Evaluating the Feasibility of a Statewide Collaboration to Improve Cardiac Rehabilitation Participation: THE MICHIGAN CARDIAC REHAB NETWORK

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Evaluating the Feasibility of a Statewide Collaboration to Improve Cardiac Rehabilitation Participation

THE MICHIGAN CARDIAC REHAB NETWORK

Michael P. Thompson, PhD; Jessica M. Yaser, MPH; Annemarie Forrest, MS, MPH, RN; Steven J. Keteyian, PhD; Devraj Sukul, MD, MS

Purpose: Regional quality improvement collaboratives may provide one solution to improving cardiac rehabilitation (CR) participation through performance benchmarking and provider engagement. The objective of this study was to evaluate the feasibility of the Michigan Cardiac Rehab Network to improve CR participation.

Methods: Multipayer claims data from the Michigan Value Collaborative were used to identify hospitals and CR facilities and assemble a multidisciplinary advisory group. Univariate analyses described participating hospital characteristics and hospital-level rates of CR performance across eligible conditions including enrollment within 1 yr, mean days to first CR visit, and mean number of CR visits within 1 yr. Three diverse CR facilities were chosen for virtual site visits to identify areas of success and barriers to improvement.

Results: A total of 95 hospitals and 84 CR facilities were identified, with 48 hospitals (51%) providing interventional cardiology services and 33 (35%) providing cardiac surgical services. A 17-member multidisciplinary advisory group was assembled representing 13 institutions and diverse roles. Statewide CR enrollment across eligible admissions was 33.4%, with wide variation in CR performance measures across participating hospitals and eligible admissions. Virtual site visits revealed individual successes in improving CR participation but a variety of barriers to participation related to referrals, capacity and staffing constraints, and geographic and financial barriers.

Conclusions: This study demonstrated the feasibility of creating a statewide collaboration of hospitals and CR facilities centered around the goal of equitably improving CR enrollment for all eligible patients in Michigan that is supported by a multidisciplinary advisory group and performance benchmarking.

Key Words: cardiac rehabilitation • collaboration • quality improvement

Exercise-based cardiac rehabilitation (CR) is an underutilized service with well-documented clinical and functional benefits for patients with cardiovascular disease. Despite strong recommendations supporting its use across a spectrum of cardiovascular conditions and procedures, only a quarter of eligible patients attend a single session of CR and even fewer patients complete the recommended 36 CR sessions. Participation in CR varies on the basis of age, race, sex, type of qualifying event, type of health insurance, discharging hospital, and geographic region, suggesting opportunities for targeted quality improvement efforts. Professional societies and federal agencies have set national goals for CR enrollment, developed a road map and resources to achieve this goal, and created valid and reliable performance measures to benchmark CR performance, yet significant and sustained improvement in CR participation remains elusive.

Regional quality improvement collaboratives may provide one solution to improving CR participation and quality through benchmarking performance and facilitating quality improvement efforts. In Michigan, statewide collaborative quality initiatives (CQIs) were developed as a partnership between hospitals, physicians, and a large private insurer with the goal of improving quality and costs of care through data collection and the sharing of best practices. For almost 25 yr, the CQI model has demonstrated success in evaluating and improving the quality of care for patients undergoing cardiovascular procedures. For example, the Blue Cross Blue Shield of Michigan Cardiac Rehabilitation (BMC2), a CQI focused on improving outcomes after percutaneous coronary intervention (PCI), reduced the risk-adjusted rate of acute kidney injury after PCI from 3.3% in 2010 to 2.5% in 2016 through the development and sharing of best practices around identifying patient-specific contrast thresholds and emphasizing periprocedural hydration. In this spirit, the BMC2 partnered with another CQI, the Michigan Value Collaborative (MVC), to identify and evaluate variation in the use of CR after PCI, coronary artery bypass grafting (CABG), and medically managed acute myocardial infarction (AMI) using clinical and claims data registries. Establishing engagement across inpatient and outpatient settings using the CQI model is a needed step to assist with improving CR enrollment and quality.
The purpose of this study was to evaluate the feasibility of a statewide CQI for CR. First, the development of the Michigan Cardiac Rehab Network (MiCR Network) was described, including the types of participating hospitals and advisory group composition. Second, hospital-level performance in CR enrollment was benchmarked across eligible conditions using a comprehensive administrative claims database. Third, to identify areas for improvement in patient participation in CR, virtual site visits were conducted with CR facilities in Michigan and the findings from such are summarized herein.

