Assessing Patient Recall of Discharge Instructions for Acute Myocardial Infarction

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Abstract: Guidelines for acute myocardial infarction (AMI) include secondary prevention (SP) strategies, but little is known about patients' recall of instructions following hospital discharge. We conducted telephone interviews to assess recall of risk-reduction information among patients discharged with AMI. Results indicated similar proportions of documented and patient recall of discharge instructions. However, lifestyle recommendations were documented and recalled less frequently than pharmacologic therapy. Many patients were unable to name their diagnosis or link known risk factors as contributing causes, which may contribute to low adherence to SP therapies. Quality improvement strategies are needed to guide more effective provider–patient communication.

Keywords
clinical quality management
myocardial infarction
risk factors
secondary prevention

Secondary prevention (SP) measures include lifestyle and pharmacologic interventions and are integral to the care of patients with coronary heart disease (CHD) (Smith et al., 2006). Detailed SP recommendations are included in multiple CHD treatment guidelines, including acute myocardial infarction (AMI) (Antman et al., 2008), percutaneous interventions (PCI) (King et al., 2008), coronary artery bypass surgery (CABG) (Eagle et al., 2004), and chronic angina (Fraker & Fihn, 2007).

Translating guidelines into clinical practice is challenging (Mehta et al., 2002; LaBresh, Ellrodt, Gliklich, Liljestrand, & Peto, 2004; Tricoci, Peterson, & Roe, 2006). Focused quality improvement (QI) strategies, such as the American Heart Association's (AHA) ''Get with the Guidelines'' program (LaBresh et al., 2004), are available to aid implementation of post-AMI treatment recommendations before hospital discharge and have improved processes of care (Mehta et al., 2002; LaBresh et al., 2004; Tricoci et al., 2006). To date, only a few QI projects have targeted the transition period between hospitalization and outpatient care (Newby et al., 2006). Therapeutic guidelines are only effective if the patient hears, understands, and follows the recommendations that are known to improve outcomes after hospital discharge. Although hospitalization for AMI presents a ''teachable moment'' for providers to teach about the diagnosis and giving SP instructions, little is known about the patients' understanding of their condition or the retention of information following hospital discharge. Our overall goal was to identify opportunities for improvement in providing SP discharge instructions for patients hospitalized with AMI. The two specific aims of this study were (1) to determine medical record documentation rates of SP instructions, and (2) to explore patients' understanding of their medical diagnosis and recall of SP discharge instructions provided during their AMI hospitalization.

Methods

Telephone surveys and hospital medical record reviews were conducted (March 2006–February 2007) among patients discharged with an AMI diagnosis from an academic medical center. Criteria similar to those of the National Registry of Myocardial Infarction (Rogers et al., 2000) were used to identify patients who were admitted to the hospital with suggestive signs and symptoms of AMI, had a discharge diagnosis code of 410.X1 (*International Classification of Diseases, Ninth Revision*), and at least one of the following clinical criteria: electrocardiographic evidence of AMI or increased level of troponin I (>1.5 ng/mL). Only patients discharged to home (vs. discharged to a nursing home or skilled nursing facilities) were considered eligible. The study was approved by the academic medical center's Institutional Review Board.

Telephone contacts were attempted among 348 eligible patients within 60 days following hospital discharge. If multiple admissions with AMI occurred per patient during the study period, only the index admission data were included. A total of 159 (46%) patients completed the telephone interview. Reasons for not completing the interview were unable to contact within 60 days postdischarge ($n=94$), disconnected phones ($n=23$), too ill or questionable cognition ($n=24$), deceased ($n=19$), other/unknown ($n=12$), and patient declined ($n=17$).

Based on literature review and clinical experience, the investigator-developed questionnaire was pilot tested for clarity and feasibility with patients with a history of CHD and cardiovascular health professionals. The questionnaire included

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Table 1. Comparison of Baseline Characteristics between Responders and Nonresponders to the Telephone Interview Following Hospital Discharge with an Acute Myocardial Infarction

	Respondents ($n = 159$)	Nonrespondents ($n = 189$)	p-value
Gender: women, n (%)	59 (37)	82 (43)	NS
Ethnicity: non-White, n (%)	36 (23)	63 (33)	NS
Discharge service			.02
Cardiology	129 (81)	150 (79)	
Cardiovascular surgery	21 (13)	14 (7)	
Other service	9 (6)	25 (13)	
Age (years), mean (SD)	61.7 (± 12.7)	61.2 (± 14.1)	NS
# Days hospitalized, mean (SD)	4.3 (± 3.9)	5.1 (6.7)	NS

(1) demographic information and perceived general health, (2) medical information recalled (reason for hospitalization, heart procedures, and risk factors), (3) discharge instructions (diet, physical activity, smoking cessation, cardiac rehabilitation [CR], and follow-up physician appointment), and (4) listing medications. Each interview took approximately 10–15 min (mean, 12 ± 5 min). All interviews were conducted by a trained interviewer. Medical record documentation provided information on diagnosis, cardiovascular procedures, risk factors, SP discharge instructions, and medications.

