Published in final edited form as:

J Am Med Dir Assoc. 2009 January ; 10(1): 1–3. doi:10.1016/j.jamda.2008.08.019.

Cardiovascular Disease Care in the Nursing Home: The Need for Better Evidence for Outcomes of Care and Better Quality for Processes of Care

Ali Ahmed, MD, MPH and O. James Ekundayo, MBChB, DrPH

Division of Gerontology, Geriatrics and Palliative Care, University of Alabama at Birmingham, and Veterans Affairs Medical Center, Birmingham, Alabama

Poor quality of care is not equal opportunity and disproportionately affects vulnerable segments of the population.¹⁻³ As one of the most vulnerable patient populations, nursing home residents often receive poor quality care.⁴⁻⁹ Nursing home quality of care has traditionally focused on nursing-intensive cares such as physical activities, restraints, falls, pressure ulcers, weight loss, and vaccination. The Center for Medicare and Medicaid Services (CMS) has developed indicators to measure quality of these cares in the nursing home. However, there is currently no such indicator to measure quality of chronic disease care in the nursing home.

Chronic cardiovascular disease is common among nursing home residents.¹⁰ Nursing home residents with chronic cardiovascular disease are frequently referred to emergency rooms during episodes of acute exacerbation and many are eventually hospitalized. However, a large number of these patients often do not receive proper care during hospital stay and discharge. This is puzzling as these frail elderly nursing home residents often endure the delays and deliriums of emergency departments and hospital rooms and yet may not receive the necessary standard of care!

In one study of hospitalized acute heart failure patients, 9% of patients were nursing home residents.⁵ In that study, only about 40% of nursing home residents with heart failure had their left ventricular function evaluated, and among those with systolic heart failure who were eligible for angiotensin-converting enzyme inhibitors, only 50% were prescribed those drugs. These rates were significantly lower than the rates for those admitted from the community. Evaluation of left ventricular ejection fraction and use of angiotensin-converting enzyme inhibitors are CMS quality indicators for heart failure.⁵ Nursing home residents with heart failure were being hospitalized during acute exacerbation, yet they were not prescribed recommended evidence-based therapy that could potentially reduce mortality and rehospitalization.

For patients hospitalized with acute myocardial infarction, use of aspirin and beta-blockers are considered quality indicators by the CMS. However, findings from a national study of Medicare fee-for-service beneficiaries during 1997-1999 indicated that only 72% of eligible patients were receiving prescription for beta-blockers during hospital discharge.¹¹ Data from the National Cooperative Cardiovascular Project based on 115,015 patients 65 years and older

Correspondence: 1530 3rd Ave South, CH19-219, Birmingham, Alabama 35294-2041, U.S.A. Tel.: (205) 934-9632; Fax. (205) 975-7099; Email address: aahmed@uab.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

hospitalized with a confirmed acute myocardial infarction during 1994-1995 indicated that only 50% of the 45,308 eligible patients were prescribed a beta-blocker before hospital discharge.¹² In this latter study, the use of beta-blockers was associated with a significant 14% decrease in 1-year mortality (unadjusted risk ratio, 0.59; 95% confidence interval, 0.56 – 0.63; $P < 0.0001$). The association between beta-blocker use and 1-year mortality remained significant (adjusted risk ratio, 0.86; 95% confidence interval, 0.80 – 0.91; $P < 0.0001$) after adjustment for demographic, clinical presentation, hospital course, and discharge medication variables.¹² The higher rates (72%) reported by Jencks et al. (based on 1997-1999 data) than those (50%) reported by Krumholz et al. (based on 1994-1995 data) may be a reflection of temporal improvement in quality of care of acute myocardial infarction and variations in study methodologies.¹¹

Levy et al analyzed the National Cooperative Cardiovascular Project datasets and reported their findings on the quality and outcomes of care of nursing home residents with acute myocardial infarction in the current issue of the journal.¹³ Unlike the parent study by Krumholz et al. which was based on 115,015 patients, the current study is based on 127,163 patients, which may be due to variations in the inclusion / exclusion criteria used in these two studies. The authors report that 61% of all eligible patients with acute myocardial infarction received “early” beta-blockers during hospital stay but only 44% of the nursing home residents received these drugs during the same period. The overall 61% rate of early beta-blocker use reported in this study is higher than the rate of 50% discharge use of beta-blockers reported by Krumholz et al in the same cohort.¹² This is unlikely due to variations in the timing of beta-blocker use (early use by Levy et al and discharge use by Krumholz et al) between the two studies. The rate of beta-blocker use within 24 hours of hospital admission has been reported to be lower than that during hospital discharge.^{11, 14} Levy et al. also reported a similar underuse of aspirin in nursing home residents with acute myocardial infarction. It is unknown to what extent the underuse of these essential life-saving drugs may have been caused by biases associated with imbalances in baseline characteristics. Findings from the Table 1 of the current report demonstrate that compared to patients admitted from the community, those admitted from a nursing home were more likely to be older and have higher disease and comorbidity burden.¹³