METHODS
The work covered in this study was approved by the University of Michigan Institutional Review Board (HUM00081314) and data use is approved through an unfunded agreement (20-UFA0024). All analyses were conducted using SAS 9.4 (SAS Institute).

DEVELOPMENT OF THE MiCR NETWORK AND ITS PARTICIPANTS
The mission of the MiCR Network is to equitably increase participation in CR for all eligible individuals in Michigan. The MiCR Network began as a collaboration between the MVC and the Blue Cross Blue Shield of Michigan Cardiovascular Consortium (BMC2), which are both funded by Blue Cross Blue Shield of Michigan’s Value Partnerships program. The BMC2 started in 1997 and is a multicenter collaborative of health care providers who seek to improve quality in PCI, vascular, and structural heart procedures. The BMC2 includes all 48 nonfederal hospitals that provide PCI services in Michigan. The MVC started in 2012 and is a statewide collaborative of 100 nonfederal, acute care hospitals and 40 physician organizations in Michigan, with the goal of improving the health of Michigan through sustainable, high-value health care across the continuum of care through data and engagement with clinical and quality leaders. The MVC is supported by a multipayer administrative claims data registry that includes comprehensive claims on Michigan residents insured by Medicare fee-for-service, Blue Cross Blue Shield of Michigan, Blue Care Network, and Michigan Medicaid plans. After this collaboration was established, additional stakeholders were sought out to be included in the MiCR Network, including leaders from Michigan CR facilities and the Michigan Society for Cardiovascular and Pulmonary Rehabilitation.

Analysis of MVC claims data identified 95 hospitals and 84 CR facilities in Michigan that treated eligible patients. Information from the 2017 American Hospital Association Annual Survey was used to describe the hospitals participating in the MiCR Network. Characteristics included teaching status (major, minor, nonteaching), location (metropolitan, micropolitan, rural), system affiliation (yes vs no), bed size (<100, 100-300, >300), and cardiovascular services provided (interventional cardiology, cardiac surgery). Provider-specific five-digit zip code from the MVC claims registry was used to map the locations of participating hospitals and CR facilities.

A multidisciplinary advisory group was convened to facilitate development of the MiCR Network. Participation in the advisory group is voluntary, but participants were specifically invited to ensure representation across roles (eg, exercise physiologist, cardiologist, cardiac surgeon, epidemiologist, patient) and health care settings (eg, hospital, CR facility, rural, urban, academic, community). The titles and affiliations of the participants in the advisory group were summarized. Quarterly meetings of the advisory group discussed strategies to develop data reporting on CR enrollment, opportunities for collaborative learning, best practices around CR, and barriers to CR participation.

BENCHMARKING CR PERFORMANCE
The MVC claims registry was used to benchmark performance in CR enrollment over time and across hospitals for eligible admissions, including medically managed AMI, congestive heart failure (CHF), PCI, CABG, surgical aortic valve replacement (SAVR), and transcatheter aortic valve replacement (TAVR). These cohorts were based on International Classification of Diseases, Tenth Edition diagnosis or procedure codes in facility-level claims and current procedural terminology claims in professional-level claims (see Supplemental Digital Content 1, available at: http://links.lww.com/JCRP/A396). Admissions for PCI include both inpatient and outpatient (so-called “same-day”) procedures. Admissions were eligible for inclusion in benchmarking if they occurred between July 1, 2017, and June 30, 2020, and were excluded from benchmarking if the patient died during the index admission, was discharged to hospice care, or had missing discharge disposition information.

Enrollment in CR sessions was defined using current procedural terminology codes (93797 and 93798) and health care common procedure codes in facility and professional claims data (G0422 and G0423 with revenue center code 943). All claims for CR sessions within 1 yr of discharge date were obtained for each admission. A binary indicator was created for each admission if they had any CR visits within 1 yr of discharge. For patients with a CR visit, the number of days from day of hospital discharge to first CR session and number of CR sessions within 1 yr were calculated.

