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Developing an interdisciplinary community action team for reduction in maternal mortality related to cardiovascular disease

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ABSTRACT

Background: Pregnancy-associated deaths involving cardiovascular disease (CVD) often occur beyond six weeks postpartum and are associated with delayed recognition.

Objectives: We report on a community-informed approach to create an issue-specific community action team (CAT), which selected and tailored an intervention for CVD in pregnancy and postpartum.

Methods: City-based maternal mortality review committee (MMRC) data on pregnancy-associated deaths involving CVD was leveraged to build an issue-specific CAT.

Results: MMRC data highlighted the high frequency of cardiac-related symptoms as well as hospital-based evaluations among individuals during the year prior to death. The CAT identified and optimized a quality improvement intervention for CVD screening in pregnancy and postpartum. This process integrated feedback from stakeholders from multiple care settings across the city and created a foundation for rapid citywide dissemination of the revised algorithm and supplementary materials.

Conclusions: CATs may be an effective organizational strategy to center community perspectives and build partnerships for intervention development to address pregnancy-associated mortality.

KEYWORDS: Cardiovascular Diseases, Community health partnerships, Health Care Quality, Access, and Evaluation, Health Services Accessibility, Access, and Evaluation, Women’s Health Services

INTRODUCTION

The United States has one of the highest pregnancy-related and pregnancy-associated mortality rates, which has risen over the past two decades (1, 2). Between 2017 and 2019, 1,018 individuals in the United States experienced pregnancy-related mortality, which is death caused by, related to or aggravated by pregnancy (3). In contrast, pregnancy-associated mortality includes all deaths that occur during pregnancy and up to one year postpartum, regardless of whether pregnancy had a direct physiologic impact on the cause of death. There are significant racial and ethnic disparities in these outcomes, with Black and American Indian/Alaskan Native birthing people experiencing 4-5 times the mortality compared to white birthing people, with differences in cause-specific proportionate mortality (4). For every pregnancy-related death, there are an estimated 50-100 birthing people who experience severe maternal morbidity (SMM), with similar racial and ethnic disparities as seen with pregnancy-related mortality (5-7).

Cardiovascular disease (CVD) in pregnancy is one of the leading causes of pregnancy-related deaths, contributing to more than 25% of deaths in thirteen states between 2011 and 2015 (8). CVD-related events are also a leading contributor to SMM in the early postpartum period, including a wide spectrum of illness such as cardiomyopathy, coronary heart disease, congenital heart disease, valvular disease, and arrhythmias (5). The assessment of pregnancy-related deaths and near-miss cases should not only assess clinical factors but should also include a critical review of systemic factors, which can often be significant contributors to the poor outcome and may be potential candidates for broader quality improvement interventions (9). Symptoms common to both CVD and pregnancy such as shortness of breath, edema, and fatigue can lead to late or unrecognized diagnoses (10). Cardiovascular complications often occur in the postpartum period following delivery admission which can also create diagnostic challenges as they may be evaluated in settings or by provider teams that are not as familiar with the peripartum period (11). Quality improvement efforts should also focus on addressing underlying interpersonal and structural racism that drive disparities in outcomes, in partnership with affected communities (12).

Maternal mortality review committees (MMRCs) facilitate interdisciplinary, comprehensive review of pregnancy-related or -associated deaths at either the state or local levels, taking a systematic approach to identifying clinical and non-clinical contributors to the outcome and the potential for preventability (13, 14). At the state level, these efforts have been the focus of significant national attention and federal funding support (15). While data has suggested that state-wide review committees may identify a higher degree of preventability than regional reviews (16), city-based MMRCs can potentially produce granular data specific to local context. Not only may this locally sourced data help to guide closely tailored recommendations for change, it may also promote institutional and community partnerships to support interventions to reduce maternal morbidity and mortality. Philadelphia is an ideal city to implement a local MMRC as it is the poorest of the nation’s ten largest cities, with 26% of 1.58 million inhabitants living in poverty. It also has a higher maternal mortality rate than the national average, i.e., 20 per 100,000 live births in Philadelphia vs 17.4 per 100,000 live births nationally (17).

