

From Study to Standard to Systems of Care: Ongoing Needs to Increase Evidence Adoption

Eric D. Peterson^{a,b} and Robin Mathews^{a,b}

^aDuke Clinical Research Institute, Durham, North Carolina, United States

^bDivision of Cardiology, Duke University Medical Center, Durham, North Carolina, United States

Over the past decade, clinical trials have provided a wealth of new evidence on how best to treat patients with acute coronary syndromes (ACS). Leading professional societies such as the American College of Cardiology (ACC), the American Heart Association (AHA), the European Society of Cardiology (ESC), and the Spanish Society of Cardiology (SEC) routinely summarize these findings in rigorous practice guidelines,¹⁻³ providing practitioners with uniform care recommendations for the management of ACS patients. Yet the act of publication itself does not ensure that this evidence will be fully adopted into community practice. In fact, multiple international studies have clearly demonstrated large and persistent gaps between guideline recommendations and routine clinical use.^{4,5} Variation in the use of evidence-based care can further be seen at the patient level (eg, age, gender, ethnicity, and co-morbid illness), provider level (eg, specialist vs generalist care), hospital level (eg, teaching facilities or those with specialized technology), and system level (eg, feasibility of hospital transfer). The challenge of providing standardized care across all health care settings and systems has become the new

quality improvement (QI) frontier. This QI frontier is the topic of Ruiz Nodar et al's⁶ article, published in the current issue of *Revista Española de Cardiología*.

Spain has a long and proud history of assessing the care of ACS patients via community-based registries. Since the publication of Spain's first practice guideline on non-ST elevation acute coronary syndrome (NSTEMACS) management in 2000,² large registries have provided key information on the characteristics of patients, as well as their disease progression and management.^{7,8} The Descripción del Estado de los Síndromes Coronarios Agudos en un Registro Temporal Español (DESCARTES) study found sub-optimal adherence to guideline therapy, even among high-risk patients admitted with NSTEMACS.⁷ After the publication of revised guidelines for NSTEMACS, the Manejo del Síndrome Coronario Agudo Registro Actualizado (MASCARA) Registry reported improved guideline adherence and increased use of invasive procedures. Unfortunately, however, these improvements did not necessarily take place among patients who may have been the most likely beneficiaries.⁸

The current Guías y Síndrome Coronario Agudo (GYSCA) study builds on this tradition of meticulous data collection. The GYSCA registry is a multi-center observational trial with 1-year follow-up investigating the implementation of practice guidelines in the management of NSTEMACS across community and tertiary hospitals throughout Spain. The registry had several strengths, including the collection of detailed patient clinical characteristics such as acute care and outcomes, as well as important longitudinal clinical endpoints such as cardiac mortality, readmission for ACS, revascularization, and major adverse cardiac events (MACE). Impressively, less than 5% of patients were lost to follow-up at 1 year, reducing selection bias and improving internal validity.

The current GYSCA publication reported that patients who were admitted to tertiary hospitals capable of hemodynamic monitoring capacity,

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Correspondence: E. D. Peterson, MD, MPH,
2400 Pratt Street Rm 7009, North Pavilion DUMC, Durham,
NC 27715 E-mail: peter016@mc.duke.edu

Full English text available from: www.revespcardiol.org

were more likely to be acutely treated with aspirin, clopidogrel, low molecular weight heparin, beta blockers, angiotensin-converting enzyme inhibitors, and statins. Patients admitted to tertiary hospitals were also more likely to undergo cardiac catheterization (70% vs 49%; $P<.01$) and revascularization (43.1% vs 29.7%; $P<.01$) than those admitted to community hospitals. Despite these differences in acute care, there was no difference in inpatient (3.5% vs 3.7%; $P=NS$) or 1-year mortality (9.1% vs 9.4%; $P=NS$). However, there were measurable differences in downstream morbidity and resource utilization. Patients admitted to community hospitals had higher rates of MACE and significantly more repeat hospitalizations for NSTEMI at 1 year than those patients in the tertiary hospital admission group (12.8% vs 2.3%; $P<.01$).