Quarterly trends in CR enrollment across all participating hospitals for each condition were calculated on the basis of admission date. Hospital-level CR performance across conditions in each of the three CR outcomes was evaluated, including any CR use within 1 yr, the mean number of days to first CR visit, and number of CR sessions within 1 yr. Box plots were created to illustrate hospital-level variation in CR performance for each condition and measure.

VIRTUAL SITE VISITS
To better understand potential opportunities for directed quality improvement, we conducted virtual site visits with staff at three CR facilities around Michigan. The three sites were chosen to represent a diversity in geography, population served, and CR performance. Virtual site visits were conducted via video conferencing and were 1 hr in duration. Participants in these virtual site visits included physicians, CR program directors, and exercise physiologists. A set of standardized discussion topics and sample questions were developed before the first visit in specific domains, including process of referral and enrollment, patient education and engagement, perceived barriers and facilitators, local key stakeholders and implementation processes, and quality improvement opportunities (see Supplemental Digital Content 2, available at: http://links.lww.com/JCRP/A397).

RESULTS
A total of 95 hospitals and 84 CR facilities were included in the MiCR Network because they had sufficient volume of admissions for CR eligible conditions. Descriptive characteristics of these 95 hospitals can be found in Table 1. Most hospitals in the sample were minor teaching hospitals and rural, urban, academic, and community. The titles and affiliations of the participants in the advisory group were summarized. Quarterly meetings of the advisory group discussed strategies to develop data reporting on CR enrollment, opportunities for collaborative learning, best practices around CR, and barriers to CR participation.
Table 1
Descriptive Characteristics of Hospitals Participating in the Michigan Cardiac Rehab Network

<table>
<thead>
<tr>
<th>Main Features</th>
<th>Characteristics</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td></td>
<td>95 (100)</td>
</tr>
<tr>
<td>Teaching status</td>
<td>Major</td>
<td>8 (8)</td>
</tr>
<tr>
<td></td>
<td>Minor</td>
<td>50 (53)</td>
</tr>
<tr>
<td></td>
<td>Nonteaching</td>
<td>37 (39)</td>
</tr>
<tr>
<td>Location</td>
<td>Metropolitan</td>
<td>61 (64)</td>
</tr>
<tr>
<td></td>
<td>Micropolitan</td>
<td>17 (18)</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>17 (18)</td>
</tr>
<tr>
<td>System affiliated</td>
<td>Yes</td>
<td>78 (82)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>17 (18)</td>
</tr>
<tr>
<td>Bed size</td>
<td>&gt;300</td>
<td>28 (29)</td>
</tr>
<tr>
<td></td>
<td>100-300</td>
<td>29 (31)</td>
</tr>
<tr>
<td></td>
<td>&lt;100</td>
<td>38 (40)</td>
</tr>
<tr>
<td>CV services provided</td>
<td>Interventional</td>
<td>48 (51)</td>
</tr>
<tr>
<td></td>
<td>Cardiac surgery</td>
<td>33 (35)</td>
</tr>
</tbody>
</table>

Abbreviation: CV, cardiovascular.

Cardiac Rehabilitation Sites in Michigan

Hospitals Receiving Cardiac Rehab Reports

BENCHMARKING CR PERFORMANCE

The overall statewide CR enrollment rate was 33.4% (24,358/72,973) for non–CHF-eligible admissions. When CHF is included, the statewide enrollment rate into CR across all conditions was 19.8% (26,398 of 133,641 eligible admissions). Rates of CR enrollment within 1 yr were highest for patients undergoing CABG (5550/9508 = 58.4%), followed by PCI (13,644/39,461 = 34.6%), TAVR (13,554/40,900 = 33.1%), and AMI (2148/16,884 = 12.7%). Rates of CR enrollment were lowest for CHF patients (2040/60,668 = 3.4%). Statewide trends in CR enrollment can be found for AMI, CABG, CHF, PCI, SAVR, and TAVR in Figure 2. There were observed declines in CR enrollment beginning in quarter 4 of 2019, when the 1-yr follow-up period after hospital discharge began to align with the COVID-19 pandemic. Although participation rates began to recover in quarter 2 of 2020, for each condition they remained below prepandemic rates.

