Published in final edited form as:

Am J Cardiol. 2018 October 01; 122(7): 1121–1127. doi:10.1016/j.amjcard.2018.06.043.

Barriers to Healthcare Access and to Improvements in Health-Related Quality of Life after an Acute Coronary Syndrome (From TRACE-CORE)

Nathaniel A. Erskine, BA^a, Barbara Gandek, PhD^{a,b}, Hoang V. Tran, MD^a, Hawa Abu, MBBS MPH^a, David D. McManus, MD MSc^{a,c}, Catarina I. Kiefe, PhD MD^a, and Robert J. Goldberg, PhD^a

^aDepartment of Quantitative Health Sciences, University of Massachusetts Medical School, Worcester, MA

^bJohn Ware Research Group, Watertown, MA

^cDivision of Cardiovascular Medicine, Department of Medicine, University of Massachusetts Medical School, Worcester, MA

Abstract

Little is known about how barriers to healthcare access affect health-related quality of life (HRQOL) after an acute coronary syndrome (ACS). In a large cohort of ACS survivors from six medical centers in Massachusetts and Georgia enrolled between 2011-2013, patients were classified as having any financial barriers, no usual source of care (USOC), or transportation barriers to healthcare based on their questionnaire survey responses. The principal study outcomes included clinically meaningful declines in generic physical and mental HRQOL and in disease-specific HRQOL between 1 and 6 months post-hospital discharge. Adjusted relative risks (aRRs) for declines in HRQOL were calculated using Poisson regression models, controlling for several sociodemographic and clinical factors of prognostic importance. Among 1,053 ACS survivors, 29.0% had a financial barrier, 14.2% had no USOC, and 8.7% had a transportation barrier. Patients with a financial barrier had greater risks of experiencing a decline in generic physical (aRR 1.48, 95% CI: 1.17, 1.86) and mental (aRR 1.36, 95% CI 1.07, 1.75) HRQOL at 6 months. Patients with two or more access barriers had greater risks of decline in generic physical (aRR 1.53, 95% CI 1.20, 1.93) and mental (aRR 1.50, 95% CI 1.17, 1.93) HRQOL compared to those without any healthcare barriers. There was a modest association between lacking a USOC and experiencing a decline in disease-specific HRQOL (aRR 1.46, 95% CI: 0.96, 2.22). Financial and other barriers to healthcare access may be associated with clinically meaningful declines in HRQOL after hospital discharge for an ACS.

Address for Correspondence: Robert J. Goldberg, Ph.D., Department of Quantitative Health Sciences, University of Massachusetts Medical School, 368 Plantation Street, Worcester, MA 01605, robert.goldberg@umassmed.edu, Tel: (508) 856-3991; Fax: (508) 856-8993.

Conflicts of Interest:

The authors have no conflicts of interest to disclose

Keywords

health care barriers; acute coronary syndromes; quality of life

INTRODUCTION

The majority of the 1.4 million American adults who annually survive a hospitalization for an acute coronary syndrome (ACS) avoid short-term readmission to the hospital and death.^{1,2} These individuals, however, tend to have worse health-related quality of life (HRQOL) than the general population,^{3,4} and many experience subsequent declines in HRQOL after hospital discharge for an ACS.⁵ Better knowledge about changes in HRQOL after an acute coronary event may be particularly useful for patients who are determining their long-term health goals.⁶ We know little about the factors that affect HRQOL after an ACS,⁶ particularly with regards to the impact of healthcare access.⁷ Barriers to healthcare remain common in the U.S.^{8,9} and these barriers may lead to poor uptake and adherence to secondary prevention therapies for coronary heart disease that could otherwise improve patient's HRQOL.^{10,11} Using data from a longitudinal study of hospital survivors of an ACS,^{12,13} we examined the association between several healthcare barriers with clinically meaningful changes in HRQOL during the six months after hospital discharge for an ACS.

METHODS

In the prospective Transitions, Risks, and Actions in Coronary Events Center for Outcomes Research and Education (TRACE-CORE) cohort study,^{12,13} trained research assistants (RAs) recruited a total of 2,174 adults who survived their hospitalization for an ACS at 6 medical centers in central Massachusetts and Georgia between April, 2011 and May, 2013. Eligibility criteria included being 21 years of age or older and having a confirmed ACS.¹⁴ Trained RAs abstracted data from electronic medical records and conducted a baseline interview, either in-person during the index hospitalization or by telephone within 72 hours of discharge. Patients participated in additional telephone interviews after hospital discharge. This study received approval from the Institutional Review Boards at participating sites.

Participants with complete data on the specific barriers to healthcare, type of ACS, SF-36v2[®] Health Survey physical (PCS) and mental (MCS) component summary scores,¹⁵ and a Seattle Angina Questionnaire Quality of Life (SAQ QOL)¹⁶ score at 1 and 6 months after discharge, and various potentially confounding factors, comprised the analytical sample. As our principal exposure factors, we examined variables in this study that could act as enabling resources for care access.¹⁷ These included having adequate financial resources, a usual source of care (USOC), and having transportation for obtaining medical care.