Microsoft Excel 2003 (Microsoft, Redmond, WA) and SPSS 11.5 (SPSS Inc., Chicago, IL) were used for data analyses. Frequency of categorical responses was described as proportions; continuous variables were presented as means and standard deviations. Most questions were structured to obtain a definitive answer (e.g., Do you recall the name of your heart condition from your most recent hospital stay?) and categorized as "no," "yes," or "don't know or unsure." If the response was "yes," respondents were asked to recall the information for that specific question. If the patient responded either "heart attack" or "myocardial infarction" for the name of their condition, a correct response was recorded and alternate responses were also listed. Responses of "no" and "don't know or unsure" were classified as a single category. Multivariable logistic regression analyses determined whether age, gender, race/ethnicity, or having a cardiovascular interventional procedure were independently associated with patients' recall of their diagnosis. Separate multivariable logistic regression models for each CHD risk factor were used to determine if age, gender, or race/ethnicity were associated with individuals' naming each of these risk factors as a contributing cause for their heart condition.

Results

Table 1 compares baseline demographic characteristics between responders and nonresponders. More nonrespondents were discharged from noncardiology services. The mean time from hospital discharge to telephone interview among responders was 40.5 (±11.5) days. Table 2 describes the frequency of responses when asked, "Do you recall the name of your heart condition from your most recent hospital stay?" Less than half (41%) independently recalled heart attack or AMI and 19% were unable to provide a specific

Table 2. Frequency of Patient Recall of Name of Heart Condition During Hospitalization

Do you recall the name of your heart condition from your most recent hospital stay?	n (% yes)
Heart attack or myocardial infarction	65 (41)
Blocked artery	42 (26)
Heart disease, other	12 (8)
Heart failure	8 (5)
Chest pain	2 (1)
Unsure/no recall	30 (19)

The specific interview question was "Do you recall the name of your heart condition from your most recent hospital stay?"

The spontaneous, nonprompted responses were tabulated in frequency counts. The number of respondents is $n = 159$.

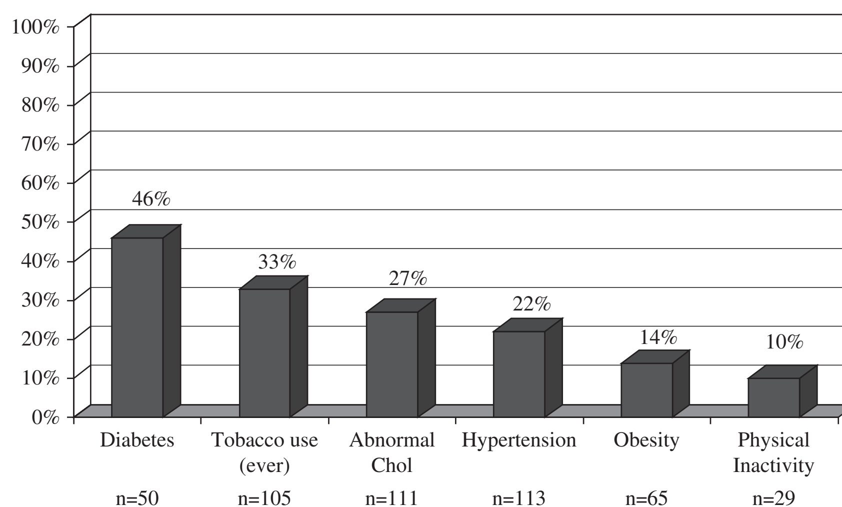
name for their heart event. However, when a separate question was asked, ''Did you have any heart procedures during this hospital stay?'' 140 (88%) responded yes. When asked to name the procedure, the information recalled was congruent with medical record documentation for both CABG (100%) and PCI (99%).

Two separate questions were asked about CHD risk factors (Figure 1). When asked, ''Do you know of your risk factors or conditions that may contribute to your heart problem,'' few patients were able to independently identify personal risk factors that may have contributed to their heart condition. Among those who did not name a specific risk factor, we asked ''has anyone (e.g., a health professional) ever told you that you have . . .?'' for each of the major risk factors. A larger proportion (compared with the responders from the first, unprompted question) responded positively. The prevalence of each risk factor varied. Thus the denominator of the proportion differed between risk factors, preventing us from formally assessing whether risk factors were recalled differentially. Only seven patients reported having all major risk factors. Among them, diabetes was most likely and physical activity least likely to be reported without prompting, but power was too low to demonstrate the difference statistically.

