Telemedicine for Post-Myocardial Infarction Patients: An Observational Study

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Abstract

“SHL” Telemedicine (established 1987 in Israel) provides professional care to subscribers who use cardiobeepers and contact its medical call center via telecommunication networks. The extended 6-month Acute Coronary Syndrome Israel Survey (ACSIS) 2004 involved all 26 intensive cardiac care units in Israeli hospitals. We compared the 1-year survival rates of the “SHL” Telemedicine subscribers and ACSIS participants who survived hospitalization after sustaining an acute myocardial infarction. The myocardial infarction data for the ACSIS cohort (3,899 patients) and the SHL Telemedicine cohort (699 subscribers) were provided for this study by the ACSIS executive and SHL’s files, respectively. One-year mortality was ascertained by telephone contacts with patients or their relatives. Mortality at 1 year was 4.4% for the “SHL” patients and 9.7% for the ACSIS patients (p < 0.0001). The “SHL” cohort was significantly older (p < 0.0001) than the ACSIS cohort (mean age [±SD] 69 ± 11 versus 63 ± 13 years), had significantly more past myocardial infarctions (p < 0.001), more past strokes (p < 0.0032), more heart failure (p < 0.0001), more hypertension (p = 0.002), and more hyperlipidemia (p < 0.0001). Gender distribution and diabetes status were similar for both groups. In spite of having more risk factors than the ACSIS subjects, the “SHL” Telemedicine subscribers had significantly higher survival rates at 1 year compared to the ACSIS patients, whose outcome is consistent with that of the Western world. Availability of medical call centers in the out-of-hospital setting for patients with suspected cardiac symptoms improves their motivation to seek timely and appropriate medical assistance.

Key words: myocardial infarction patients, Acute Coronary Syndrome Israel Survey, “SHL” Telemedicine

Introduction

Since most deaths associated with acute myocardial infarction (MI) occur within the first hour of onset, the importance of prompt diagnosis and rapid application of appropriate management cannot be overemphasized. Delay in recognition of the seriousness of symptoms and in seeking medical attention (“decision time”) and prehospital evaluation is one of the most important factors in determining survival. Patient-related factors that correlate with a longer decision time include older age, female gender, low socioeconomic status, low emotional or somatic awareness, history of angina, diabetes, consulting a spouse or other relative, and consulting a physician.1–4

Recognition of the importance of time in this setting has spurred efforts to shorten the interval between symptom presentation and treatment administration for patients with acute coronary syndrome, including the improvement of the medical dispatch factor by expanding prehospital emergency system coverage5 and implementing telemedicine call centers. Information on the impact of telemedical facilities on patient outcome, and comparison between them and the standard methods of care among survivors of acute MI, however, is scarce, and little is known about when telemedicine applications are practical and when they are not applicable.6 Moreover, efforts to improve survival and the quality of life after MI should extend to awareness and modification of known risk factors and changes in unhealthy lifestyles. The decrease in fatalities after acute MI7,8 has led to an increase in the population of MI survivors who are candidates for secondary prevention.

Despite the remarkable success of therapeutic interventions and secondary prevention during the post-MI period, however, there is
considerable room for improvement, especially for the preventive measures that specifically target the rising numbers of affected elderly persons. One of the most promising of these measures is a telemedicine call center that allows continuous and remote supervision, monitoring, and triage of patients with an acute MI. Such medical call centers are becoming increasingly available in the community. We compared the 1-year post-acute myocardial infarction survival of subscribers to “SHL” Telemedicine with an unselected consecutive cohort of patients who survived an infarction and who were included in the Acute Coronary Syndrome in Israel Survey (ACSIS).

Materials and Methods

STUDY DESIGN

This is a nonrandomized, noncontrolled, retrospective observational study. The same demographic, historical, and clinical data, including all-cause mortality, in-hospital complications, medical management, and procedures performed were compared between two large groups of patients who suffered an acute MI and survived hospitalization.

ACSIS

The ACSIS cohort consisted of patients who were part of a nationwide prospective biannual survey that was performed over a 2-month period in all 26 intensive cardiac care units operating in Israel and described in detail elsewhere.9 It was extended to 6 months in 2004 (from February to July). The ACSIS data were collected on specific forms for all participants by dedicated study physicians in the intensive cardiac care units. Eligibility for inclusion in that survey was validated before the patient’s discharge from the intensive cardiac care units. The diagnosis of an acute MI was based on the standard clinical, electrocardiographic, and cardiac markers criteria published by the American Heart Association in 2000.10 All patients with acute MI who were admitted to the extended ACSIS 2004 and who survived the hospital phase were included in this study.