Financial barriers to healthcare included difficulty in affording care and lack of insurance at hospital discharge. At the baseline interview, participants answered 2 yes/no questions: "During the past 12 months, have you had any problems paying medical bills?" and "In the past 12 months, have you avoided obtaining any health care services because of the cost?"¹⁸ We categorized patients responding affirmatively to either of these questions and/or lacking insurance as having a financial barrier to healthcare.

During the baseline interview, participants answered the question “Is there a place that you usually go to when you are sick or need advice about your health?” We classified patients who responded no to the first question or listing an emergency room in the second question as having no USOC.⁸

To assess the presence of transportation-related barriers to medical care, participants answered the following questions during the baseline interview: “Overall, and in terms of transportation, how difficult is it for you to get to your health care appointments?” (no problem at all, not very, somewhat, moderately, or extremely difficult) and “Within the past 12 months, have you missed a medical appointment or been unable to obtain needed health care because of problems with your transportation?”. We classified patients who reported missing care or perceiving moderate to extreme difficulty in getting to their medical appointments as having a transportation barrier to accessing healthcare.

To assess generic HRQOL, participants completed the SF-36v2 Health Survey.¹⁵ This instrument yields measures that assess overall physical and mental health, with higher scores indicating better HRQOL. We defined changes of 3.0 points as clinically meaningful decreases and/or increases in HRQOL.¹⁹ To assess disease-specific HRQOL, we used the 3-item quality of life scale from the Seattle Angina Questionnaire (SAQ QOL).¹⁶ The SAQ QOL is scored from 0 to 100; higher scores indicate better HRQOL. We defined changes of 16.0 points as clinically meaningful decreases and/or increases in HRQOL.¹⁶

Patient’s self-reported race and ethnicity, level of education, household composition, employment status, and smoking status were obtained during the baseline interview. The ACS was classified as either an ST-segment elevation myocardial infarction (STEMI), non-STEMI, or unstable angina.¹⁴ Our trained RAs abstracted data on patients’ pre-existing medical conditions, hospital treatment practices, and we calculated Global Registry of Acute Coronary Events (GRACE) risk scores (2.0).²⁰

During the hospitalization, we asked participants “How confident are you filling out medical forms by yourself?” on a 5-point Likert scale²¹; we categorized those responding extremely/quite a bit, somewhat, and a little bit/not at all as having high, medium, and low health literacy, respectively. We assessed cognitive status using the Telephone Interview for Cognitive Status (TICS) at 1 month after hospital discharge²². Patients completed the Patient Activation Measure, a measure of patients’ knowledge, skills, and confidence to manage their disease.⁵

We examined the baseline characteristics of participants according to the presence of a financial, USOC, or transportation-related barrier to healthcare access. We used chi-square and unpaired t-tests to compare differences in the distributions of categorical and continuous variables, respectively, among those with and without specific healthcare barriers. We examined differences in mean HRQOL scores after hospital discharge using paired t-tests.

Using Poisson regression models, we calculated relative risks (RR) and accompanying 95% confidence intervals (95% CIs) for experiencing a clinically meaningful decrease in HRQOL at 6 months according to the presence of individual healthcare barriers. Due to potential selection bias resulting from differential loss to follow-up, we performed our regression

analyses using inverse probability weighting.²³ We first constructed a regression model that contained the three healthcare barriers together. We then adjusted the models for pre-specified factors and additional covariates if their inclusion changed beta coefficients for the association between at least one barrier to healthcare access and changes in HRQOL by 10% and also adjusted for the 1-month HRQOL scores.

RESULTS

The analytical sample consisted of 1,053 of the 2,174 original TRACE-CORE study participants. Compared to included participants, those excluded from the present study were younger, were more likely to belong to a racial or ethnic minority, have less education, be unemployed, and have strained monthly finances. Participants who were excluded from the present study, due primarily to a lack of follow-up information on HRQOL, were also more likely to have previously diagnosed heart failure, be a current smoker, not have undergone a percutaneous coronary intervention during their acute hospitalization, have a longer hospital stay, have worse health literacy, and have impaired cognition than included participants. The prevalence of financial barriers to care (38.4% vs. 29.0%), lack of a USOC (19.3% vs 14.2%), and transportation barriers to healthcare access (14.4% vs. 8.7%) were significantly higher among excluded participants ($p<0.001$).

In the analytical sample, 305 (29.0%) participants had a financial barrier, 149 (14.2%) lacked a USOC, and 92 (8.7%) had a transportation barrier (Table 1). Compared to those without the healthcare barrier of interest, participants with each barrier tended to be younger, female, of a racial or ethnic minority, unemployed, and have strained monthly finances. The frequencies of chronic lung disease, current smoking status, and mildly to severely impaired cognitive status were higher among those with the specific barriers to healthcare access.

