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Myocardial Infarction Outcomes: “the times, they are a-changin...”

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The American Heart Association recently defined as goal “By 2020, to improve the cardiovascular health of all Americans by 20% while reducing deaths from cardiovascular diseases and stroke by 20%.”¹ These are bold objectives, which represent a substantial challenge to care providers, patients, stakeholders and populations in view of alarming trends in obesity and diabetes.² To demonstrate success, we must be able to monitor progress. Our ability to do so is challenged by the lack of a national system to conduct surveillance of cardiovascular disease, which hinders our assessment of the effectiveness of interventions aiming at improving its outcome in populations.³ Absent a national system, the surveillance of cardiovascular disease relies on a multi-tier strategy leveraging vital statistics, administrative datasets, community surveillance programs and local registries. In the present issue of *Circulation: Cardiovascular Quality and Outcomes*, an important article by Kostis illustrates the use of such approach for surveillance of cardiovascular disease by reporting on trends in the prognosis of patients with acute myocardial infarction hospitalized in New Jersey hospitals⁴. Using the Myocardial Infarction Data Acquisition System (MIDAS), which contains hospital discharge data from non-federal acute care hospitals in New Jersey, the authors examined the outcome of 285,387 patients hospitalized with a first myocardial infarction between 1986 and 2007. The length of hospital stay decreased as did in-hospital mortality. Importantly, 30-day mortality, a critical indicator, which is independent of length of hospital stay, was nearly cut in half, as it decreased markedly as well from 18% to 10%. Conversely, a small but definite increase in mortality beyond 30 days and up to one year post myocardial infarction was detected with an increase of 1.2% over the time period. This increase is small but is a signal that should not be ignored. It was particularly evident among older age groups and, importantly, was due to non-cardiovascular causes, in particular, respiratory and renal disease, as well as septicemia and cancer. This increase in non-cardiovascular mortality was independent of age, sex, complications of myocardial infarction and interventions.

The power of detecting new trends

The central message of the Kostis paper⁴ is that patients hospitalized with myocardial infarction in New Jersey are less likely to die within 30 days of their infarction in 2007 than twenty years ago. However, they are now more likely to die later and of illnesses such respiratory or kidney diseases or cancer. This is a substantial paradigm shift that only studies focusing on population trends are positioned to detect. In reacting to such a report, the validity of the data should always be discussed as MIDAS, like any study, will have its own share of methodological limitations (such as shift in coding practices, increased

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documentation requirements in the medical records, change in diagnostic assays etc). However, the data in the Kostis paper⁴ is consistent with several studies published in the past year that all have documented a profound change in the epidemiology of myocardial infarction.⁵⁻⁷ Indeed, these population studies have reported a decreased incidence of myocardial infarction and a shift in case mix characterized by a dramatic decline in the incidence of ST segment elevation myocardial infarction associated with an increase in the incidence of non-ST segment elevation myocardial infarction. Importantly, these changes, while they may have been amplified by the change in the definition of myocardial infarction,⁸ predated the introduction of troponin as the biomarker of choice for the diagnosis of myocardial infarction.⁵ With regards to outcomes, these reports documented a decline in short term case fatality rate and in cardiovascular mortality but no change in total mortality. This translates into a shift in the cause of death from cardiovascular to non-cardiovascular among myocardial infarction survivors. The Kostis data⁴ is consistent with these findings and the coherence across studies attests to the robustness of the data and support their validity.

Implications

Let's pause to ask ourselves what these data really mean. To the emergency department physicians, the interventional cardiologists, and acute care providers, this is unambiguously a message of good news. The battle of the past 2 decades to improve the care of hospitalized myocardial infarction, initiated on the basis of robust evidence, is finally paying off. The impact of programs such as the American Heart Association Get With The Guidelines further underscores that improving care can be achieved.⁹ Importantly, improvement is demonstrated not only by favorable changes in process measures but also by improvement in outcomes, as detected in registries like CRUSADE (Can Rapid Risk Stratification of Unstable Angina Patients Suppress Adverse Outcomes),¹⁰ in the present paper and in population studies.^{5, 6, 11} While we may have won a battle however, we have not won the war. Indeed, disparities in care persist and demand urgent and vigorous attention, thus precluding any inclination to complacency.⁷ To this end, there is alarming data suggesting that the favorable trends in the outcomes of myocardial infarction may not have been experienced equally by all groups and that there are substantial disparities with deleterious outcomes persisting among blacks.⁷ This further emphasizes the importance of a robust surveillance system, which can capture the trends over time according to race and ethnicity. Further, the care of myocardial infarction is heterogeneous as the disease itself is heterogeneous and there is evidence from CRUSADE that the care of non ST segment elevation acute coronary syndromes still presents substantial opportunities for improvement.¹⁰

To our patients with acute coronary syndromes, the data from the Kostis paper⁴ is also wonderful news: providing that care can be accessed, we as care provider can deliver effective treatments that reduce their risk of dying, at least short term...The "short term" aspect is a critical component of this discussion and delineates a new challenge: recommitting to holistic care for our patients.