Figure 1. Map of hospitals and cardiac rehabilitation facilities across Michigan. Abbreviations: AMI, acute myocardial infarction; CABG, coronary artery bypass grafting; CHF, congestive heart failure; PCI, percutaneous coronary intervention; SAVR, surgical aortic valve replacement; TAVR, transcatheter aortic valve replacement. This figure is available in color online (www.jcrpjournal.com).
There was wide variation in the performance measure of any CR enrollment within 1 yr of discharge across hospitals and eligible conditions (Figure 3). Relative to CR enrollment, there was less variation in the hospital-level mean days to first CR visit across hospitals and eligible admissions (see Supplemental Digital Content 4, available at: http://links.lww.com/JCRP/A399). The mean number of CR visits within 1 yr at the hospital level was between 13 and 18 visits across eligible admissions; however, there was substantial hospital-level variation within each admission type (see Supplemental Digital Content 5, available at: http://links.lww.com/JCRP/A400).

**DISCUSSION**

This descriptive study demonstrated the feasibility of assembling a statewide network of hospitals and CR facilities, with the purpose of improving CR enrollment using a multidisciplinary advisory group and CR performance benchmarking data. Only one out of three patients with qualifying events attended CR within 1 yr of discharge with wide variation in CR enrollment across eligible conditions and discharging hospitals (29% when including CHF), which highlights opportunities for collaborative quality improvement and shared learning. Through virtual site visits among a purposeful selection of diverse CR facilities in the state, facilities reported individual successes in improving CR enrollment. However, these facilities also described similar barriers brought on by the COVID-19 pandemic, such as loss of staff, reduced referrals, and capacity constraints. One facility seeking to introduce a virtual or hybrid CR program also noted limitations in broadband access for its large rural population.

**VIRTUAL SITE VISITS**

A summary of the virtual site visits performed in three CR facilities is shown in Table 2. The table includes a description of the geographic area, population served, and overall CR enrollment level for each of the participating sites. Areas of success in improving CR enrollment for these sites included direct contact with eligible patients after discharge, implementation of a CR liaison, and strong buy-in from clinical and administrative leadership. Several barriers to improving CR enrollment were also identified across sites such as patient challenges with cost and travel, limited patient engagement prior to the referral process, and physical and technological gaps in the referral and enrollment process between discharging hospitals and CR facilities. Each facility also noted challenges brought on by the COVID-19 pandemic, such as loss of staff, reduced referrals, and capacity constraints. One facility seeking to introduce a virtual or hybrid CR program also noted limitations in broadband access for its large rural population.
outcomes in patients with cardiovascular disease. Using the MiCR Network to disseminate best practices for referral, enrollment, and adherence developed by the Million Hearts Initiative may help address common challenges faced by CR facilities, such as patient engagement, clinical processes, and provider and administrative support. Connecting sites that have implemented best practices with others that have not implemented will facilitate the collaborative learning process in hopes of improving overall rates of CR enrollment and reducing intrahospital variation. In the future, these efforts could be further accelerated with the implementation of pay-for-performance programs to financially incentivize providers to invest resources into achieving collaborative-wide performance goals. Similar financial and other incentives have been used for CR enrollment and participation and were proposed in Medicare, but the latter was ultimately never realized. The collaborative learning model supplemented with financial incentives may prove to be a replicable model to achieve the national goal set by the Million Hearts Initiative.

There are also continued challenges to improving CR enrollment associated with the COVID-19 pandemic. Although rates of CR enrollment have begun to recover to prepandemic levels, sites reported continued challenges related to loss of staff, reduced referrals, and capacity constraints. One solution to this problem is the expansion of virtual CR options, such as home-based or hybrid CR programs, which are increasingly supported by evidence that it is as effective as facility-based programs. The use of virtual CR was accelerated by the COVID-19 pandemic as facilities sought to limit in-person visits and with the decision by Medicare to reimburse for virtual CR in order to combat declining use associated with COVID-19 mitigation efforts. Although the future of virtual CR as a standard of care has not yet been fully realized, the MiCR Network could serve as an applied laboratory to accelerate the development and refinement of alternative CR care delivery models and reimbursement policies.