In multivariable logistic regression models (Table 3), gender was the only variable significantly associated with independent recall of AMI or ''heart attack.'' Women were more likely than men (49% vs 36%) to correctly name the diagnosis. Compared with younger individuals, older patients were less likely to name smoking as a contributing risk factor. Although not statistically significant, we observed a similar trend of older age being associated with lower likelihood of recognizing other conditions as risk factors for the heart event.

Table 4 shows the concordance between medical record documentation and patients' recall of SP instructions and compares overall documentation and patient recall. Congruency between documentation and patient recall ranged from 53% to 90%. Figure 2 illustrates patient responses to questions regarding CR participation. Only 40% were currently enrolled or intending to enroll in CR. Varied reasons were given for not enrolling in CR, such as uninterested, unaware of CR, logistical barriers, and medical concerns.

Figure 1. The Proportion of Patients Identifying a Risk Factor as a Contributing Cause to their Heart Condition



The specific interview questions concerning risk factors were (1) ''Do you know of your risk factors or conditions that may contribute to your heart problem?'' (no prompt for risk factors was given by interviewer for risk factors). (2) ''Has anyone ever told you that you have . . .?''(each risk factor not previously mentioned by the patient in response to the first question was named by the interviewer).
The proportions indicate the number of patients who identified a risk factor independently (question #1) divided by the sum of patients responding positively for questions #1 and #2 and displayed as the ''*n*'' for each risk factor

Table 3. Adjusted Odds Ratios and 95% Confidence Intervals for the Factors Associated with the Recall of Myocardial Infarction as Diagnosis and Naming of Risk Factor as a Contributing Cause to the Heart Event

		Naming Risk Factor as a Contributing Cause to Heart Event					
	Recall of MI ($n = 159$)	Hypertension ($n = 113$)	Diabetes ($n = 50$)	Abnormal Cholesterol ($n = 111$)	Obesity ($n = 65$)	Physical Inactivity ($n = 29$)	Smoking ($n = 105$)
Age (per 1 year)	0.98 (0.96–1.01)	0.98 (0.95–1.02)	0.96 (0.91–1.01)	0.97 (0.93–1.00)	0.94 (0.86–1.01)	0.90 (0.78–1.04)	0.96* (0.93–1.00)
Female gender (vs. male)	2.06* (1.03–4.09)	1.15 (0.46–2.89)	1.14 (0.34–3.74)	1.14 (0.47–2.76)	0.84 (0.19–3.83)	0.36 (0.02–8.35)	0.65 (0.25–1.65)
White race (vs. non-White)	2.12 (0.90–5.04)	0.71 (0.26–1.99)	1.42 (0.35–5.80)	0.46 (0.26–1.86)	1.12 (0.22–5.80)	0.22 (0.01–4.81)	2.08 (0.75–5.78)
Documented revascularization	1.53 (0.71–3.30)						

*Statistically significant with p-value $< .05$.

The specific interview questions concerning risk factors were:

(1) "Do you know of your risk factors or conditions that may contribute to your heart problem?" (no prompt for risk factors was given by interviewer for risk factors).

(2) "Has anyone ever told you that you have . . .?"(each risk factor was named by interviewer).

MI, myocardial infarction.

Table 4. Proportions of Congruency between Medical Record (MR) Documentation and Patient Recall of Receiving Instructions and Comparing the Proportional Differences between Overall MR Documentation and Patient Recall of the Instructions

Discharge Instructions	Congruent	Noncongruent	MR Documentation	Patient Recall	*p*-value
Diet ($n = 156$)	93 (60)	63 (40)	119 (76)	98 (63)	$<.05$
Physical activity ($n = 156$)	94 (60)	62 (40)	106 (68)	104 (67)	NS
Smoking cessation ($n = 62$)[a]	33 (53)	29 (47)	39 (62)	36 (57)	NS
Cardiac rehabilitation ($n = 158$)	109 (69)	49 (31)	67 (42)	86 (54)	$<.05$
Clinic appointment ($n = 157$)	141 (90)	16 (10)	149 (95)	148 (94)	NS

Some MR documentation on discharge variables were missing due to no discharge summary available or pt signing out AMA and not able to verify information from other documentation sources during hospital stay. Only data with both recall and medical record documentation were included in this table.