“SHL”

“SHL,” a call center that was established in 1987, provides medical assistance to its >60,000 subscribers. This service has been described in detail elsewhere.11–16 Briefly, it operates 24 hours a day, 365 days a year, through a call center managed by a medical staff. Each subscriber’s complete medical file (which also includes a full 12-lead electrocardiogram) is stored in the medical call center’s information technologies system and the details on numerous parameters are continuously updated. All the subscribers carry a cardiobeeper by which they can transmit a 3- (I, II, III) or 12-lead electrocardiogram via a telephone line. Once the subscriber is identified by name or identification number, his or her medical file is immediately displayed on the medical call center’s screen. The medical staff at the center obtains all the pertinent facts from the file as well as from a transtelphonic anamnesis. After interpreting the newly transmitted electrocardiographic data, and based on the integration of written protocols, computerized algorithms, and clinical judgment, the staff will advise the subscriber according to the medical call center’s protocol. The call center also routinely initiates calls to subscribers from time to time to reassure them, to encourage them to use the service whenever needed, and for providing training of the use of cardiobeeper appliances when indicated.

All “SHL” subscribers who survived the hospital phase of an acute MI between 2001 and 2004 were included in this study. Diagnosis of an acute MI was made according to the same diagnostic criteria as those for the ACSIS group10 and retrieved from each patient’s hospital discharge summary.

At the end of 1 year since study inclusion, all the ACSIS and “SHL” participants or their relatives were interviewed in order to ascertain the patient’s survival status and to collect any relevant information pertaining to the cause of death for nonsurvivors.

STATISTICAL ANALYSIS

Descriptive statistics for continuous variables are given as means ± standard deviation. Demographic variables are compared by χ² tests. Survival outcomes focus on 1-year survival and are computed

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>&quot;SHL&quot; (n = 699)</th>
<th>ACSIS (n = 3,899)</th>
<th>p VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y (mean ± SD)</td>
<td>69 ± 11</td>
<td>63 ± 13</td>
<td>0.0001</td>
</tr>
<tr>
<td>Male (%)</td>
<td>71</td>
<td>76</td>
<td>0.0200</td>
</tr>
<tr>
<td>Past myocardial infarction (%)</td>
<td>33</td>
<td>24</td>
<td>0.0001</td>
</tr>
<tr>
<td>Past stroke (%)</td>
<td>10</td>
<td>7</td>
<td>0.0032</td>
</tr>
<tr>
<td>Heart failure (%)</td>
<td>23</td>
<td>7</td>
<td>0.0001</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>36</td>
<td>32</td>
<td>0.0358</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>69</td>
<td>54</td>
<td>0.0001</td>
</tr>
<tr>
<td>Hyperlipidemia (%)</td>
<td>67</td>
<td>50</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

ACSIS, Acute Coronary Syndrome in Israel Survey; “SHL,” SHL Telemedicine Services.

*The data on 51 ACSIS patients who survived hospitalization and who were lost to follow-up are not included. All 1-year follow-up data were available for the “SHL” cohort.
as the simple percentage of subjects who were alive 1 year after the index MI. The “SHL” subscribers were compared to the ACSIS cohort using the Mantel-Haenszel test stratified by gender and age groups. The cohorts were compared within strata by the $\chi^2$ test. We recognize that the test results are not exact because there is some overlap of patients (around 20 patients in the ACSIS group were estimated to be members of the SHL group); We have no means of isolating “SHL” subscribers from nonsubscribers in the ACSIS group and of excluding them from the analysis of the ACSIS data. The overlapping of patients induces positive dependence of the two groups and so our $p$ values, which treat the data sources as if they were completely independent, are higher than they should be. Statistical significance was set at $p < 0.05$.

**Results**

The final “SHL” cohort consisted of 699 “SHL” Telemedicine subscribers who survived an acute MI and completed a follow-up of 1 year or had died within 1 year. Of the 3,950 patients with confirmed MI who were discharged alive from hospital in the ACSIS group, 51 were lost to follow-up and were excluded from final analysis, leaving a total of 3,899 patients who had completed a follow-up of 1 year or had died within 1 year.

Selected epidemiological parameters of the two groups of patients are presented in Table 1. The only greater risk factor for MI in the ACSIS group was a significantly higher percentage of males. “SHL” subscribers were significantly older, had more traditional coronary risk factors (e.g., hypertension and hyperlipidemia), and experienced more infarctions, strokes, and heart failure in the past. At the 1-year follow-up, however, the death rate was significantly lower for the “SHL” group than for the ACSIS group (4.4% versus 9.7%, respectively, $p < 0.0001$).