Mean PCS scores increased between 1 and 6 months after hospital discharge, from 42.4 to 44.0 points ($p<0.001$), although 25.5% of participants experienced a clinically meaningful decrease in their generic physical HRQOL. Patients with each healthcare barrier had significantly lower mean PCS scores at 1 and 6 months post-discharge compared to their counterparts without such barriers (Table 2). Overall, 31.5% who reported a financial barrier to care, 22.2% who lacked a USOC, and 31.5% who had a transportation barrier to care experienced a clinically meaningful decline in their physical HRQOL. Patients with a financial barrier to care had a significantly higher multivariable adjusted risk of experiencing a clinically meaningful decrease in their physical HRQOL but not those lacking a USOC or having a transportation barrier (Table 2).

Mean MCS scores increased from 50.9 points at 1 month to 52.6 points at 6 months post-discharge ($p<0.001$); despite these favorable increases, 24.6% of patients experienced a clinically meaningful decline in MCS scores between these time points (Table 3). Mean MCS scores were significantly lower among participants with each healthcare barrier at 1 and 6 months post discharge (Table 3). Slightly less than one third of participants with a financial barrier, lack of a USOC, or transportation barrier experienced a clinical meaningful decline in their mental HRQOL. Patients with a financial barrier to healthcare had a

significantly higher multivariable adjusted risk of a meaningful decline in their mental HRQOL (Table 3).

Mean SAQ QOL scores increased from 76.2 to 80.9 points between 1 and 6 months post-discharge ($p<0.001$). Overall, 12.7% of participants experienced a clinically meaningful decline in their disease-specific HRQOL during the 6 months after hospital discharge (Table 4). Participants with each healthcare barrier had lower mean SAQ QOL scores than patients without such a barrier at 1 and 6 months after discharge. Participants without a USOC had a non-significantly elevated risk of experiencing declines in disease-specific HRQOL over the six months after hospital discharge compared to those with a USOC (Table 4).

Overall, 59.8% of patients had no healthcare barriers, 11.2% had a single barrier, and 29.0% had two or all three barriers. As the number of barriers to healthcare access increased, the proportion of patients with a clinically meaningful decline significantly increased for PCS and MCS (Table 5), but did not increase significantly for SAQ QOL. Patients with two or three healthcare barriers had a significantly higher multivariable adjusted risk of experiencing declines in generic physical and mental HRQOL over the following 6 months (Table 5).

DISCUSSION

The results of this prospective study found that approximately one-quarter of study participants experienced a clinically meaningful decline in their physical or mental HRQOL over the six months after hospital discharge for an ACS, while about one-eighth experienced a decline in disease-specific HRQOL. Patients with a financial barrier had higher risks of experiencing clinically meaningful declines in physical and mental HRQOL over this period. We found that those with two or more barriers to care also had higher risks of experiencing declines in physical and mental HRQOL. We found a modest association between lacking a USOC and an increased risk of experiencing declines in disease-specific HRQOL.

To our knowledge, this is the first study to identify an association between healthcare access barriers with declines in HRQOL after an ACS. A limited number of studies have examined the relationship between healthcare access and HRQOL at a pre-specified time following hospitalization for an ACS, but did not examine changes in HRQOL over time.^{18,24} In a large nationwide cohort study of patients who were hospitalized for an acute myocardial infarction (AMI), those reporting avoiding healthcare due to costs had lower mean generic physical and mental HRQOL, and lower SAQ QOL scores, at one year after discharge, compared to those without such a barrier.¹⁸ We could not identify any prior studies that examined the relationship between lacking a USOC or having a transportation barrier with HRQOL after an ACS.

Our results suggest that those with financial barriers to care may be more likely to experience declines in their physical HRQOL. Patients with difficulty affording healthcare may be less likely to receive follow-up care and effective medical and lifestyle therapies that would otherwise protect their physical health.²⁵ Alternatively, such patients may unnecessarily limit their physical activities after an ACS because they lack reassurance about

their safety from providers. Since exercise may have a protective effect against a recurrent coronary event, financial barriers to healthcare could further adversely affect patient's long-term prognosis.

Patients reporting a financial barrier to healthcare were more likely to experience a subsequent decline in their generic mental HRQOL. In general, survivors of an ACS have a high risk of developing depression.²⁶ Patients with financial constraints on their healthcare may have difficulty accessing standard therapies for depression and/or be less adherent to prescribed treatment modalities than patients without cost constraints.²⁶ Moreover, the constrained financial resources could cause declines in mental HRQOL. Since secondary prevention treatment may impose substantial out-of-pocket costs,²⁷ patients may have to make considerable financial sacrifices which could lead to worries about an increased risk of a recurrent coronary event.²⁸

We failed to find an association between lacking a USOC or having a transportation barrier with experiencing clinically meaningful declines in either physical or mental HRQOL. Many patients lack a USOC due to having good health and/or not perceiving a need to regularly see a doctor.^{29,30} Our inability to find an association between lacking a USOC at baseline with declines in generic HRQOL could result from not being able to distinguish between patients who could not obtain such care from those who did not believe they needed a USOC. Some patients with a transportation barrier at admission may have been able to receive help from their social contacts or through arrangements by healthcare providers after discharge, thereby attenuating the association between transportation barriers with subsequent declines in HRQOL.

