

EDITORIAL

How Many Operators Are Optimal for Higher-Risk Percutaneous Coronary Intervention Procedures?

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The benefits of a multioperator approach to procedures performed in the cardiac catheterization laboratory have perhaps been best exemplified in the realm of structural heart disease.¹ However, whether this approach is translatable to other disciplines within the catheterization laboratory is not known.

See Article by Kovach et al.

There has been an increasing interest in higher-risk percutaneous coronary intervention (HRPCI) when it is clinically indicated and in the best interest of the patient from either a symptom-driven or a prognostic standpoint. Complex and HRPCI procedures encompass a heterogeneous group of anatomic lesion subsets (eg, left main lesions, chronic total occlusions, and severely calcified lesions) as well as clinical parameters (including patient comorbidities, adverse hemodynamics, depressed ventricular function, and concomitant valvular disease).² Careful patient selection, especially for patients deemed too high risk for surgical revascularization, along with judicious use of techniques and tools for complex percutaneous coronary intervention (PCI) can allow this group of patients to benefit from revascularization in the cardiac catheterization laboratory. However, almost by definition, increased patient and lesion complexity engender both a greater risk of

procedural complications and adverse outcomes.^{3,4} Considering these outcomes inherent to HRPCI procedures, a team-based approach to these procedures might be ideal.

IS MULTIPLE-OPERATOR HRPCI ASSOCIATED WITH DIFFERENT OUTCOMES THAN SINGLE-OPERATOR HRPCI?

In this issue of the *Journal of the American Heart Association (JAHA)*, Kovach et al attempt to address this issue by performing a novel and interesting review of single- versus multiple-operator HRPCI procedures from a cohort of 6672 patients who underwent HRPCI between 2015 and 2018 within the Veterans Affairs Healthcare System.⁵ In this analysis, HRPCI was defined as a procedure with estimated risk of periprocedural mortality >1.1%, left ventricular ejection fraction \leq 35%, or a Veterans Health Administration (VA) SYNTAX score \geq 15%. Despite the included patients having a mean age of 70 years, complex coronary anatomic features, and high prevalence of ventricular dysfunction and previous coronary artery bypass grafting, the rates of bifurcation lesion intervention, chronic total occlusion intervention, and use of atherectomy, intravascular imaging, and mechanical circulatory support were relatively low overall.

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Multiple-operator procedures were rare, occurring in <10% of HRPCI cases. However, the authors observed an increasing trend in multioperator HRPCI procedures over time, consistent with a growing prevalence of more complex and HRPCI in the modern-day cardiac catheterization laboratory. Operators performing multiple-operator HRPCI had fewer years of experience and lower annual PCI (and HRPCI) volumes than those involved in single-operator procedures. Notably, HRPCI performed by multiple operators more frequently involved more complex anatomic features, including chronic total occlusions and calcific disease. Compared with single-operator HRPCI, there were also higher rates of multiple arterial access, a greater number of stents placed, longer procedure times, and more frequent use of atherectomy. Despite these differences, the authors observed no differences in outcomes between patients undergoing single-operator versus multiple-operator HRPCI.

Although this report examines the outcomes of a “team-based approach” versus a single operator for HRPCI, as a retrospective study conducted at disparate sites with differing levels of experience and practice patterns, it is hard to be definitive about actionable practice change based on it. No amount of statistical adjustment can address the inherent dissimilarities among the patients who were selected for multiple-operator HRPCI compared with those treated with the more conventional single-operator approach. By definition, selection of a multiple-operator approach was a decision made by the treating interventionalists performing the HRPCI. As such, it is no surprise that multioperator cases were more complex and involved interventionalists with less overall experience than single-operator cases. In some institutions, such as ours for example, it is commonplace for HRPCI cases to be either performed by highly experienced operators or multiple operators (with involvement of a more experienced operator) when the primary operator’s experience is more limited. In some respects, *the finding of no increase in adverse outcomes in multiple-operator cases despite the increased procedural complexity*, supports the thoughtfulness of the treating physicians in appropriately seeking assistance when clinically warranted. It would be of interest to examine how infrastructure, salary, and reimbursement structures potentially influence or can incentivize the choice to involve additional team members. One could surmise that in systems where time accounting and/or remuneration is not as closely tied to individual operator productivity that these collaborative processes could be more likely to occur. However, the fact that multiple-operator cases were still rare within the VA system suggests that cultural change is necessary in addition to a financial system that could support a multioperator approach.

Another challenge of the use of observational data to address this issue is parsing out cases where a priori 2 operators were selected versus the not-uncommon situation where a second operator is called in to assist because of a procedural complication. One could imagine that the latter scenario would be associated with greater imminent risk than the former, and yet an analysis of multiple operators versus single operators would combine both scenarios under the “multiple-operator” umbrella. Finally, the exclusion of emergency procedures and ST-segment–elevation myocardial infarction, although understandable from a desire to isolate the analyses to more elective/urgent cases, seems somewhat of a lost opportunity to examine the potential role of second operators during challenging procedures. In some respects, having a second operator could be more impactful and potentially more demonstrable in cases where the cognitive and technical capacity of primary operator is strained.

A MULTIPLE-OPERATOR APPROACH TO HRPCI IN PRACTICE

In our institution, for those cases that are being performed by operators other than those highly skilled in HRPCI, we have adopted a team-based and multioperator approach that begins with preprocedural planning. By having multiple operators and team members looking at the indications for the procedure as well as discussing potential revascularization strategies and possible anticipated problems, we are able to achieve general consensus and are better prepared for the case. This consensus can be conveyed to patients and families as well as to primary and referring physicians, and we have found it to be reassuring, especially when undertaking a higher-risk procedure. Within the procedure room, HRPCI cases can last long hours and involve intraprocedural multitasking, and operators are required to pay attention to details of the patient’s clinical status and hemodynamics while at the same time performing technically challenging PCI. In such scenarios, having a second set of hands, eyes, and an additional experienced operator who is free to think more broadly can be invaluable. When facing unanticipated complications or troubleshooting, a second operator can be in better position to think on her/his feet, offer valuable input, and take on additional tasks (eg, managing pressors, airway, and other devices, such as hemodynamic support), thereby unburdening the primary operator of these. In addition, having 2 operators within a case also enables primary and second operators to alternate as needed for respites as well as intentionally when one operator is less experienced, thus safely adding to experiential knowledge and skills improvement. Finally, at the conclusion of the case, a

team-based approach can also facilitate better coverage of postprocedural management (eg, if the primary operator is occupied with a subsequent case).

Given the complexity of HRPCI with little room for mistakes because of patients' limited reserve to tolerate procedural complications, we have found this team-based approach to facilitate the care of our highest-risk patients. Whether there are clinically demonstrable advantages to this approach is an open question. One could hypothesize that the relationship between lower procedural volumes and adverse clinical outcomes that is manifested in HRPCI lesion subsets, such as left main PCI⁶ and chronic total occlusion PCI,⁷ could be blunted at institutions that use multiple operators (specifically including a higher-volume HRPCI operator) for cases in which a lower-volume operator is the primary interventionalist. In this light, and perhaps contrary to the conventional interpretation of "negative" study findings, the report by Kovach et al actually offers an initial glimpse of the promise of such an approach.

ARTICLE INFORMATION

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