied scientifically

Responses	Frequency	Percent	Cumulative Percent		
2	1	5.3	5.3		
3	1	5.3	10.5		
4	1	5.3	15.8		
5	5	26.3	42.1		
6	11	57.9	100.0	Mean	SD
Total	19	100.0		5.26	1.147

Responses: 1 = Not at all, 6 = Very much

APPENDIX E

Mid-America Heart Institute Cardiac Care Unit (MAHI-CCU) Instrument

Table E1. Mid-America Heart Institute Cardiac Care Unit Instrument.

Interventions/Diagnostics Needed and New Diagnoses/Symptoms Developed *Check All That Apply*	
Severity Category 1 Need for _____ Anti-anginal agents or antibiotics _____ Arterial pressure monitoring (continuous) _____ 2D-echo _____ Stress test _____ Gastrointestinal procedure Development of _____ Unstable angina	Severity Category 2 Need for _____ Anti-arrhythmic, inotropic, diuretic, anti-hypertensive, or anti-coagulant drugs _____ Coronary cath/angiography (left heart cath, no intervention) Development of _____ Atrial fibrillation _____ Supraventricular tachyarrhythmia _____ Hypotension (systolic < 90 15 mins) _____ Pneumonia _____ New onset renal failure _____ Anemia requiring blood transfusion
Severity Category 3 Need for _____ Vasopressor drugs _____ Temporary pacemaker _____ An electrophysiology study _____ Radiofrequency ablation _____ Interventional coronary procedure (PTCA) _____ PTCA + stent/rotablator _____ Swan-Ganz catheterization (right heart cath) _____ Central pressure monitoring/CVP _____ Re-admission to the ICU after transfer Development of _____ 3rd degree heart block _____ Gastrointestinal bleed _____ TIA or cerebrovascular accident _____ Extension of infarction	Severity Category 4 Need for _____ Permanent pacemaker _____ Intra-aortic balloon pump _____ Intubation/ventilation _____ Implanted cardiac defibrillator _____ Major surgery of any kind, such as coronary bypass, open heart surgery, valve replacement, or VAD implant Development of _____ Congestive heart failure (CHF) _____ Ventricular tachycardia or fibrillation _____ Severe sepsis or septic shock
Severity Category 5 Development of _____ Cardiac or cardiopulmonary arrest	Severity Category 6 _____ Death

APPENDIX F

Medications Included on the MAHI-CCU Instrument

Table F1. Medications included on the MAHI-CCU Instrument.

Severity	Category	Medications Included
1	Anti-anginal agents	Nitroglycerine PO/SL/Topical, Isosorbide (Imdur), Diltiazem (Cardizem).
	Anti-biotics	Cefadroxil (Duricef), Cefazolin (Ancef), Piperacillin-Tazobactam (Zosyn), Azithromycin (Zithromax), Nystatin (Mycostatin), Ceftriaxone (Rocephin), Amoxicilin-Potassium clavulanate (Augmentin), Levofloxacin (Levaquin), Vancomycin, Clindamycin, Cephalexin (Keflex), Gentamicin, Miconazole (Monistat).
2	Anti-arrhythmics	Lidocaine, Amiodarone (Cordarone), Atropine, Flecainide (Tambacor), Digoxin, Sotolol (Betapace).
	Inotropes	Dobutamine (Dobutrex), Milrinone (Primacor).
	Diuretics	Furosemide (Lasix), Spironolactone (Aldactone), Torsemide (Demadex), Chlorothiazide (Diuril), Nesiritide (Natrecor), Mannitol (Osmitrol), Hydrochlorothiazide (HCTZ).
	Anti-hypertensive agents	Enalapril (Vasotec), Metoprolol (Lopressor, Toprol XL), Nitroglycerine IV, Amlodipine (Norvasc), Carvedilol (Coreg), Ramipril (Altace), Benazepril (Lotensin), Hydralazine (Apresoline), Nicardipine (Cardene), Lisinopril (Prinivil), Nifedipine (Procardia), Nitroprusside (Nipride), Losartan (Cozaar), Fosinopril (Monopril), Esmolol (Brevibloc), Clonidine (Catapress), Atenolol (Tenormin).
	Anti-coagulant agents	Enoxaparin (Lovonox), Acetylsalicylic acid (Asprin), Heparin, Warfarin (Coumadin).
3	Vasopressors	Dopamine, Epinephrine, Norephinephrine (Levophed), Vasopressin (Pitrissin), Phenlylephrine (Neosynephrine).

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VITA

Lotte Smith-Hansen was born in Roskilde, Denmark, on March 13, 1977, the daughter of Hanne Smith-Hansen and Olaf Smith-Hansen. She completed high school at Østervangsskolen in Roskilde, Denmark, in May of 1993. Her subsequent education included one year as an exchange student at Lake View High School in San Angelo, Texas; two years at Amtsgymnasiet in Roskilde, Denmark; and two years at Angelo State University in San Angelo, Texas. In August of 1998, she entered The University of Texas at Austin. She graduated summa cum laude with the degree of Bachelor of Arts in Psychology in December of 2000. In October of 2001, she started employment as a research associate with the Charles A. Dana Center at The University of Texas at Austin. She entered the Graduate College of Texas State University – San Marcos in August of 2002.

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