Table 2 illustrates the relationship between mortality and the parameters of age and gender. The results significantly favored all age groups of the SHL cohort. Notably, the differences between the

<table>
<thead>
<tr>
<th>A</th>
<th>AGE (y)</th>
<th>SHL (n = 498)</th>
<th>ACSIS (n = 3,899)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PATIENTS (n)</td>
<td>MORTALITY (%)</td>
<td>PATIENTS (n)</td>
</tr>
<tr>
<td>&lt;70</td>
<td>333</td>
<td>8 (2.4)</td>
<td>2,572</td>
</tr>
<tr>
<td>70–79</td>
<td>228</td>
<td>7 (3.1)</td>
<td>840</td>
</tr>
<tr>
<td>&gt;80</td>
<td>138</td>
<td>16 (11.6)</td>
<td>485</td>
</tr>
<tr>
<td>Overall</td>
<td>699</td>
<td>31 (4.4)</td>
<td>3,897</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>B</th>
<th>MALE SEX AGE (y)</th>
<th>SHL (n = 699)</th>
<th>ACSIS (n = 2,943)</th>
</tr>
</thead>
<tbody>
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<td>PATIENTS (n)</td>
<td>MORTALITY (%)</td>
<td>PATIENTS (n)</td>
</tr>
<tr>
<td>&lt;70</td>
<td>266</td>
<td>5 (1.9)</td>
<td>2,157</td>
</tr>
<tr>
<td>70–79</td>
<td>138</td>
<td>4 (2.9)</td>
<td>536</td>
</tr>
<tr>
<td>&gt;80</td>
<td>94</td>
<td>14 (14.9)</td>
<td>250</td>
</tr>
<tr>
<td>Overall</td>
<td>498</td>
<td>23 (4.6)</td>
<td>2,943</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>FEMALE SEX AGE (y)</th>
<th>SHL (n = 201)</th>
<th>ACSIS (n = 958)</th>
</tr>
</thead>
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<tr>
<td></td>
<td>PATIENTS (n)</td>
<td>MORTALITY (%)</td>
<td>PATIENTS (n)</td>
</tr>
<tr>
<td>&lt;70</td>
<td>67</td>
<td>3 (4.5)</td>
<td>415</td>
</tr>
<tr>
<td>70–79</td>
<td>90</td>
<td>3 (3.3)</td>
<td>304</td>
</tr>
<tr>
<td>&gt;80</td>
<td>44</td>
<td>2 (4.6)</td>
<td>235</td>
</tr>
<tr>
<td>Overall</td>
<td>201</td>
<td>8 (4.0)</td>
<td>954</td>
</tr>
</tbody>
</table>

ACSIS, Acute Coronary Syndrome in Israel Survey; “SHL,” SHL Telemedicine Services.

aData are missing for two ACSIS patients.

$p < 0.0001$ for all comparisons.
SHL and ACSIS findings became more prominent with increasing age. For both groups, the mortality rate was significantly higher among the patients who did not undergo any revascularization procedure during hospitalization (224/1,142 [19.6%] for the ACSIS group and 22/232 [9.5%] for the SHL group: \( p < 0.0001 \) between them) compared to those who did undergo revascularization (153/2,757 [5.5%] for the ACSIS group and 9/467 [1.9%] for the SHL group: \( p < 0.0001 \) between them) during hospitalization for the index MI.

During the 1-year follow-up, 6,149 calls were initiated by 572 SHL subscribers (Table 3). Excluding from final analysis the one subscriber who called the medical call center more than five times daily, the mean number of calls per year per subscriber (698 individuals) was 6.7 ± 10.6. Eighteen percent of the subscribers did not initiate any calls, while the “SHL” call center initiated 2,293 calls to 573 subscribers (mean 3.3 ± 6.2 calls per year per subscriber after excluding the one exception). There was at least one telephone contact with either the subscriber or a close relative during the 1-year follow-up. Overall, there were 404 hospitalizations of 351 subscribers during the first year of follow-up. Thirty-five subscribers (5%) underwent a recurrent infarction within 3.7 ± 5 months since the index MI. Other reasons for hospitalizations (not all of them through a direct intervention by “SHL”) are listed in Table 4. During follow-up, 139 (20%) subscribers were referred by the “SHL” call center 235 times to their physicians due to various nonurgent noncardiac complaints (gastrointestinal, urological, etc.), new findings that did not warrant transport to hospital or immediate care (arrhythmias, changes in blood pressure, etc.), or re-adjustment of medication dosage. One hundred and forty-four subscribers (21%) underwent coronary angiography, which resulted in revascularization procedures in 138 of them (96%), of whom 41 underwent coronary bypass procedures while the other 97 had balloon angioplasty and stenting; none of these subscribers died during follow-up. A permanent pacemaker was implanted in 16 subscribers due to bradyarrhythmias, while an automatic implantable cardioverter defibrillator was implanted in an additional eight subscribers (following successful resuscitation in three of them): none of them died during follow-up.