[a]Although nonsmokers may have received information, they were not included in these analyses. Only current and recent (quit <1 year) self-reported smokers were included where smoking cessation counselling was deemed appropriate.

No significant differences were observed between medical record documentation of SP discharge medications and patients reporting these medications at the time of the interview (Table 5). When asked, ''Did you fill all of your new prescriptions?'' 147 (95%) responded yes. Among the eight who did not fill their prescriptions, seven cited financial reasons, and one respondent did not think he needed the medications. The majority (98%) reported that they took the medications as prescribed.

Discussion

SP therapies are integral to healthcare quality among patients with AMI (Antman et al., 2008; Smith et al., 2006). However, little is known about how much patients understand about their condition or the information they recall after being discharged home after an AMI. We found that many patients were unable to accurately name their diagnosis or associate their risk factors as a contributing cause, even if they acknowledged having a particular risk factor.

Figure 2. Cardiac Rehabilitation (CR) Enrollment Rate and Reasons Given for Those Not Enrolling in CR

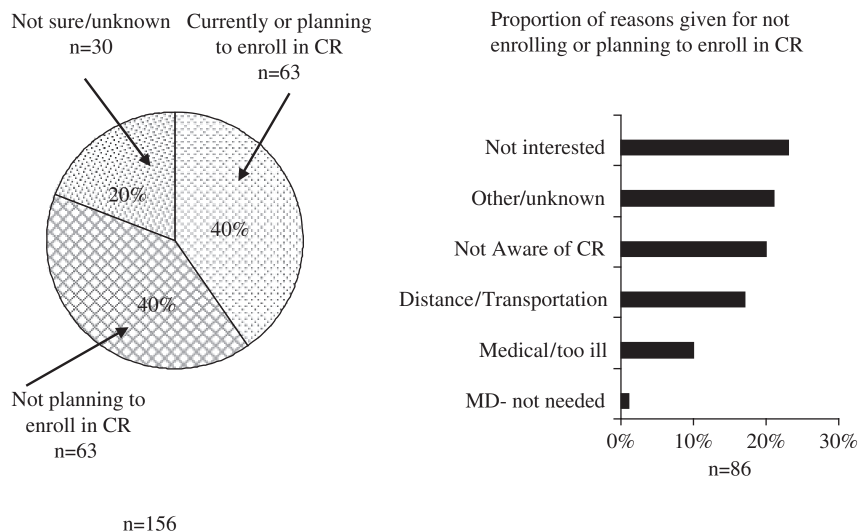


Table 5. Proportions of Congruency/Noncongruency between Medical Record (MR) Documentation of Discharge Medications and Patients' Reporting the Medications during the Interview and Comparing the Proportional Differences between Overall MR Documentation and Patient Reporting the Medication

Secondary Prevention Medication	Congruent	Non-Congruent	MR Documentation	Patient Reported	*p*-Value
Aspirin ($n = 146$)	124 (85)	22 (15)	134 (92)	122 (84)	NS
β-blocker ($n = 143$)	129 (90)	14 (10)	123 (86)	117 (82)	NS
ACE-I or ARB ($n = 144$)	115 (80)	29 (20)	105 (73)	92 (64)	NS
Statin ($n = 145$)	121 (83)	24 (17)	118 (81)	112 (77)	NS
Other lipid lowering medicines ($n = 144$)	137 (95)	7 (5)	17 (12)	14 (10)	NS
Clopidogrel ($n = 144$)	129 (90)	15 (10)	119 (79)	110 (73)	NS

Some MR documentation on discharge variables were missing due to no discharge summary available or pt signing out AMA and not able to verify information from other documentation sources during hospital stay. Only data with both recall and medical record documentation were included in this table.

ACE-I, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker.

We also found that documentation rates of important SP discharge instructions were suboptimal, but patient recall of SP advice was even lower than what was documented for many of the lifestyle recommendations.

Because AMI is a serious cardiac event, we were surprised to find that less than half of respondents were able to correctly name their diagnosis. Although some patients described their heart condition in general terms like ''blocked artery'' or ''heart disease,'' a substantial proportion was unable to recall any specific term to describe the reason for their hospitalization. This raises concern that patients may underestimate the seriousness of the cardiac event (i.e., do not understand that heart damage occurred) and may underestimate their risk for future events. Another study (Makaryus & Friedman, 2005) that examined patients' understanding of treatment plans and diagnosis at discharge also reported that less than half were able to name their diagnoses. Although not limited to a cardiac population, this study underscored the problem of patients' low awareness about their condition that may interfere with their ability to comply fully with discharge treatment plans. Similarly, Flacker, Park, & Sims (2007) reported that many older patients recall their hospitalization in general terms (problems related to heart, kidney, etc.), but 10% were unable to explain why they had been hospitalized.