Our results leave open the possibility that actions to improve healthcare access may result in better HRQOL. A contemporary systematic review on interventions and changes in HRQOL after an AMI did not identify any studies that used interventions to improve healthcare access.¹¹ Further research is warranted to more fully understand how enhancing healthcare access among survivors of an ACS may improve their HRQOL and how providers might play an important role in this process.

The strengths of this study include its large sample size and assessment of multiple barriers to healthcare access as well as both generic and disease-specific measures of HRQOL. However, we acknowledge the potential for selection bias due to the fairly high loss to follow-up rate and to observed differences between those with and without further follow-up information on HRQOL. Unmeasured confounders, such as the receipt of social services, treatment practices, or changes in employment status after hospital discharge may have affected the relationship between healthcare barriers and changes in patient's HRQOL.

In conclusion, given the high prevalence of barriers to healthcare in the U.S., additional research is warranted to finding the best approaches to improve healthcare access among these patients, and perhaps consequentially their health status, through health policy changes and better referral of at-risk patients to support services.

Acknowledgements

The National Institutes of Health (NIH) National Heart, Lung, and Blood Institute (NLBI) supported N.E. (1T32HL120823-01), D.M. (R01HL126911), and R.G. (1R01HL135219-01). C.K. received support from the Patient-Centered Outcomes Research Institute (ME-1310-07682) and the NIH National Center for Advancing Translational Sciences (UL1TR0001453-02). The TRACE-CORE study was funded through NIH NLBI grant U01HL105268.

Funding Sources:

The National Institutes of Health (NIH) National Heart, Lung, and Blood Institute (NLBI) supported N.E. (1T32HL120823-01), D.M. (R01HL126911), and R.G. (1R01HL135219-01). C.K. received support from the Patient-Centered Outcomes Research Institute (ME-1310-07682) and the NIH National Center for Advancing Translational Sciences (UL1TR0001453-02). The TRACE-CORE study was funded through NIH NLBI grant U01HL105268.

References

1. Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, de Ferranti SD, Floyd J, Fornage M, Gillespie C, Isasi CR, Jiménez MC, Jordan LC, Judd SE, Lackland D, Lichtman JH, Lisabeth L, Liu S, Longenecker CT, Mackey RH, Matsushita K, Mozaffarian D, Mussolino ME, Nasir K, Neumar RW, Palaniappan L, Pandey DK, Thiagarajan RR, Reeves MJ, Ritchey M, Rodriguez CJ, Roth GA, Rosamond WD, Sasson C, Towfighi A, Tsao CW, Turner MB, Virani SS, Voeks JH, Willey JZ, Wilkins JT, Wu JH, Alger HM, Wong SS, Muntner P. Heart Disease and Stroke Statistics-2017 Update: A Report From the American Heart Association. *Circulation* 2017;135:e146–e603. [PubMed: 28122885]
2. McManus DD, Gore J, Yarzebski J, Spencer F, Lessard D, Goldberg RJ. Recent trends in the incidence, treatment, and outcomes of patients with STEMI and NSTEMI. *Am J Med* 2011;124:40–47. [PubMed: 21187184]
3. Schweikert B, Hunger M, Meisinger C, König HH, Gapp O, Holle R. Quality of life several years after myocardial infarction: comparing the MONICA/KORA registry to the general population. *Eur Heart J* 2009;30:436–443. [PubMed: 19019995]
4. Xie J, Wu EQ, Zheng ZJ, Sullivan PW, Zhan L, Labarthe DR. Patient-reported health status in coronary heart disease in the United States: age, sex, racial, and ethnic differences. *Circulation* 2008;118:491–497. [PubMed: 18625894]
5. Erskine NA, Gandek B, Waring ME, Kinney RL, Lessard DM, Devereaux RS, Chrysanthopoulou SA, Kiefe CI, Goldberg RJ. Survivors of an Acute Coronary Syndrome With Lower Patient Activation Are More Likely to Experience Declines in Health-Related Quality of Life. *J Cardiovasc Nurs* 2018;33:168–178. [PubMed: 28574974]
6. Rumsfeld JS, Alexander KP, Goff DC, Jr., Graham MM, Ho PM, Masoudi FA, Moser DK, Roger VL, Slaughter MS, Smolderen KG, Spertus JA, Sullivan MD, Treat-Jacobsen D, Zerwic JJ. Cardiovascular health: the importance of measuring patient-reported health status: a scientific statement from the American Heart Association. *Circulation* 2013;127:2233–2249. [PubMed: 23648778]
7. Kang K, Gholizadeh L, Inglis SC, Han HR. Correlates of health-related quality of life in patients with myocardial infarction: A literature review. *Int J Nurs Stud* 2017;73:1–16. [PubMed: 28511032]
8. Ward BW, Clarke TC, Freeman G, Schiller JS. Early release of selected estimates based on data from the 2014 National Health Interview Survey. National Center for Health Statistics.; 2015.
9. Syed ST, Gerber BS, Sharp LK. Traveling towards disease: transportation barriers to health care access. *J Community Health* 2013;38:976–993. [PubMed: 23543372]
10. Yohannes AM, Doherty P, Bundy C, Yalfani A. The long-term benefits of cardiac rehabilitation on depression, anxiety, physical activity and quality of life. *J Clin Nurs* 2010;19:2806–2813. [PubMed: 20738450]
11. Kang K, Gholizadeh L, Inglis SC, Han HR. Interventions that improve health-related quality of life in patients with myocardial infarction. *Qual Life Res* 2016;25:2725–2737. [PubMed: 27592108]