Several next steps have been identified for the MiCR Network because of the work conducted in this study. Through advisory group engagement and virtual site visits, development has begun of a best-practice tool kit that includes turnkey documents designed to improve evidence-based CR participation processes, such as CR inpatient liaisons, group orientations, and automatic referrals. These documents are intended to reflect best practices laid out by the Million Hearts Initiative and will be made publicly available. Involving patients in the process of quality improvement will help inform these best practices and guide efforts to achieve patient-centered solutions. Our recent work suggests that physicians play an important role in ensuring CR referral and downstream utilization. Understanding physician attitudes toward CR may also be an important step in identifying opportunities for improvement. Administering validated instruments to physicians, such as the Provider Attitudes Toward Cardiac Rehabilitation and Referral survey, and linking them to existing clinical and claims data may provide these insights. Deeper analysis of patient and hospital factors that contribute to different levels of performance will help direct quality improvement efforts, including efforts to understand and address well-documented inequities in CR enrollment across demographic and socioeconomic patient subgroups. Finally, continued partnership with BCBSM/BCN may open opportunities to study how insurance benefit design and alternative payment models may be used to enhance CR participation and quality.

There are limitations to this study to consider. First, it is difficult to ascertain the level of engagement within each individual hospital and CR facility, which may impact the overall success of the MiCR Network. Second, there is limited information on CR facility characteristics and the extent to which they are connected to individual hospital characteristics. Third, our advisory group does not include important roles related to CR, such as nurses and patients. Exclusion of these roles during the creation of the advisory group was unintentional and future iterations of the advisory group will seek to address this gap. Fourth, administrative data used to benchmark CR enrollment did not include other private insurance products or uninsured patients. Fifth, site visits were conducted with a small, purpose sample, and additional successes and challenges may emerge with additional site visits. Finally, it is not yet possible to ascertain the direct impact of MiCR Network engagement and subsequent CR enrollment and quality. Future

Table 2
Summary of Virtual Site Visits With Three Cardiac Rehabilitation Facilities

<table>
<thead>
<tr>
<th>Domain</th>
<th>Site 1</th>
<th>Site 2</th>
<th>Site 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic area</td>
<td>Southeast Michigan</td>
<td>Central Michigan</td>
<td>Northern Michigan</td>
</tr>
<tr>
<td>Population served</td>
<td>Urban, low-income</td>
<td>Mixed urban/rural and income</td>
<td>Mixed urban/rural and income</td>
</tr>
<tr>
<td>CR enrollment performance</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Areas of success</td>
<td>Patient contact within 48 hr of discharge improved rates of scheduling referrals</td>
<td>CR liaison improves process from qualifying event to enrollment</td>
<td>Automatic referrals for all qualifying events</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contacting all patients who get a referral boosted enrollment</td>
<td>Nurses serve as CR liaisons to schedule first CR visit at the nearest facility</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Strong buy-in from clinical and administrative leaders</td>
</tr>
<tr>
<td>Barriers to improvement</td>
<td>Loss of referrals when placed during afternoons or on weekends</td>
<td>Loss of automatic referrals with EHR vender change</td>
<td>Capacity constraints limit ability to grow practice</td>
</tr>
<tr>
<td></td>
<td>Capacity constraints, not able to meet demand</td>
<td>Decline in patient referrals, staff, and transportation services due to COVID</td>
<td>Financial constraints for some patients despite financial assistance programs</td>
</tr>
<tr>
<td></td>
<td>Limited patient engagement prior to referral process</td>
<td>Broad service area with potentially long travel for patients</td>
<td>Seasonal population and climate changes make consistent CR enrollment a challenge</td>
</tr>
<tr>
<td></td>
<td>Challenges with costs and transportation</td>
<td>Financial challenges for low-income patients</td>
<td>Limited broadband access restricts ability to provide virtual or hybrid CR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geographic barriers between CR facility/staff and hospital campus</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: CR, cardiac rehabilitation; EHR, electronic health record.
work will be pursued to evaluate its overall impact as the MiCR Network develops.

CONCLUSIONS
National efforts to improve CR enrollment and quality continue to expand, particularly following the COVID-19 pandemic. This study demonstrated the feasibility of a statewide collaboration of acute care hospitals and CR facilities centered around the goal of equitably improving CR enrollment for all eligible patients in Michigan, one that is supported by a diverse, multidisciplinary advisory group and is driven by performance benchmarking data.

ACKNOWLEDGMENTS
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