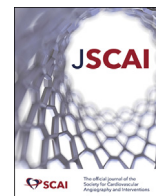




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Research Letter

Utilization of Sex-Specific Reporting to Assess Disparities in Percutaneous Coronary Intervention-Related Process Measures



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There is increasing focus on disparities in the diagnosis, treatment, and outcomes of patients with cardiovascular disease.¹ Sex-based differences have been observed in interventional cardiology processes and clinical outcomes.²⁻⁴ In a study by Swaminathan et al,³ women were more likely than men to experience nonsystem delays in primary percutaneous coronary intervention (PCI) for ST-segment elevation myocardial infarction (STEMI), which has been associated with in-hospital mortality. In a quality-improvement initiative described by Huded et al,⁴ protocols were developed to act upon deficiencies in STEMI care. Although not specifically intended to address gender disparity, the changes implemented improved care for both women and men and closed the gender gap that had existed in door-to-balloon time and rates of guideline-directed medical therapy (GDMT).³ These studies highlight the need for efforts that reduce sex-based disparities in PCI.

The aim of this study was to determine if the quality data collected for the CathPCI National Cardiovascular Data Registry (NCDR) database could be utilized to evaluate disparities in PCI-related care. Using institutional data collected for the NCDR Cath PCI Registry version 4.4, from 2 high-volume PCI centers, temporal trends in PCI-related process measures from July 2009 through March 2018 were analyzed. Process measures included discharge on GDMT, immediate PCI within 90 minutes for STEMI, median time to immediate PCI for STEMI (door-to-balloon time), and positive stress or imaging study prior to elective PCI. For each metric, eligibility was based on NCDR-defined inclusion criteria (Table 1). Only PCI procedures meeting criteria for each metric were included in the analysis, and each metric therefore was assessed in a different number of procedures. Crude rates were calculated for all process measures according to sex, and trend analysis was performed using logistic regression including an interaction between sex and time. The study was approved by the Lifespan institutional review board with waiver of consent.

During the 9-year period, at our institutions, there were no sex-based disparities in 2 STEMI process measures, primary PCI within 90 minutes and median time to immediate PCI. With respect to the other process measures examined, however, women were less likely to meet goals for GDMT use and underwent preprocedural stress testing or imaging less often than men (Table 1). Overall, rates of GDMT were high but statistically lower in women than in men (93.7% vs 95.2%; $P < .001$), with no interaction between sex and time. With regard to preprocedural testing in elective PCI, women had lower rates (54.8% vs 60.9%; $P = .02$), with no interaction between sex and time.

Routine use of sex-specific reporting for PCI-related process measures could help identify disparities and inform quality improvement efforts. This methodology could be applied to risk-adjusted outcome measures as well. Using the Victorian Cardiac Outcomes Registry, Stehli et al² noted differences which included delays in revascularization and higher adjusted mortality in women presenting with STEMI. We observed no sex-based disparities in STEMI performance metrics, including door-to-balloon time and median time to revascularization, which may be related to the high volume of these procedures and standard protocols in place for this cohort at our 2 institutions; nevertheless, examination of national NCDR CathPCI data would provide much needed insight. We did find that women were less likely to meet goals for GDMT use at discharge and undergo preprocedural testing in elective PCI than men. These observed disparities did not improve over the period analyzed, most likely due to lack of recognition. A limitation of the analysis is that the PCI appropriate use criteria metrics could not be determined, and the differences we observed in women compared with men in the stress or imaging study metric may not have translated into differences in procedural appropriateness. In addition, GDMT was restricted to aspirin, P2Y12 inhibitor, and statin; therefore, we cannot comment on other medications that may have been indicated in certain PCI procedures.

Abbreviations: ECG, electrocardiogram; GDMT, guideline-directed medical therapy; NCDR, National Cardiovascular Data Registry; PCI, percutaneous coronary intervention; STEMI, ST-segment elevation myocardial infarction.

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Table 1. PCI-related process measures and institutional performance in women and men from 2009 to 2018

Process measure	Definition	Exclusion criteria	Eligible patients	Performance	Sex and time interaction
Discharge on guideline-directed medical therapy	Patients who receive prescriptions for all medications (aspirin, P2Y12 inhibitor, and statin)	Contraindication to aspirin, P2Y12 inhibitors, or statin	Women n = 5216 Men n = 12,588	93.7% in women vs 95.2% in men, $P < .001$	$P = .32$
Immediate PCI within 90 min	Proportion of STEMI patients with a time from your hospital arrival (or subsequent ECG if ST elevation first noted on subsequent ECG) to immediate PCI ≤ 90 min	Patients transferred in from another acute care facility Nonsystem reason for delay does not equal none ^a	Women n = 511 Men n = 1424	93.9% in women vs 94.5% in men, $P = .62$	$P = .99$
Median time to immediate PCI for STEMI patients	Median time from hospital arrival to immediate PCI for STEMI patients in minutes	Patients transferred in from another acute care facility Nonsystem reason for delay does not equal none ^a	Women n = 511 Men n = 1424	60 min in women vs 58 min in men, $P = .07$	$P = .62$
Proportion of elective PCIs with prior positive stress or imaging study	Proportion of elective PCI procedures with an antecedent stress or imaging study with a positive result (suggestive of ischemia) or with a fractional flow reserve value of ≤ 0.8 during the PCI	Patients with acute coronary syndromes	Women n = 516 Men n = 1579	54.8% in women vs 60.9% in men, $P = .02$	$P = .90$

ECG, electrocardiogram; PCI, percutaneous coronary intervention; STEMI, ST-segment elevation myocardial infarction.

^a Documented reason for nonsystem delay: difficult vascular access, cardiac arrest or need for intubation before PCI, patient delays providing consent, difficulty crossing the culprit lesion during the PCI, procedure, other, or none.

Nonetheless, our findings suggest that periodic institutional reporting on the part of NCDR would be more informative if granular data on women and men were provided. For now, local efforts rely on utilization of available quality databases for identification and improvement of disparities in cardiovascular care. Further investigation is needed to understand whether national efforts to provide institutions with sex-specific metrics would identify disparities and result in changes in practice and outcomes over time. The quality reporting structure can also be used to examine potential disparities in racial and ethnic groups.

Declaration of competing interest

H.D.A. is a consultant for Philips and Silk Road Medical. J.D.A. receives research grants from Boston Scientific and MicroPort and is a consultant for Abbott, Medtronic, Philips, and Recor. Other authors have no disclosures.

Ethics statement

The research reported adhered to the principles that guide the conduct of ethical research.

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