12. Waring ME, McManus RH, Saczynski JS, Anatchkova MD, McManus DD, Devereaux RS, Goldberg RJ, Allison JJ, Kiefe CI. Transitions, Risks, and Actions in Coronary Events--Center for Outcomes Research and Education (TRACE-CORE): design and rationale. *Circulation*: CQO 2012;5:e44–e50.
13. Goldberg RJ, Saczynski JS, McManus DD, Waring ME, McManus R, Allison J, Parish DC, Lessard D, Person S, Gore JM, Kiefe CI. Characteristics of contemporary patients discharged from the hospital after an acute coronary syndrome. *Am J Med* 2015;128:1087–1093. [PubMed: 26007672]
14. Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey DR, Jr, Chavey WE, 2nd, Fesmire FM, Hochman JS, Levin TN, Lincoff AM, Peterson ED, Theroux P, Wenger NK, Wright RS, Jneid H, Ettinger SM, Ganiats TG, Philippides GJ, Jacobs AK, Halperin JL, Albert NM, Creager MA, DeMets D, Guyton RA, Kushner FG, Ohman EM, Stevenson W, Yancy CW. 2012 ACCF/AHA focused update incorporated into the ACCF/AHA 2007 guidelines for the management of patients with unstable angina/non-ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol* 2013;61:e179–e347. [PubMed: 23639841]
15. Ware JE, Jr. SF-36 health survey update. *Spine* (Phila Pa 1976). 2000;25:3130–3139. [PubMed: 11124729]
16. Spertus JA, Winder JA, Dewhurst TA, Deyo RA, Prodzinski J, McDonell M, Fihn SD. Development and evaluation of the Seattle Angina Questionnaire: a new functional status measure for coronary artery disease. *J Am Coll Cardiol* 1995;25:333–341. [PubMed: 7829785]
17. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav* 1995;36:1–10. [PubMed: 7738325]
18. Rahimi AR, Spertus JA, Reid KJ, Bernheim SM, Krumholz HM. Financial barriers to health care and outcomes after acute myocardial infarction. *JAMA* 2007;297:1063–1072. [PubMed: 17356027]
19. Frendl DM, Ware JE, Jr. Patient-reported functional health and well-being outcomes with drug therapy: a systematic review of randomized trials using the SF-36 health survey. *Med Care* 2014;52:439–445. [PubMed: 24714581]
20. Fox KA, Fitzgerald G, Puymirat E, Huang W, Carruthers K, Simon T, Coste P, Monsegu J, Gabriel Steg P, Danchin N, Anderson F. Should patients with acute coronary disease be stratified for management according to their risk? Derivation, external validation and outcomes using the updated GRACE risk score. *BMJ Open* 2014;4:e004425.
21. Powers BJ, Trinh JV, Bosworth HB. Can this patient read and understand written health information? *JAMA* 2010;304:76–84. [PubMed: 20606152]
22. Brandt J, Spencer M, Folstein M. The telephone interview for cognitive status. *Neuropsychiatry Neuropsychol Behav Neurol* 1988;1:111–117.
23. Seaman SR, White IR. Review of inverse probability weighting for dealing with missing data. *Stat Methods Med Res* 2013;22:278–295. [PubMed: 21220355]
24. Arnold SV, Masoudi FA, Rumsfeld JS, Li Y, Jones PG, Spertus JA. Derivation and validation of a risk standardization model for benchmarking hospital performance for health-related quality of life outcomes after acute myocardial infarction. *Circulation* 2014;129:313–320. [PubMed: 24163068]
25. Smith SC, Jr., Benjamin EJ, Bonow RO, Braun LT, Creager MA, Franklin BA, Gibbons RJ, Grundy SM, Hiratzka LF, Jones DW, Lloyd-Jones DM, Minissian M, Mosca L, Peterson ED, Sacco RL, Spertus J, Stein JH, Taubert KA. AHA/ACCF Secondary Prevention and Risk Reduction Therapy for Patients with Coronary and other Atherosclerotic Vascular Disease: 2011 update: a guideline from the American Heart Association and American College of Cardiology Foundation. *Circulation* 2011;124:2458–2473. [PubMed: 22052934]
26. Lichtman JH, Bigger JT, Jr., Blumenthal JA, Frasure-Smith N, Kaufmann PG, Lespérance F, Mark DB, Sheps DS, Taylor CB, Froelicher ES. Depression and coronary heart disease: recommendations for screening, referral, and treatment: a science advisory from the American Heart Association Prevention Committee of the Council on Cardiovascular Nursing, Council on Clinical Cardiology, Council on Epidemiology and Prevention, and Interdisciplinary Council on Quality of Care and Outcomes Research: endorsed by the American Psychiatric Association. *Circulation* 2008;118:1768–1775. [PubMed: 18824640]