Women in our study were more likely than men to independently recall their AMI diagnosis. Similar gender differences were found in a large, multicenter study (Dracup et al., 2008) that assessed CHD patients' level of knowledge about heart disease and perceived risk factors for a future AMI. Higher knowledge scores were significantly related to female sex, younger age, higher education, and CR participation (Dracup et al., 2008). Women were also more likely than men to perceive their future AMI risk as moderate to high. Awareness of heart disease as the leading cause of death among women has nearly doubled in the last decade according to a nationally representative survey of women (Mosca et al., 2006), at least in part due to national campaigns such as the AHA's ''Go Red'' and the National Heart, Lung, and Blood Institute's ''Heart Truth'' programs. However, a less optimistic report about patients with established CHD cited that women still received less aggressive SP therapies than men (Cho, Hoogwerf, Huang, Brennan, & Hazen, 2008).

Not surprisingly, we found that AMI patients, who also had invasive interventions (CABG or PCI), readily recalled these procedures. The emergency atmosphere that surrounds a patient undergoing an invasive procedure will most likely leave a more lasting impression of the importance of this treatment than any explanation of the underlying problem and patients with interventional procedures have tangible reminders of their hospital experiences like an obvious surgical scar and or detailed photographs or graphical illustrations of how the invasive intervention ''fixed'' the immediate problem. However, recent data

suggest that patients may feel less vulnerable to future AMI after surgical revascularization (Dracup et al., 2008). More effective communication methods are clearly needed to help patients with AMI understand that heart damage has occurred, that they continue to be at risk, and that risk factor management is essential in their treatment plan and not merely ancillary or superfluous to the invasive treatment strategies applied in the acute setting.

One of the most striking findings in our study is that patients may be aware of their risk factors, but do not appear to link these conditions with their cardiac event. This apparent disconnect may help explain poor adherence to lifestyle recommendations and pharmacologic therapy after a cardiac event and deserves further exploration. While the gap between acknowledging a condition and attributing risk to this condition was noted for all risk factors, the gap was especially evident with the lifestyle risk factors of physical inactivity and obesity. The link between obesity and physical inactivity to adverse health outcomes is often underestimated by clinicians and patients alike and may contribute to underutilization and poor adherence to important lifestyle interventions.

A comprehensive review (Scott & Thompson, 2003) assessed the information needs of post AMI patients and suggested that top patient priorities included information on risk factors and practical information pertinent to survival. However, our findings indicate that communication efforts need to go beyond risk factor education. Patients may be more motivated to adhere to SP therapies if they better understand that controlling their risk factors is not merely designed to improve these risk factors, but that risk-reduction therapies are treating their underlying heart condition.

We were interested in exploring two aspects of healthcare quality that may affect patient outcomes: (1) documentation of SP performance measures, and (2) patients' ability to recall SP information. Documenting process/performance measures known to improve patient outcomes is becoming increasingly important as a tool to assess healthcare quality (Centers for Medicare and Medicaid Services, 2008; Glickman et al., 2007; Jah et al., 2005; Spertus, Eagle, Krumholz, Mitchell, & Normand, 2005). Despite widely disseminated CHD risk-reduction treatment guidelines (Smith et al., 2006), a treatment gap exists in actual clinical practice for delivering proven SP therapies (LaBresh et al., 2004). For discharge SP medications, our documentation rates were higher than those from a large, multicenter observational study completed in 2003 (Peterson et al., 2006): ASA (both 92%), β-blocker (86%, vs. 84%), ACE or ARB (73%, ACE only, 61%), statin (81% vs. 76%), clopidogrel (79% vs. 54%), possibly reflecting a secular trend of increasing acceptance of the benefits of these therapies, but this was not formally evaluated in this study. In our study, documentation of SP medications and patients' naming of these medications were almost identical. In contrast, investigators from Canada reported that only 77% of AMI patients filled their discharge prescriptions within 1 week and 82% within 120 days (Jackevicius, Ping, & Tu, 2008) and others have reported that only 66% of patients continued their use of aspirin, β-blockers, and statins within 1 month, while the remaining patients discontinued one and often all of these medications (Ho et al., 2006). Since our study was conducted within 60 days following hospital discharge, our findings may represent early compliance to getting prescriptions filled.