Historically, perinatal quality collaboratives (PQCs) have typically been the organizations charged with implementing MMRC recommendations, and the work has focused primarily on healthcare settings and has involved healthcare providers (18). However, there have long been calls for action to increase community partnership in agenda setting, data collection and intervention development for reduction of pregnancy-related mortality and SMM, particularly in global health settings,(19, 20). The opportunity for communities to shape interventions, particularly those that occur at the intersection between health services and community (21), are a necessary part of these interventions' relevance to the communities that healthcare institutions are intending to serve as well as their potential for success (22). Models for the integration of community-based participatory methodologies with perinatal quality improvement have been proposed (23) though models in obstetric practice are not yet well characterized in the literature, particularly for hospital-based services.

Community action teams (CATs) are multidisciplinary groups with organizations, agencies and individuals (ideally including lived experience experts) who solve issues in a local context within either a defined geographic area or specific target population. They have been described primarily within the educational system as school-home-community partnerships that facilitate community engagement and collaboration on the development of schools (24). They aim for partnership, rather than engagement with the community, with co-creation of planned interventions as well as implementation strategies.

In 2020, the Philadelphia MMRC published data demonstrating that CVD was one of the leading factors involved in pregnancy-associated deaths in Philadelphia in a publicly available report (17). Concurrently, in conjunction with the MMRC and with approval from the Philadelphia Department of Public Health IRB, data abstraction from the electronic medical record on these cases demonstrated that the majority of individuals with pregnancy-associated deaths involving CVD had symptoms such as chest pain, shortness of breath, fatigue or lower extremity edema and at least one hospital-based evaluation in the year prior to their death. The MMRC reported pregnancy-associated rather than pregnancy-related deaths so that its recommendations could address the burden of CVD in this vulnerable time period rather than the specific impact of pregnancy on CVD.

In this study, we aim to 1) describe the use of this city-based MMRC data to strengthen community and institutional partnerships to reduce pregnancy-associated mortality involving CVD and to form a community action team (CAT) and 2) report lessons learned from partnership with a CAT to select and tailor interventions addressing CVD in pregnancy and postpartum to the local context.

METHODS

The MMRC in Philadelphia was established in 2010, eight years prior to the state-based MMRC in Pennsylvania. It includes multidisciplinary clinical representation (physicians in maternal fetal medicine, obstetrics and gynecology, anesthesia/critical care and emergency medicine as well as midwives and nurses) from the five hospitals with labor and delivery units in the city, members from city agencies (e.g., law enforcement and housing representatives) and non-governmental organizations such as private insurers and community-based organizations centered on maternal health. On a quarterly basis, the MMRC identifies, tracks and reviews pregnancy-associated deaths in the city, utilizing the Maternal Mortality Review Information Application surveillance system developed by the Centers of Disease Control and Prevention (25).

Community Partnership: In September 2019, the Philadelphia Department of Public Health (PDPH) created The Organized Voices for Action (OVA). The OVA is a multidisciplinary group of local stakeholders including lived experience experts (LEEs), local and state governmental agencies, health care system professionals, insurance providers, community-based programs and policy advocates who are dedicated to decreasing the incidence of maternal mortality in Philadelphia (26). The OVA is charged with implementing recommendations from the Philadelphia MMRC by developing and supporting citywide initiatives that address contributors to maternal mortality. After reviewing and prioritizing MMRC recommendations utilizing a formal voting process to assess feasibility and impact, OVA creates community action teams (CATs, called "workgroups") in order to design initiatives to address these local priorities alongside community.

Central to the formation of OVA is the Collective Impact Framework, which is an intentional and structured approach to collaboration that includes three key elements: (1) backbone commitment, (2) establishing trust with community and (3) sharing power. The PDPH committed to being the funding and administrative backbone of OVA, providing a steady stream of resources for OVA's ongoing work to partner with community to reduce maternal mortality. To begin building trust with community, the PDPH worked with stakeholder groups to develop a Common Agenda, which allowed community to co-design the strategic priorities for the anticipated partnership (which would later be called OVA). Finally, to formalize a process of power sharing with community, these stakeholder groups created a governance document which specified tangible expectations regarding community representation and decision-making authority on OVA, fiduciary responsibilities on OVA, and appropriate attributions for OVA's work. In particular, the agreements included requirements regarding (1) the number of LEEs on OVA and (2) the number of LEEs on each CAT.