Need for a holistic approach to care

Indeed, as the cause of death after myocardial infarction is shifting towards non-cardiovascular causes, improving long term outcomes requires expanding care strategies beyond the boundaries of the heart in order to target chronic diseases, the determinants of these adverse long-term outcomes.

One could argue that the imperative for patient-centric versus organ-centric care is hardly a novel concept. This is true, as indeed, the guidelines of the American Heart Association/

American College of Cardiology on acute coronary syndromes published in 2007, underscore the need to assess general health, comorbidity, cognitive status, and life expectancy.^{13, 14} However, implementing these recommendations is more complex. Indeed, addressing this need requires including, in the care of elderly with acute coronary syndromes, key constructs such as frailty, cognition, and physical function. All entities can profoundly impact the effective delivery of care and subsequent outcomes and should be included in the evaluation of patients with myocardial infarction. In addition, the role of patient-centered measures such as health status is increasingly recognized as a central determinant of care seeking behaviors and outcomes. This is aligned with recommendations from the National Heart Lung and Blood Institute Working Group on Outcomes Research in Cardiovascular Disease.¹⁵ Despite their conceptual importance, these constructs (comorbidity, frailty, cognition, physical function and health status) are seldom, if ever, formally evaluated in clinical practice. The data by Kostis⁴ underscore the urgent need to expand our scope of care from the heart to the patient in order to foster care effectiveness by focusing on global health and optimize the use of health care resources. How could we do this, in the face of increasing pressures to cut costs and shorten hospital stays? The acute treatment of myocardial infarction should remain geared primarily towards the timely treatment of coronary obstruction and the initial implementation of life saving evidence-based cardiac care. Perhaps, is it time to reengineer the role and scope of cardiac rehabilitation, which remains underused, to expand it towards the systematic appraisal of the burden of chronic diseases and its management. While this is a hypothesis that would have to be tested, the data by Kostis and others⁵⁻⁷ certainly challenge us to give it some thought. Effective partnership between cardiologists and primary care providers is equally vital for the delivery of holistic care, underscoring the pivotal importance of cohesive care transitions.

The Institute of Medicine defines quality of care as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.”¹⁶ This statement implies that the quality of care must be contextualized to understand the outcomes observed and define strategies to improve them when necessary. The paper by Kostis⁴ et al points to a new direction for our efforts in this regard.

REFERENCES

1. Lloyd-Jones DM, Hong Y, Labarthe D, Mozaffarian D, Appel LJ, Van Horn L, Greenlund K, Daniels S, Nichol G, Tomaselli GF, Arnett DK, Fonarow GC, Ho PM, Lauer MS, Masoudi FA, Robertson RM, Roger V, Schwamm LH, Sorlie P, Yancy CW, Rosamond WD. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. *Circulation*. 2010; 121(4):586–613. [PubMed: 20089546]
2. Writing Group M, Lloyd-Jones D, Adams RJ, Brown TM, Carnethon M, Dai S, De Simone G, Ferguson TB, Ford E, Furie K, Gillespie C, Go A, Greenlund K, Haase N, Hailpern S, Ho PM, Howard V, Kissela B, Kittner S, Lackland D, Lisabeth L, Marelli A, McDermott MM, Meigs J, Mozaffarian D, Mussolino M, Nichol G, Roger VL, Rosamond W, Sacco R, Sorlie P, Stafford R, Thom T, Wasserthiel-Smoller S, Wong ND, Wylie-Rosett J, on behalf of the American Heart Association Statistics Committee and Stroke Statistics S. Heart Disease and Stroke Statistics--2010 Update: A Report From the American Heart Association. *Circulation*. 2010; 121(7):e46–215. [PubMed: 20019324]
3. Goff DC Jr, Brass L, Braun LT, Croft JB, Flesch JD, Fowkes FG, Hong Y, Howard V, Huston S, Jencks SF, Luepker R, Manolio T, O'Donnell C, Robertson RM, Rosamond W, Rumsfeld J, Sidney S, Zheng ZJ. Essential features of a surveillance system to support the prevention and management of heart disease and stroke: a scientific statement from the American Heart Association Councils on Epidemiology and Prevention, Stroke, and Cardiovascular Nursing and the Interdisciplinary

Working Groups on Quality of Care and Outcomes Research and Atherosclerotic Peripheral Vascular Disease. *Circulation*. 2007; 115(1):127–155.