Our findings for documentation of lifestyle counseling were similar to a multicenter study (Peterson et al., 2006) for diet counseling (76% vs. 72%), smoking cessation counseling (68% vs. 66%), and CR (both 42%). A study from Europe (Rushford et al., 2007) assessed women with cardiac disease two months following hospitalization: recall of dietary information was similar to our findings (over 60%), but recall of smoking (76% vs. 62%) and physical activity (76% vs. 68%) information was greater. Since length of hospital stay was not reported, it is unknown whether there was a longer period of time for the provision of patient education that may have favorably affected recall.

CR/SP (Balady et al., 2007) is an integral component of care for patients with CHD and an American College of Cardiology/American Heart Association Class I recommendation (useful and effective) for patients with AMI (Antman et al., 2008). We observed a CR referral rate of 42%, comparable to a large multicenter study of patients with acute coronary syndromes (Peterson et al., 2006). Performance measures for CR (Thomas et al., 2007) are now available to help hospital settings, office practices, and CR programs more rapidly translate the clinical evidence into practice. However, CR referral is only the first step

toward improving patient outcomes, since the benefits are only achieved if patients enroll, actively participate, and ultimately adhere to the prescribed therapies. A recent study (Mazzini, Stevens, Whalen, Ozonoff, & Balady, 2008) that evaluated the effect of an evidence-based clinical pathway on referral and enrollment into CR after AMI reported a 55% referral rate, but only 19% of the patients on the clinical pathway actually enrolled in CR. It is obvious that more effective QI strategies are needed to facilitate patient enrollment following a physician referral.

Limitations

There are important limitations to this study. It is descriptive in design, was conducted at a single site, and included only patients who could be reached by phone following their AMI discharge. Although there were only minimal differences in baseline characteristics between responders and nonresponders, results may not be representative of all AMI patients. Second, patients may respond to an interviewer with expected favorable answers, such as taking prescribed medications. Finally, there are multiple other factors (literacy level, cognitive status, education, socioeconomic status, etc.) that were not assessed in this study, but may affect patients' ability to accurately recall instructions. Despite these limitations, we believe this observational study has provided some new and important information that has QI implications and will help guide future research on provider–patient communication related to SP.

Implications for Quality Management and Research

Effective provider–patient communication is critical for patients to adopt and maintain CHD risk-reduction recommendations. Documenting SP discharge instructions is necessary, yet insufficient if patients have a poor understanding about their underlying heart condition and what they can do to reduce their risk of future events by following SP treatment recommendations. QI strategies are needed to improve discharge teaching for patients with AMI. However, the complexity of acute-care settings, such as short hospital stays and competing priorities among health professionals, are real and further complicated by patient factors, such as anxiety, poor health literacy, or other distractions. These all may prevent patients from absorbing important information during hospitalization. While more research is needed to determine what type and delivery mode of teaching (e.g., face-to-face, reading materials, audio/video) is most effective in the inpatient setting, we believe that the biggest treatment gap occurs at the point of transitioning the care of patients with CHD from inpatient to outpatient settings. We need to improve utilization of existing resources such as CR/SP programs and develop and test new transitioning approaches that go beyond these structured settings.

References

Antman, E. M., Hand, M., Armstrong, P. W., Bates, E. R., Green, L. A., Halasyamani, L. K., et al. (2008). 2007 focused update of the ACC/AHA 2004 guidelines for the management of patients with ST-elevation myocardial infarction. *Circulation, 117*, 296–329.

Balady, G. J., Williams, M. A., Ades, P. A., Bittner, V., Comoss, P., Foody, J. M., et al. (2007). Core components of cardiac rehabilitation/secondary prevention programs: 2007 update. A scientific statement from the American Heart Association Exercise, Cardiac Rehabilitation, and Prevention Committee; the Council on Clinical Cardiology; the Councils on Cardiovascular Nursing, Epidemiology and Prevention, and Nutrition, Physical Activity, and Metabolism; and the American Association of Cardiovascular and Pulmonary Rehabilitation. *Circulation, 115*, 2675–2682.

Centers for Medicare and Medicaid Services. *Medicare quality monitoring system.* Retrieved May 14, 2008, from www.cms.gov/qualityinitiatives

Cho, L., Hoogwerf, B., Huang, J., Brennan, D. M., & Hazen, S. L. (2008). Gender differences in utilization cardiovascular secondary prevention: A Cleveland Clinic prevention database study. *Journal of Womens Health, 17*, 515–521.

Dracup, K., McKinley, S., Doering, L. V., Riegel, B., Meischke, H., Moser, D. K., et al. (2008). Acute coronary syndrome: What do patients know? *Archives of Internal Medicine, 168*, 1049–1054.

Eagle, K. A., Guyton, R. A., Davidoff, R., Edwards, F. H., Ewy, G. A., Gardner, T. J., et al. (2004). ACC/AHA 2004 guideline for coronary artery bypass graft surgery: Summary article: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee to Update the 1999 Guidelines for Coronary Artery Bypass Graft Surgery). *Circulation, 110*, 1168–1176.