27. Choudhry NK, Avorn J, Glynn RJ, Antman EM, Schneeweiss S, Toscano M, Reisman L, Fernandes J, Spettell C, Lee JL, Levin R, Brennan T, Shrank WH. Full coverage for preventive medications after myocardial infarction. *N Engl J Med* 2011;365:2088–2097. [PubMed: 22080794]
28. Dhaliwal KK, King-Shier K, Manns BJ, Hemmelgarn BR, Stone JA, Campbell DJ. Exploring the impact of financial barriers on secondary prevention of heart disease. *BMC Cardiovasc Disord* 2017;17:1–8. [PubMed: 28052754]
29. Reasons for Lacking a Usual Source of Care: 2001 Estimates for the US Civilian Noninstitutionalized Population. 2001 at http://www.meps.ahrq.gov/mepsweb/data_files/publications/st32/stat32.pdf.)
30. Hayward RA, Bernard AM, Freeman HE, Corey CR. Regular source of ambulatory care and access to health services. *Am J Pub Health* 1991;81:434–438. [PubMed: 2003619]

Table 1:

Baseline characteristics of hospital survivors of an acute coronary syndrome according to the presence of specific barriers to healthcare access: TRACE-CORE

Characteristics	Full Sample (n = 1,053)	Financial Barrier (n = 305)	No Usual Source of Care (n = 149)	Transportation Barrier (n = 92)
Age, mean, yrs (SD)	62.7 (10.8)	58.2 (9.9)	57.5 (11.1)	59.6 (10.0)
Women	33.0%	41.3%	27.5%	44.6%
Non-Hispanic White	80.3%	68.9%	63.8%	63.0%
Education				
Less than high school	10.6%	16.1%	18.1%	22.8%
High school	29.5%	35.7%	40.9	29.3%
Some college / post-high school	30.8%	30.2%	25.5%	30.4%
College graduate	29.1%	18.0%	15.4%	17.4%
Living Situation				
With spouse	52.4%	42.6%	35.6%	26.1%
With family (non-spouse)	14.2%	21.0%	22.1%	28.3%
With non-family	13.3%	14.1%	18.8%	19.6%
Alone	20.0%	22.3%	23.5%	26.1%
Employment Status				
Retired	42.5%	26.9%	20.8%	32.6%
Working	40.9%	40.7%	50.3%	21.7%
Unemployed	16.6%	32.5%	28.9%	45.7%
Finances at End of Month (%)				
Some left over	50.7%	21.0%	38.3%	18.5%
Just enough to make ends meet	34.1%	43.0%	34.9%	41.3%
Not enough to make ends meet	15.2%	36.1%	26.8%	40.2%
Arthritis	21.2%	19.0%	14.1%	20.7%
Cancer	12.2%	11.5%	11.4%	13.0%
Chronic lung disease	18.0%	22.6%	20.8%	30.4%
Chronic kidney disease	9.5%	8.9%	12.1%	20.7%
Diabetes	30.9%	38.0%	25.5%	54.3%
Heart disease	50.3%	56.7%	48.3%	68.5%
Heart failure	11.2%	14.1%	8.7%	22.8%
Hyperlipidemia	70.7%	73.1%	59.1%	77.2%
Hypertension	75.0%	77.4%	68.5%	87.0%
Peripheral vascular disease	9.6%	9.2%	9.4%	17.4%
Stroke/TIA	8.4%	8.9%	7.4%	14.1%
Smoke				
Never	31.1%	26.9%	20.8%	18.5%
Former	49.1%	42.3%	43.0%	45.7%
Current	19.8%	30.8%	36.2%	35.9%

Characteristics	Full Sample (n = 1,053)	Financial Barrier (n = 305)	No Usual Source of Care (n = 149)	Transportation Barrier (n = 92)
Acute coronary syndrome type (%)				
ST-segment elevation myocardial infarction	16.0%	11.5%	16.1%	10.9%
Non-ST-segment elevation myocardial infarction	54.9%	58.4%	55.7%	57.6%
Unstable angina	29.2%	30.2%	28.2%	31.5%
Reperfusion Therapy (%)				
PCI	69.2%	68.9%	61.1%	69.6%
CABG	12.9%	10.5%	16.8%	13.0%
No PCI or CABG surgery	17.9%	20.7%	22.1%	17.4%
Length of hospital stay – 3 days	49.4%	50.5%	55.0%	57.6%
GRACE risk score, mean (SD) *	96.1 (26.5)	90.0 (25.4)	89.9 (25.8)	96.6 (27.0)
Health Literacy				
High	69.0%	61.6%	65.1%	50.0%
Medium	16.4%	17.4%	14.1%	30.4%
Low	14.5%	21.0%	20.8%	19.6%
Cognitive Status				
Normal	67.1%	59.3%	54.4%	43.5%
Ambiguous	29.5%	34.8%	40.3%	46.7%
Mildly or Severely Impaired	3.3%	5.9%	5.4%	9.8%
Patient Activation Level				
1: Disengaged (lowest)	8.8%	12.8%	10.1%	17.4%
2: Aware	40.7%	40.7%	41.6%	43.5%
3: Taking Action	21.2%	21.0%	20.8%	15.2%
4: Maintaining Behaviors	29.2%	25.6%	27.5%	23.9%