<p>| Table 3. Frequency of “SHL” Subscriber-Initiated and “SHL” Medical Call Center-Initiated Calls |
|-----------------------------------------------|------------------|
| <strong>“SHL” SUBSCRIBER-INITIATED CALLS (BY 572 SUBSCRIBERS)</strong> |                  |</p>
<table>
<thead>
<tr>
<th>SUBSCRIBERS (n)</th>
<th>CALLS (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>321</td>
<td>1–5</td>
</tr>
<tr>
<td>134</td>
<td>6–10</td>
</tr>
<tr>
<td>71</td>
<td>11–20</td>
</tr>
<tr>
<td>39</td>
<td>21–50</td>
</tr>
<tr>
<td>5</td>
<td>51–100</td>
</tr>
<tr>
<td>1</td>
<td>&gt;1,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>“SHL” MEDICAL CALL CENTER-INITIATED CALLS (TO 573 SUBSCRIBERS)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBSCRIBERS (n)</td>
<td>CALLS (n)</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>480</td>
<td>1–5</td>
</tr>
<tr>
<td>53</td>
<td>6–10</td>
</tr>
<tr>
<td>29</td>
<td>11–20</td>
</tr>
<tr>
<td>9</td>
<td>21–50</td>
</tr>
<tr>
<td>2</td>
<td>51–100</td>
</tr>
<tr>
<td>1</td>
<td>&gt;100</td>
</tr>
</tbody>
</table>

<p>| Table 4. Reasons for Hospitalizations of the “SHL” Cohort During 1 Year of Follow-Up |
|-----------------------------------------------|------------------|</p>
<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>HOSPITALIZATIONS (n)</th>
<th>MEAN TIME ELAPSE FROM INDEX MI TO HOSPITALIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td></td>
<td>3.4 ± 4.0 months</td>
</tr>
<tr>
<td>Chest pain</td>
<td></td>
<td>155</td>
</tr>
<tr>
<td>Cardiac origin excluded</td>
<td></td>
<td>103</td>
</tr>
<tr>
<td>Recurrent angina</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>Arrhythmias</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Paroxysmal atrial fibrillation</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Complete atrioventricular block</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Ventricular tachycardia</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Pulmonary edema</td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>Other**</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Noncardiac</td>
<td></td>
<td>3.8 ± 5.5 months</td>
</tr>
<tr>
<td>Febrile disease</td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>Neurological complaints</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Bleeding</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Malaise</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Other†</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td><em>SHL,</em> SHL Telemedicine Services; MI, myocardial infarction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>**Pericarditis, pacemaker electrode replacement, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>†Malignancy, trauma, elective noncardiac surgical procedures, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thirty-six percent of the study cohort had diabetes, mostly type 2 treated with at least one oral hypoglycemic drug. Although the 1-year mortality was higher among the diabetics (14/252, 5.6%) compared with the nondiabetics (17/446, 3.8%), it did not reach a level of significance (p = 0.283). Data on diabetes were not available for 1 patient.

Of the total of 31 deaths recorded during the 1-year follow-up period, 14 were patients with renal failure (14/112, 12.5%), and they represented 45% of all deaths (p < 0.0001 compared to the 586 subscribers without renal failure). Data on renal failure were not available for 1 patient.

Importantly, 65% of the “SHL” subscribers called the medical call center within 1 hour from onset of symptoms (interpreted by them to be of cardiac origin), 8% called within 1–2 hours, 7% within 2–3 hours, and 20% after more than 3 hours.

ACSIS

Comparable data for the above-cited parameters are not available for the patients who comprised the ACSIS study cohort with the exception of survival at 1 year after the index acute MI.