Flacker, J., Park, W., & Sims, A. (2007). Hospital discharge information and older patients: Do they get what they need? *Journal of Hospital Medicine, 2*, 291–296.

Fraker, T. D., & Fihn, S. D. (2007). Chronic angina focused update of the ACC/AHA 2002 guidelines for the management of patients with chronic stable angina. *Circulation, 116*, 2762–2772.

Glickman, S. W., Fang-Shu, O., DeLong, E. R., Roe, M. T., Lytle, B. L., Mulgund, J., et al. (2007). Pay for performance, quality of care, and outcomes in acute myocardial infarction. *Journal of American Medical Association, 297*, 2373–2380.

Ho, P. M., Spertus, J. A., Masoudi, F. A., Reid, K. J., Peterson, E. D., Magid, D. J., et al. (2006). Impact of medication therapy discontinuation on mortality after myocardial infarction. *Archives of Internal Medicine, 166*, 1842–1847.

Jackevicius, C. A., Li, P., & Tu, J. V. (2008). Prevalence, predictors, and outcomes of primary nonadherence after acute myocardial infarction. *Circulation, 117*, 1028–1036.

Jah, A. K., Li, Z., Orav, E. J., Epstein, A. M. (2005). Care in U.S. hospitals—the Hospital Quality Alliance program. *New England Journal of Medicine, 353*, 265–274.

King, S. B., Smith, S. C., Hirshfeld, J. W., Jacobs, A. K., Morrison, D. A., & Williams, D. O. (2008). 2007 focused update of the ACC/AHA/SCAI 2005 guideline update for percutaneous intervention. *Circulation, 117*, 261–295.

LaBresh, K. A., Ellrodt, G., Gliklich, R., Liljestrand, J., & Peto, R. (2004). Get with the guidelines for cardiovascular secondary prevention. *Archives of Internal Medicine, 164*, 203–209.

Makaryus, A. N., & Friedman, E. A. (2005). Patients' understanding of their treatment plans and diagnosis at discharge. *Mayo Clinical Proceedings, 80*, 991–994.

Mazzini, M. J., Stevens, G. R., Whalen, D., Ozonoff, A., & Balady, G. J. (2008). Effect of an American Heart Association Get with the Guidelines program-based clinical pathway on referral and enrollment into cardiac rehabilitation after acute myocardial infarction. *American Journal of Cardiology, 101*, 1084–1087.

Mehta, R. H., Montoye, C. K., Gallogly, M., Baker, P., Blount, A. for the GAP Steering Committee of the American College of Cardiology. (2002). Improving quality of care for acute myocardial infarction: The Guidelines Applied in Practice (GAP) initiative. *Journal of American Medical Association, 287*, 1269–1276.

Mosca, L., Mochari, H., Christian, A., Berra, K., Taubert, K., Mills, T., et al. (2006). National study of women's awareness, preventive action, and barriers to cardiovascular health. *Circulation, 113*, 525–534.

Newby, L. K., Allen LaPointe, N. M., Chen, A. Y., Kramer, J. M., Hammill, B. G., Delong, E. R., et al. (2006). Long-term adherence to evidence-based secondary prevention therapies in coronary artery disease. *Circulation, 113*, 203–212.

Peterson, E. D., Roe, M. T., Mulgund, J., Delong, E. R., Lytle, B. L., Brindis, R. G., et al. (2006). Association between hospital process performance and outcomes among patients with acute coronary syndromes. *Journal of American Medical Association, 295*, 1912–1920.

Rogers, W. J., Canto, J. F., Lambrew, C. T., Tiefenbrunn, A. J., Kinkaid, B., Shoultz, D. A., et al. (2000). Temporal trends in the treatment of over 1.5 million patients with myocardial infarction in the US from 1990 through 1999: The National Registry of Myocardial Infarction 1, 2, 3. *Journal of American College of Cardiology, 36*, 2056–2063.

Rushford, N., Murphy, B. M., Worcester, M. U., Goble, A. J., Higgins, R. O., LeGrande, M. R., et al. (2007). Recall of information received in hospital by female cardiac patients. *European Journal of Cardiovascular Prevention and Rehabilitation, 14*, 463–469.

Scott, J. T., & Thompson, D. R. (2003). Assessing information needs of post-myocardial infarction patients: A systematic review. *Patient Education and Counseling, 50*, 163–167.