Levy et al. also reported that the “early” use of beta-blockers in hospitalized nursing home residents with acute myocardial infarction was associated with significant reduction in unadjusted 30-day and 1-year mortalities.¹³ Unadjusted 1-year mortality occurred in 38% and 55% of nursing home residents respectively receiving and not receiving beta-blockers ($P < 0.0001$). Similar association between aspirin use and mortality was also observed. Even though the authors did not present data on baseline characteristics for nursing home residents receiving and not receiving beta-blockers or aspirin, it is likely that nursing home residents who were prescribed these drugs were younger with fewer comorbidities and lesser disease burden. It is unknown to what extent these imbalances in baseline characteristics may explain the lower mortality associated with the use of these drugs. Data from the parent Cooperative Cardiovascular Project indicate that the mortality reduction associated with the use of these two drugs remained significant after multivariable risk adjustment.^{12, 15}

The authors could have saved the readers from making these assumptions and extrapolations by performing multivariable regression-based risk adjustments as done in the parent studies.^{12, 15} They also could have given the readers a preview of the balance or lack thereof in baseline characteristics of nursing home residents receiving and not receiving aspirin and beta-blockers. The presentation of the baseline characteristics data was made complicated by the authors' study of more than one drug or therapy in their study. This could have been simplified by presenting baseline data separately by aspirin and beta-blocker use, or by analyzing them separately as done in the parent studies.^{12, 15}

Recently, propensity score matching has emerged as powerful tool with which to design non-randomized studies.¹⁶⁻¹⁸ Unlike traditional regression-based multivariable risk adjustment, propensity-matched studies can be designed while remaining blinded to study outcomes thus mimicking one key feature of randomized clinical trials (Figure 1).¹⁷ In addition, covariate imbalances before and after study design can be objectively measured and presented using visually pleasant graphics.¹⁸⁻²¹ Because many of the clinical questions involving nursing home residents may not be answered from evidence derived from randomized clinical trials, it is essential to use stringent study designs such as propensity matching to derive the best evidence for nursing home residents that non-randomized studies can provide. When randomized clinical trials are not logistically feasible and/or ethically unjustifiable, non-randomized studies using rigorous methodology may provide evidence for clinical practice.²²

While investigators improve their design for non-randomized studies of outcomes of care involving nursing home residents, it is important that clinicians continue their efforts to improve processes of care for hospitalized nursing home residents. If we make a frail elderly nursing home resident to go through the near-traumatic and at times life-changing experience of hospitalization, then we are also obligated to provide them the standard of care that is received by other hospitalized patients. Individual exceptions are expected and should be well documented in charts. We should treat our nursing home residents in the same manner we would like ourselves, our parents and our grandparents to be treated. We need to keep in mind that our practice will set the precedence for future generations of clinicians who will treat us should we live long enough...!

Acknowledgements

Dr. Ahmed is supported by the National Institutes of Health through grants from the National Heart, Lung, and Blood Institute (5-R01-HL085561-02 and P50-HL077100), and a generous gift from Ms. Jean B. Morris of Birmingham, Alabama.

References

1. Ahmed A, Allman RM, DeLong JF, Bodner EV, Howard G. Age-related underutilization of angiotensin-converting enzyme inhibitors in older hospitalized heart failure patients. *South Med J* 2002;(95):703–710. [PubMed: 12144075]
2. Bierman AS. Sex matters: gender disparities in quality and outcomes of care. *CMAJ* 2007;(177):1520–1521. [PubMed: 18003953]
3. Schneider EC, Zaslavsky AM, Epstein AM. Racial disparities in the quality of care for enrollees in medicare managed care. *JAMA* 2002;(287):1288–1294. [PubMed: 11886320]
4. Aronow WS. Underutilization of aspirin in older patients with prior myocardial infarction at the time of admission to a nursing home. *J Am Geriatr Soc* 1998;(46):615–616. [PubMed: 9588376]
5. Ahmed A, Weaver MT, Allman RM, DeLong JF, Aronow WS. Quality of care of nursing home residents hospitalized with heart failure. *J Am Geriatr Soc* 2002;(50):1831–1836. [PubMed: 12410902]
6. Ghosh S, Ziesmer V, Aronow WS. Underutilization of aspirin, beta blockers, angiotensin-converting enzyme inhibitors, and lipid-lowering drugs and overutilization of calcium channel blockers in older persons with coronary artery disease in an academic nursing home. *J Gerontol A Biol Sci Med Sci* 2002;(57):M398–400. [PubMed: 12023270]
7. Fahey T, Montgomery AA, Barnes J, Protheroe J. Quality of care for elderly residents in nursing homes and elderly people living at home: controlled observational study. *BMJ* 2003;326:580. [PubMed: 12637404]
8. Gupta G, Aronow WS. Underuse of procedures for diagnosing osteoporosis and of therapies for osteoporosis in older nursing home residents. *J Am Med Dir Assoc* 2003;(4):200–202. [PubMed: 12837141]
9. Morley JE. Caring for the vulnerable elderly: are available quality indicators appropriate? *J Am Med Dir Assoc* 2008;(9):1–3. [PubMed: 18187106]