The GYSCA study's findings regarding hospital facility differences are consistent with other findings in the field.^{9,10} Using data from the National Registry of Myocardial Infarction (NRM), Rogers et al also found higher rates of primary reperfusion among patients admitted to hospitals with invasive capabilities, yet similar rates of 90-day mortality.⁹ More recently, in an analysis of more than 85 000 U.S. patients admitted with ACS, academic or teaching hospitals had slightly higher rates of guideline adherence in acute and discharge medications, and again, similar in-hospital mortality rates.¹⁰

Together, the current GYSCA study and these prior works raise 3 important issues regarding guideline adherence, outcomes, and application of best care practices across diverse patient populations and health care systems. First and foremost: What are the underlying reasons for hospital-level variability in care? One reason is that there may be subtle differences in the types of patients treated at these hospitals. For example, though overall TIMI and GRACE risk scores were similar among tertiary and community hospitals in the GYSCA study, tertiary hospital patients were slightly younger and more likely to be troponin positive—and both of these features typically lead to more aggressive medical and procedural intervention.⁸ Another possible reason for hospital-level variability in care is the fact that community hospitals have less access to specialty providers. Non-cardiac specialists may be less familiar and less comfortable with the use of acute therapy in NSTEMI.¹¹ Finally, though not discussed in this study, tertiary hospitals may have more resources, which encourage evidence-based care tactics like internal audits, feedback systems and computerized order entry, and more QI personnel.

A second important question raised by the work of GYSCA and similar studies is: Why don't differences in acute care among centers translate into measurable differences in patient mortality? Once again, there are several potential explanations for this apparent paradox. First, the data (by their very nature) are observational and therefore subject to unmeasured confounders. Specifically, it is possible that features such as cardiogenic shock that were not measured in the study were unfavorably distributed at tertiary hospitals, thus altering patients' profiles. Conversely, patients living in rural areas, treated by community centers, may generally be more fit and healthy than patients who have migrated to cities and tertiary hospitals. Second, given the low rates of mortality in general, the study lacked sufficient power to detect a meaningful difference in this endpoint. The increase in the composite MACE rate among those admitted to community hospitals tends to support this explanation. Finally, the presumption that greater application of invasive cardiac care in ACS will alter mortality rates has not been consistently found in all studies—especially if the major difference in the use of catheterization and/or revascularization at tertiary sites is among low- to moderate-risk ACS patients.¹

A third question raised by the work of GYSCA and similar studies is: Why were rates of MACE and readmission rates higher at 1 year at community sites even after differences in acute care and invasive cardiac procedure use was adjusted for? Specifically, in Table 6, the authors⁶ report that after multivariate analysis, hospital type remained a significant predictor of MACE—even after adjusting for guideline medication adherence and revascularization. To explain these findings, there must be other factors not clearly measured that distinguish the 2 groups of patients presenting to these hospitals. Non-clinical factors such as socioeconomic status, insurance type, or educational level may play a role in outcomes.^{12,13} Finally, if patients presenting to community hospitals had less complete medical care follow-up or were less adherent to discharge medications, outcomes such as readmissions may have been affected.

There have been admirable strides made over the past several decades to improve the care and outcomes of cardiac patients. Yet studies like GYSCA serve as continual reminders of the need for ubiquitous administration of best care practices across all patient subgroups. Though incremental advances have been noted over the past several years in adherence to practice guidelines, there is still substantial room for improvement. The service

and manufacturing industries have achieved high standards (eg, through the development of business management strategies such as “six sigma”) in producing standardized products and services. The practice of medicine should be no different. Provider, hospital, and system-wide interventions are needed to ensure that all cardiac patients are provided the same opportunity to receive the best treatment possible. Recent examples such as the AHA’s Get With The Guideline’s (GWTG) program and the ACC’s Door to Balloon (D2B) campaign have demonstrated that system-wide change is possible when there is appropriate national attention paid to QI.¹⁴ Similarly, governmental policies such as hospital-level public reporting “pay for performance” programs (P4Ps), have been consistently associated with both improved overall adherence to evidence-based performance measures and reductions in hospital-to-hospital variation in care quality.¹⁵ Spain could consider either implementing these provider-led voluntary programs or state-run incentive programs, as a means of addressing hospital variability in care quality.

The pursuit of QI is an ongoing process that strives to provide safe, effective, and equitable care to all members of society. These goals can only be attained through critical and perpetual self examination of our practices and our results. The insight gained through the important work of GYSCA and similar studies, is integral to this pursuit. The body of evidence created will continue to direct our next steps in devising more efficacious methods that will disseminate knowledge widely and, simultaneously, ensure that this knowledge is implemented fairly. Our collective experience as a global community remains our best and perhaps most untapped resource, to advance the pursuit of quality and promote the importance of this cause.

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