Discussion

We believe the current study to be the first to compare the 1-year survival rate of a large number of patients who suffered an acute MI and were managed according to the established protocol of a telemedicine call center with the survival rate of patients who went through the traditional channels of referral and a variety of decision-making processes. Subscribers who were treated by the intervention of the “SHL” medical call center had a significantly lower mortality rate (4.4%) compared to the mortality rate of the ACSIS patients (9%) who represent the “real world” of clinical practice.17–22

Although there has been an age-adjusted decline in coronary heart disease mortality in the developed world, there has been no noticeable change in the number of sudden and unexpected coronary deaths in the out-of-hospital setting.23 It stands to reason that a facilitated approach to medical care in the prehospital setting will improve the motivation of patients with possible cardiac symptoms to seek timely and appropriate medical assistance. In a recent paper on 5,831 rescue missions, Muller et al.24 questioned the suddenness of cardiac death. Their findings suggested that cardiac death might not emerge “suddenly out of the blue,” but that it is often preceded by warning symptoms of heart disease lasting for more than an hour. They noted that the symptoms are misinterpreted, suppressed, or denied despite the presence of a preexisting cardiac disease or cardiac risk factors, and suggested that recognition and quick response to symptoms of heart disease hold promise for reducing mortality attributed to “sudden” death. The subscribers to “SHL” Telemedicine are relieved of the responsibility of interpreting what could or could not be cardiac symptoms and in deciding whether they require urgent medical intervention: “The only thing they must do is make one telephone call to the medical call center, which operates around the clock. “SHL” Telemedicine subscribers have testified to the confidence they have in the “SHL” staff and to their relief in not having to make medical decisions.3

There is compelling evidence that depression, anxiety, and negative affectivity predict long-term cardiac-related mortality following an MI, independently of cardiac disease severity.25,26 Antman et al.3 reported that lack of adherence to prescribed treatments has been shown to be associated with increased risk of mortality after infarction. In addition, lack of an emotionally supportive network in the patient’s environment after discharge is associated with an increased risk of mortality and recurrent cardiac events. In this setting, the “SHL”-initiated follow-up calls (Table 3) not only remind the subscribers to take their prescribed medications and follow dietary restrictions and their physician’s recommendations (as noted on their “SHL” records), but also they serve as messages that the subscribers have not been abandoned even when they are feeling well. This peace of mind undoubtedly plays a part in the greater compliance with treatment.

A variety of factors contribute to the morbidity and mortality rates of acute MI survivors. Comorbid conditions and left ventricular dysfunction are traditional physical risk factors, and age is a powerful independent predictor of early and long-term mortality after an acute myocardial infarction, with advanced age consistently emerging as one of the principal determinants of mortality, especially in patients with ST-segment elevation myocardial infarction.27–29 According to our results, the benefits of the telemedicine service held true in spite of the fact that the “SHL” subscribers were at greater risk to succumb from their infarctions compared to the ACSIS cohort (Table 1). Indeed, although there was a difference in mortality rate (significant for females) in favor of SHL subscribers under 70 years of age, the differences in survival for those between 70 and 79 years of age and those older than 80 years in both sexes were highly significant (p < 0.0001 and p < 0.0003, respectively) (Table 2).

The issue of whether females have higher mortality both in the hospital and 1 year after acute MI is a controversial one.31–36 Notably, our results showed that the women in the “SHL” group were older than the women in the ACSIS cohort.

Patients with diabetes and those with renal failure were shown to be at increased risk for mortality during infarction and during the 1 year following the cardiac event.37–39 While the survival rate of the diabetic “SHL” subscribers was not different from those without diabetes,
the ones with renal failure had increased mortality. This is probably because the diabetics could be better managed by teleconsultation.

Our sole criterion in comparing the “SHL” members to another large group of patients was that each participant had undergone a well-documented MI and that he or she survived the event to leave the hospital. For the purposes of this study, we were interested only in whether or not they were alive 1 year later. We did not look into the MI characteristics and disease course of the 699-member “SHL” group and the 3,899-member ASCIS group as recorded in their medical records. It would be reasonable to assume that the patients who subscribe to a telemedicine service are highly motivated to seek medical care early and in an efficient manner and can also afford the membership fees. This makes selection bias inevitable and unavoidable for the purposes of the current study. It was also beyond the scope of this study to carry out a cost analysis.

In conclusion, although it was not surprising that the “SHL” factor would enhance survival, we could not predict to what extent it succeeded in doing so. While it is well known that mortality during the in-hospital phase has been significantly reduced over the past decades, there has been no appreciative reduction in mortality in the prehospital and posthospital survival of these patients until now. The telemedicine service was associated with dramatic rates of improvement in mortality associated with coronary disease in this patient population. Whether and how its implementation is feasible and practicable in other countries is for local authorities to decide. This study provides the first hard evidence that it is worthwhile.

Acknowledgment

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Disclosure Statement

Dr. Roth is a medical consultant of “SHL,” and Drs. Elizur and Golovner, Mrs. Malov and Tamari, and Mr. Yanay are full or part-time “SHL” employees.

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REFERENCES


5. Gibson CM. Time is myocardium and time is outcomes. Circulation 2001;104:2632–2634.


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