Abbreviations: TIA, transient ischemic attack; PCI, percutaneous coronary intervention; CABG, coronary artery bypass graft

* GRACE risk scores (2.0) incorporate data on age, cardiac biomarkers, ST segment changes, systolic blood pressure, creatinine or history of renal dysfunction, Killip class or use of diuretics, development of cardiac arrest during the index hospitalization to calculate risk for mortality in-hospital, with higher scores indicating a higher probability of death.

The presence of each of the medical history variables examined was determined on the basis of medical chart review.

Table 2:

Scores and clinically meaningful declines in generic physical health-related quality of life (HRQOL) among survivors of an acute coronary syndrome between 1 and 6 months after hospital discharge: TRACE-CORE

Barrier to Healthcare Access	Mean SF36v2 PCS Scores			Experiencing Clinically Meaningful Decline	Weighted Relative Risks Ratios (95% CI) for Clinically Meaningful Declines in Physical HRQOL	
	1 Month Post Discharge (SD)	6 Months Post Discharge (SD)	Mean Change (SD)		Adjusted Only for Each Other Healthcare Barrier	Fully Adjusted*
Financial Barrier						
Yes (n = 305)	39.2 (10.8)	40.0 (11.9)	0.8 (8.7)	31.5%	1.35 (1.08, 1.70)	1.48 (1.17, 1.86)
No (n = 748)	43.7 (9.9)	45.7 (10.9)	2.0 (8.5)	23.0%	Referent	Referent
No Usual Source of Care						
Yes (n = 149)	41.1 (10.5)	42.9 (11.8)	1.8 (8.4)	22.2%	0.85 (0.61, 1.18)	0.96 (0.70, 1.32)
No (n = 904)	42.6 (10.3)	44.2 (11.5)	1.6 (8.6)	26.0%	Referent	Referent
Transportation Barrier						
Yes (n = 92)	38.7 (10.0)	38.6 (11.5)	−0.1 (8.0)	31.5%	1.24 (0.88, 1.74)	1.08 (0.78, 1.50)
No (n = 961)	42.7 (10.3)	44.5 (11.4)	1.8 (8.6)	24.9%	Referent	Referent

Note: The SF36v2 PCS (Physical Component Summary) score is calculated so that US general population has a mean of 50 (SD=10), with higher scores indicating better generic physical health-related quality of life. A clinically meaningful decrease was defined as a decline of 3.0 points between 1 and 6 months after hospital discharge.

* Adjusted for each other barrier to healthcare as well as clinical site, age, sex, race/ethnicity, education, employment status, reperfusion therapy, GRACE risk score (incorporates data on age, cardiac biomarkers, ST segment changes, systolic blood pressure, creatinine or history of renal dysfunction, Killip class, use of diuretics, development of cardiac arrest during the index hospitalization), and 1 month SF36v2 PCS score

Table 3:

Scores and clinically meaningful declines in generic mental health-related quality of life (HRQOL) among survivors of an acute coronary syndrome between 1 and 6 months after hospital discharge: TRACE-CORE

Barrier to Healthcare Access	Mean SF36v2 MCS Scores			Experiencing Clinically Meaningful Decline	Weighted Relative Risks Ratios (95% CI) for Clinically Meaningful Declines in Mental HRQOL	
	1 Month Post Discharge (SD)	6 Months Post Discharge (SD)	Mean Change (SD)		Adjusted Only for Each Other Healthcare Barrier	Fully Adjusted*
Financial Barrier						
Yes (n = 305)	47.4 (12.5)	48.8 (12.4)	1.4 (10.6)	30.8%	1.34 (1.06, 1.69)	1.36 (1.07, 1.75)
No (n = 748)	52.3 (10.2)	54.1 (9.8)	1.8 (9.2)	22.1%	Referent	Referent
No Usual Source of Care						
Yes (n = 149)	47.6 (13.8)	49.4 (14.0)	1.8 (11.2)	28.2%	1.10 (0.82, 1.48)	1.12 (0.83, 1.51)
No (n = 904)	51.4 (10.2)	53.1 (10.5)	1.7 (9.4)	24.0%	Referent	Referent
Transportation Barrier						
Yes (n = 92)	44.3 (13.0)	44.4 (13.4)	0.1 (10.8)	32.6%	1.20 (0.84, 1.70)	1.19 (0.83, 1.71)
No (n = 961)	51.5 (10.3)	53.3 (10.8)	1.8 (9.5)	23.8%	Referent	Referent

Note: The SF36v2 MCS (Mental Component Summary) score is calculated so that the US general population has a mean of 50 (SD=10), with higher scores indicating better generic mental health-related quality of life. A clinically meaningful decrease was defined as a decline of 3.0 points between 1 and 6 months after hospital discharge.