Based on this foundation, a CAT was developed to address cardiovascular disease in pregnancy and postpartum specifically. LEEs were recruited by OVA through flyers and word of mouth, engagement through prior relationships with community members based in prior work done by OVA, and recommendations from OVA's existing community partners. There are two LEEs on this CAT, both of whom had cardiovascular complications in pregnancy or postpartum within two years of the CAT's formation. In total, there were 12 members in the CAT. The other stakeholders – prenatal care providers, emergency room and federally qualified health center providers, and cardiologists at multiple delivery hospitals in Philadelphia – were also recruited by OVA utilizing partnerships from prior city-based work on other causes of maternal mortality.–.

The CAT for CVD is led by a maternal-fetal medicine subspecialist at a tertiary academic center with a large volume of deliveries in Philadelphia and a member of the OVA steering committee (who was also part of PDPH leadership). The CAT met bimonthly for approximately 18 months to provide ongoing feedback on selecting and tailoring quality improvement initiatives and now meets quarterly. During the intervention development phase described in this paper, the CAT leadership met with OVA on a quarterly basis to present its progress meeting the goals of identifying and disseminating interventions to address factors contributing to maternal deaths associated with CVD in Philadelphia.

While the relationships between OVA and the PDPH had been well established since 2019 and the relationships between clinical providers were already well established through professional networks, partnership across these groups was gradually built during the early CAT meetings through discussion of shared values around reducing maternal morbidity and mortality and co-creation of a shared agenda and timeline. While there was no funding attached to this specific CAT's work, it was established that any products resulting from the CAT's work would be disseminated back to academic institutions via the providers on the CAT and to community via OVA's network.

RESULTS

Disseminating city-based MMRC data to focus community partnership on CVD and pregnancy-associated deaths

Following the release of the 2020 Philadelphia MMRC report (17), the OVA widely disseminated its findings on the impact of CVD in pregnancy and postpartum to its existing institutional and community partners. Results were discussed at the OVA steering committee meeting, multiple public presentations at the city level, and in invited panels, talks and listening sessions from community-based organizations. In addition, the PDPH published a formal report and press release, which were supported by opinion editorials by key stakeholders in newspapers. The momentum resulting from this dissemination process was leveraged to recruit individuals for a CAT that aims to develop strategies to decrease pregnancy-related cardiovascular morbidity and mortality across the city.

Work in progress: Collaborating with a community action team to select and tailor interventions to address maternal mortality associated with cardiovascular disease

Selecting an intervention

Based on the MMRC data showing potential missed opportunities for diagnosis and evaluation of CVD among pregnant and postpartum individuals in Philadelphia, the CAT decided to focus on interventions that would standardize screening and evaluation of patients with cardiac symptoms during pregnancy and postpartum. CAT members performed a literature review of existing interventions described in the literature or being currently utilized at healthcare institutions locally and presented these results to the CAT. Ultimately, the CAT selected a cardiovascular screening algorithm developed by the California Maternal Quality Care

Collaborative (CQMCC). This validated cardiovascular risk-assessment algorithm risk stratifies pregnant and postpartum patients and, if utilized correctly, the algorithm can identify almost 90% of cardiovascular-related deaths before they occurred (27).