4. Kostis WJ, Deng Y, Pantazopoulos JS, Moreyra AE, Kostis JB. Trends in Mortality of Acute Myocardial Infarction After Discharge From the Hospital. *Circulation: Cardiovascular Quality and Outcomes*. 2010 In press.
5. Roger VL, Weston SA, Gerber Y, Killian JM, Dunlay SM, Jaffe AS, Bell MR, Kors J, Yawn BP, Jacobsen SJ. Trends in incidence, severity, and outcome of hospitalized myocardial infarction. *Circulation*. 2010; 121(7):863–869. [PubMed: 20142444]
6. Yeh RW, Sidney S, Chandra M, Sorel M, Selby JV, Go AS. Population trends in the incidence and outcomes of acute myocardial infarction. *N Engl J Med*. 2010; 362(23):2155–2165. [PubMed: 20558366]
7. Chen J, Normand SL, Wang Y, Drye EE, Schreiner GC, Krumholz HM. Recent declines in hospitalizations for acute myocardial infarction for Medicare fee-for-service beneficiaries: progress and continuing challenges. *Circulation*. 2010; 121(11):1322–1328. [PubMed: 20212281]
8. Alpert JS, Thygesen K, Antman E, Bassand JP. Myocardial infarction redefined--a consensus document of The Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. *J Am Coll Cardiol*. 2000; 36(3):959–969. [PubMed: 10987628]
9. Cohen MG, Fonarow GC, Peterson ED, Moscucci M, Dai D, Hernandez AF, Bonow RO, Smith SC Jr. Racial and ethnic differences in the treatment of acute myocardial infarction: findings from the Get With the Guidelines-Coronary Artery Disease program. *Circulation*. 2010; 121(21):2294–2301.
10. Peterson ED, Roe MT, Mulgund J, DeLong ER, Lytle BL, Brindis RG, Smith SC Jr, Pollack CV Jr, Newby LK, Harrington RA, Gibler WB, Ohman EM. Association between hospital process performance and outcomes among patients with acute coronary syndromes. *Jama*. 2006; 295(16):1912–1920.
11. Masoudi FA, Foody JM, Havranek EP, Wang Y, Radford MJ, Allman RM, Gold J, Wiblin RT, Krumholz HM. Trends in acute myocardial infarction in 4 US states between 1992 and 2001: clinical characteristics, quality of care, and outcomes. *Circulation*. 2006; 114(25):2806–2814. [PubMed: 17145994]
12. Adabag AS, Therneau TM, Gersh BJ, Weston SA, Roger VL. Sudden death after myocardial infarction. *Jama*. 2008; 300(17):2022–2029.
13. Alexander KP, Newby LK, Armstrong PW, Cannon CP, Gibler WB, Rich MW, Van de Werf F, White HD, Weaver WD, Naylor MD, Gore JM, Krumholz HM, Ohman EM. Acute coronary care in the elderly, part II: ST-segment-elevation myocardial infarction: a scientific statement for healthcare professionals from the American Heart Association Council on Clinical Cardiology: in collaboration with the Society of Geriatric Cardiology. *Circulation*. 2007; 115(19):2570–2589. [PubMed: 17502591]
14. Alexander KP, Newby LK, Cannon CP, Armstrong PW, Gibler WB, Rich MW, Van de Werf F, White HD, Weaver WD, Naylor MD, Gore JM, Krumholz HM, Ohman EM. Acute coronary care in the elderly, part I: Non-ST-segment-elevation acute coronary syndromes: a scientific statement for healthcare professionals from the American Heart Association Council on Clinical Cardiology: in collaboration with the Society of Geriatric Cardiology. *Circulation*. 2007; 115(19):2549–2569. [PubMed: 17502590]
15. Krumholz HM, Peterson ED, Ayanian JZ, Chin MH, DeBusk RF, Goldman L, Kiefe CI, Powe NR, Rumsfeld JS, Spertus JA, Weintraub WS. Report of the National Heart, Lung, and Blood Institute working group on outcomes research in cardiovascular disease. *Circulation*. 2005; 111(23):3158–3166. [PubMed: 15956152]
16. *Crossing the Quality Chasm: A New Health System for the 21st Century*. National Academy Press; Washington, DC: 2000.