* Adjusted for each other barrier to healthcare as well as age, sex, race, clinical site, employment status, coronary reperfusion therapy, and 1 month SF36v2 MCS score

Table 4:

Scores and clinically meaningful declines in disease-specific health-related quality of life (HRQOL) among survivors of an acute coronary syndrome between 1 and 6 months after hospital discharge: TRACE-CORE

Barrier to Healthcare Access	Mean SAQ QOL Scores			Experiencing Clinically Meaningful Decline	Weighted Relative Risks Ratios (95% CI) for Clinically Meaningful Declines in Disease-Specific HRQOL	
	1 Month Post Discharge (SD)	6 Months Post Discharge (SD)	Mean Change (SD)		Adjusted Only for Each Other Healthcare Barrier	Fully Adjusted*
Financial Barrier						
Yes (n = 305)	68.0 (25.2)	73.9 (24.0)	5.9 (20.9)	14.1%	1.01 (0.70, 1.46)	1.03 (0.71, 1.51)
No (n = 748)	79.5 (20.5)	83.7 (18.4)	4.2 (19.3)	12.2%	Referent	Referent
No Usual Source of Care						
Yes (n = 149)	69.3 (24.7)	73.0 (27.2)	3.7 (21.3)	17.5%	1.69 (1.14, 2.51)	1.46 (0.96, 2.22)
No (n = 904)	77.3 (22.0)	82.2 (19.1)	4.9 (19.5)	12.0%	Referent	Referent
Transportation Barrier						
Yes (n = 92)	64.5 (25.2)	68.3 (27.4)	3.8 (24.4)	16.3%	1.31 (0.79, 2.17)	1.14 (0.67, 1.92)
No (n = 961)	77.3 (22.0)	82.1 (19.5)	4.8 (19.3)	12.4%	Referent	Referent

Note: The Seattle Angina Questionnaire quality of life (SAQ QOL) questionnaire is scored on a scale of 0-100 with higher scores indicating better disease-specific health-related quality of life. A clinically meaningful decrease was defined as a decline of 16.0 points between 1 and 6 months after hospital discharge.

* Adjusted for each other barrier to healthcare access as well as age, sex, race, clinical site, education, living situation, reperfusion therapy, GRACE risk score (incorporates data on age, cardiac biomarkers, ST segment changes, systolic blood pressure, creatinine or history of renal dysfunction, Killip class, use of diuretics, development of cardiac arrest during the index hospitalization), and 1-month SAQ QOL score.

Table 5:

Clinically meaningful declines in health-related quality of life among survivors of an acute coronary syndrome between 1 and 6 months after hospital discharge according to the total number of barriers to healthcare access: TRACE-CORE

	No Barriers (n = 630)	1 Barrier (n = 118)	2 or More Barriers (n = 305)
SF36v2 PCS Scores			
Experiencing Clinically Meaningful Decline (%)	22.9	23.7	31.5
Weighted Relative Risks Ratios (95% CI) for Clinically Meaningful Decline			
Unadjusted	Referent	1.08 (0.75, 1.55)	1.41 (1.13, 1.77)
Adjusted [*]	Referent	1.10 (0.76, 1.60)	1.53 (1.20, 1.93)
SF36v2 MCS Scores			
Experiencing Clinically Meaningful Decline (%)	21.1	27.1	30.8
Weighted Relative Risks Ratios (95% CI) for Clinically Meaningful Decline			
Unadjusted	Referent	1.27 (0.90, 1.80)	1.47 (1.16, 1.86)
Adjusted [†]	Referent	1.30 (0.91, 1.87)	1.50 (1.17, 1.93)
SAQ QOL Scores			
Experiencing Clinically Meaningful Decline (%)	11.4	16.1	14.1
Weighted Relative Risks Ratios (95% CI) for Clinically Meaningful Decline			
Unadjusted	Referent	1.70 (1.06, 2.73)	1.27 (0.89, 1.83)
Adjusted [‡]	Referent	1.28 (0.81, 2.02)	1.14 (0.76, 1.70)

Note: For the SF36v2 PCS and MCS, a clinically meaningful decrease was defined as a decline of 3.0 points between 1 and 6 months after hospital discharge. For the Seattle Angina Questionnaire quality of life (SAQ QOL) scale, a clinically meaningful decrease was defined as a decline of 16.0 points between 1 and 6 months after hospital discharge.

^{*} Adjusted for clinical site, age, sex, race/ethnicity, education, employment status, coronary reperfusion therapy, GRACE risk score, and 1 month SF36v2 PCS score

[†] Adjusted for age, sex, race, clinical site, employment status, reperfusion therapy, 1 month SF36v2 MCS score

[‡] Adjusted for age, sex, race, clinical site, education, living situation, reperfusion therapy, GRACE risk score, and 1-month SAQ QOL score