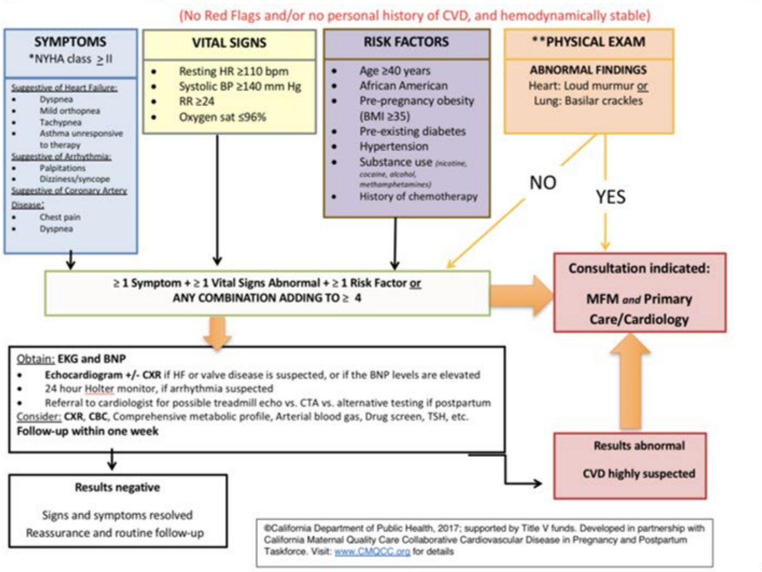
While LEEs did not directly participate in the literature review to highlight potential interventions, they offered insight that helped the CAT to focus their selection on tools that optimize diagnosis and screening rather than management. This focus was based on their lived experiences receiving care in locations such as the emergency department that were less familiar with pregnancy and postpartum physiology. The LEEs felt focusing on diagnosis and screening would address a meaningful gap, and this recommendation aligned with the data from our retrospective abstraction.

Tailoring the intervention to local context

CAT meetings then focused on tailoring the algorithm for use in Philadelphia, across a wide range of settings: emergency departments and obstetric triage units in academic health centers, federally qualified health centers, and outpatient clinics providing prenatal care. Feedback from healthcare providers predominantly focused on the clinical aspects of the algorithm as well as concerns about feasibility. Challenges with availability of testing and escalation of care (i.e., access to specialists) as well as gaps in provider education about CVD symptoms in pregnancy and postpartum were discussed. These concerns were addressed either via modification of the algorithm workflow or creation of supplementary materials.

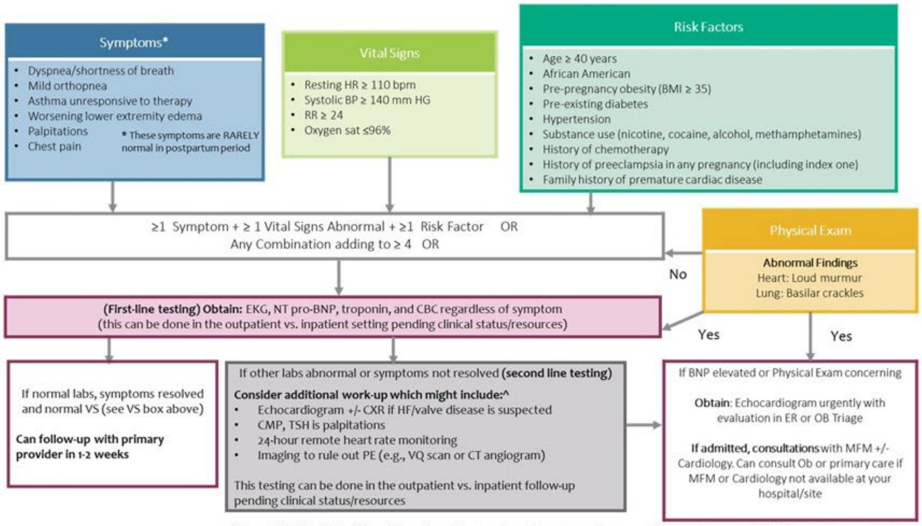
Outpatient prenatal providers on the CAT noted that limited availability of testing could limit the feasibility of the algorithm in its original design. In other words, outpatient prenatal care settings and federally qualified health centers often did not have readily available echocardiogram or chest x-ray services, unlike emergency departments and obstetric triage units operating within hospitals. In addition, they had more limited immediate access to subspecialists such as cardiologists or maternal fetal medicine physicians. As such, the algorithm was modified to distinguish between “first-line” vs “second-line” testing, reducing the burden of unnecessary service utilization in outpatient settings (Figure 1). It also shifted subspecialty consultation into a secondary step after completion of initial evaluation (e.g., abnormal testing or physical exam), rather than a presumptive next step if the initial risk screening was positive and included the option to call general obstetrics or primary care physicians as a back-up if subspecialists in maternal fetal medicine or cardiology were not available.