10. Joseph J, Koka M, Aronow WS. Prevalence of moderate and severe renal insufficiency in older persons with hypertension, diabetes mellitus, coronary artery disease, peripheral arterial disease, ischemic stroke, or congestive heart failure in an academic nursing home. *J Am Med Dir Assoc* 2008;(9):257–259. [PubMed: 18457801]
11. Jencks SF, Cuerdon T, Burwen DR, et al. Quality of medical care delivered to Medicare beneficiaries: A profile at state and national levels. *JAMA* 2000;(284):1670–1676. [PubMed: 11015797]
12. Krumholz HM, Radford MJ, Wang Y, Chen J, Heiat A, Marciniak TA. National use and effectiveness of beta-blockers for the treatment of elderly patients after acute myocardial infarction: National Cooperative Cardiovascular Project. *JAMA* 1998;(280):623–629. [PubMed: 9718054]
13. Levy CR, Radcliff TA, Williams ET, Hutt E. Acute myocardial infarction in nursing home residents -adherence to treatment guidelines reduces mortality, but why is adherence so low. *J Am Med Dir Assoc*. 2008
14. Jencks SF, Huff ED, Cuerdon T. Change in the quality of care delivered to Medicare beneficiaries, 1998-1999 to 2000-2001. *JAMA* 2003;(289):305–312. [PubMed: 12525231]
15. Krumholz HM, Radford MJ, Ellerbeck EF, et al. Aspirin in the treatment of acute myocardial infarction in elderly Medicare beneficiaries. Patterns of use and outcomes. *Circulation* 1995;(92):2841–2847. [PubMed: 7586250]
16. Rosenbaum PR, Rubin DB. The central role of propensity score in observational studies for causal effects. *Biometrika* 1983;(70):41–55.
17. Rubin DB. Using propensity score to help design observational studies: Application to the tobacco litigation. *Health Serv Outcomes Res Methodol* 2001;(2):169–188.
18. Ahmed A, Husain A, Love TE, et al. Heart failure, chronic diuretic use, and increase in mortality and hospitalization: an observational study using propensity score methods. *Eur Heart J* 2006;(27):1431–1439. [PubMed: 16709595]
19. Ahmed A, Aban IB, Vaccarino V, et al. A propensity-matched study of the effect of diabetes on the natural history of heart failure: variations by sex and age. *Heart* 2007;(93):1584–1590. [PubMed: 17488764]
20. Ahmed A, Allman RM, Fonarow GC, et al. Incident heart failure hospitalization and subsequent mortality in chronic heart failure: a propensity-matched study. *J Card Fail* 2008;(14):211–218. [PubMed: 18381184]
21. Ahmed A, Rich MW, Sanders PW, et al. Chronic kidney disease associated mortality in diastolic versus systolic heart failure: a propensity matched study. *Am J Cardiol* 2007;(99):393–398. [PubMed: 17261405]
22. Michels KB, Braunwald E. Estimating treatment effects from observational data: dissonant and resonant notes from the SYMPHONY trials. *JAMA* 2002;(287):3130–3132. [PubMed: 12069677]

Regression-Based Multivariable Risk-Adjusted Study of Aspirin:

Design involves adjustment for covariates during analysis for the association of aspirin and mortality. Confounders may not be balanced and the results may not represent the true association. Investigators are **NOT** blinded to outcome during study design

Propensity-Matched Study of Aspirin :

Design involves assembling a balanced cohort using propensity scores for aspirin based on measured covariates. Investigators are blinded to outcome during study design

Randomized Clinical Trial of Aspirin :

Design involves randomization of patients to aspirin and placebo. Investigators are blinded to outcome during study design

Outcome (e.g. mortality) --
unknown during study
design

Outcome (e.g. mortality) --
unknown during study
design

DESIGN

FOLLOW UP AND EVENT

Figure 1.

Comparing designs for randomized clinical trials, propensity-matched studies, and regression-based multivariable risk-adjusted studies. In regression-based multivariable risk-adjusted studies, the line between study design and events is blurred and the investigators are not blinded to study outcomes. However, in propensity-matched studies, investigators are blinded to study outcomes, an important feature of randomized clinical trials.