Smith, J. C. Jr., Allen, J., Blair, S. N., Bonow, R. O., Brass, L. M., Fonarow, G. C., et al. (2006). AHA/ACC guidelines for secondary prevention for patients with coronary and other atherosclerotic disease: 2006 update. *Circulation, 113*, 2363–2372.

Spertus, J. A., Eagle, K. A., Krumholz, H. M., Mitchell, K. R., Normand, S. T., for the American College of Cardiology and American Heart Association Task Force on Performance Measures. (2005). American College of Cardiology and American Heart Association methodology for the selection and creation of performance measures for quantifying the quality of cardiovascular care. *Circulation, 111*, 1703–1712.

Thomas, R. K., King, M., Lui, K., Oldridge, N., Pina, I., & Spertus, J. (2007). AACVPR/ACC/AHA 2007 performance measures on cardiac rehabilitation for referral to and delivery of cardiac rehabilitation services. *Journal of American College of Cardiology, 50*, 1400–1433.

Tricoci, P., Peterson, E. D., & Roe, M. T. (2006). Patterns of guideline adherence and care delivery for patients with unstable angina and non-ST-segment elevation myocardial infarction (from the CRUSADE quality improvement initiative). *American Journal of Cardiology, 98*(Suppl.), 30Q–35Q.

Authors' Biographies

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Core CPHQ Examination Content Area

II. Information Management

Objectives

By participating in this independent study offering, the reader will be able to

1. Define major risk factors that contribute to the development and progression of cardiovascular disease and key secondary prevention measures important for risk factor management.
2. Describe important findings in this article related to patient recall following hospitalization with an acute myocardial infarction in each of the following areas: diagnosis, risk factors, and discharge instructions.
3. Discuss quality improvement and research implications related to discharge instruction for patients with acute myocardial infarction.

Questions

1. Major risk factors for cardiovascular disease include all of these:
   a. Diabetes, hypertension, dyslipipidemia, obesity, smoking, and stress.
   b. Diabetes, hypertension, dyslipipidemia, hyperthyroidism, obesity, and smoking.
   c. Diabetes, hypertension, dyslipidemia, obesity, smoking, and physical inactivity.
   d. Diabetes, hypertension, dyslipipidemia, obesity, and smoking.

2. Risk factor management for patients with cardiovascular disease include the following secondary prevention therapies:
   a. Coronary artery bypass surgery and percutaneous interventions.
   b. Lifestyle and pharmacological interventions.
   c. Lifestyle interventions only.
   d. Pharmacological interventions only.

3. During the telephone interview following hospital discharge, the proportion of patients who spontaneously named ''heart attack'' or ''myocardial infarction'' as the reason for their hospitalization was:
   a. 41%
   b. 26%
   c. 88%
   d. 73%

4. The only significant factor that was associated with patients correctly naming ''heart attack'' or ''myocardial infarction'' as the reason for their hospitalization was:
   a. Men were more likely than women to correctly name the diagnosis.
   b. No significant factor was associated with correctly naming the diagnosis.
   c. Younger patients were more likely than older patients to correctly name the diagnosis
   d. Women were more likely than men to correctly name the diagnosis.

5. Which of the following statements about patients recall of risk factors was reported?
   a. Most patients were able to accurately name their risk factors.
   b. Hypertension was the risk factor most freqeuntly named.
   c. Obesity was the risk factor least frequently named.
   d. Few patients connected their risk factors as contributing causes to their heart disease.

6. Significant differences were found between medical record documentation and patient recall of receiving discharge instructions for:
   a. Smoking cessation and physical activity.
   b. Diet and cardiac rehabililtation.
   c. Diet and physical activity.
   d. Cardiac rehabilitation and physical activity.

7. Significant differences were found between medical record documentation and patients reporting secondary prevention medications during the telephone interview for:
   a. No differences were found between medical record documentation and patients reporting the medications.
   b. Beta blockers.
   c. Statins.
   d. Aspirin.

8. Cardiac rehabilitation referral is a performance measure for patients with acute myocardial infarction. What was the cardiac rehabilitation referral rate in this study?
   a. 60%
   b. 55%
   c. 42%
   d. 35%

9. The reason most frequently given by patients for not enrolling or planning to enroll in cardiac rehabilitation was:
   a. Transportation issues.
   b. Not interested
   c. Not aware of cardiac rehabilitation
   d. Medical reasons

10. The findings in this study suggest priority research and quality improvement initiative are needed to address:
    a. Provider-patient communication at the point of transitional care from inpatient to outpatient settings.
    b. Poor medication adherence among patients with acute myocardial infarction.
    c. Gender differences in patient recall of secondary prevention discharge instructions.
    d. Social support for patients discharged with acute myocardial infarction.