Original Screening Algorithm



©California Department of Public Health, 2017; supported by Title V funds. Developed in partnership with California Maternal Quality Care Collaborative Cardiovascular Disease in Pregnancy and Postpartum Taskforce. Visit: www.CMQCC.org for details

Revised Screening Algorithm



^Can call MFM +/- Cardiology if questions about results or the work-up. Can consult Ob or primary care if MFM or Cards not available

Figure 1. Screening Algorithms

Importantly, providers on the CAT working with marginalized patients in outpatient settings, such as federally qualified health centers, also highlighted the significant potential challenges with escalation of care to complete second-line testing in the modified algorithm. Patients may be reluctant to transition to higher levels of care: lack of familiarity (i.e., trust) with a new provider team or facility, prior traumatic experiences within the healthcare system, linguistic barriers, or concerns about transportation, finances or childcare support. The LEEs corroborated this assessment of potential barriers to care escalation. While these concerns were unable to be addressed within the scope of the CAT's selection and modification of the algorithm, they have informed the focus of the ongoing implementation work in our pilot.

Additionally, cardiologists and maternal fetal medicine subspecialists provided insight into the clinical factors that should contribute to a positive screen based on their experiences caring for pregnant patients with cardiac comorbidities. This led to the inclusion of lower extremity edema and the exclusion of dizziness as symptoms as well as the inclusion of history of preeclampsia as a risk factor. Non-obstetric providers on the CAT pointed out the need for ongoing provider education regarding cardiovascular symptoms in pregnancy to guide effective implementation of this screening algorithm. Based on this feedback, supplementary materials to educate providers regarding the key characteristics of cardiac-related symptoms in pregnancy and postpartum, based on the specific symptoms included in the screening algorithm, were created, reviewed by the CAT, and ultimately disseminated to hospitals alongside the algorithm to assist with implementation efforts (Appendix A).

In the CAT meetings, our LEEs noted some concerns regarding the patient experience with the algorithm. Specifically, provider-patient communication needed to be carefully optimized to balance clearly presenting the importance of follow-up testing completion after positive CVD screening in pregnancy or postpartum alongside the unclear long-term clinical significance of initial screen, to mitigate the potential for heightened stress following a positive screen. In addition, LEEs recommended the creation of supplementary patient education regarding the clinical significance of recommended second-line testing and key logistical information to facilitate testing completion. Based on this initial feedback, the decision was made to create separate meetings with LEEs led by a physician with significant experience in community-based work. These meetings facilitated more expansive feedback, leading to further modification of the racism-based risk factor from the original, "African American (28)" to "marker of anti-Black racism" in order to avoid pathologizing Black race as well as the co-creation of supplementary patient education materials (29). Provider training supporting patient-centered communication regarding screening results has also been a focus of implementation work in our ongoing pilot.

CONCLUSIONS

City-based MMRC data reviewing five years of pregnancy-associated deaths involving CVD highlighted the high frequency of cardiac-related symptoms as well as hospital-based evaluations among individuals during the year prior to death. Based on these findings, an issue-specific CAT focused on obstetrics-cardiology was formed and comprised of LEEs, maternal support organizations, healthcare and public health professionals, policy advocates, government representatives, and insurance providers. This CAT identified a quality improvement intervention to improve the standardized risk assessment for CVD and they also tailored the intervention to address the local context. This process integrated feedback from stakeholders from multiple care settings across the city and created a foundation for rapid citywide dissemination of the revised algorithm and supplementary materials. Altogether, this work demonstrates that CATs may be an effective organizational strategy by which to build partnership for implementation of MMRC recommendations.

There are relatively few city-based MMRCs in the United States (30). While data has suggested that state-wide review committees may identify a higher degree of preventability than regional reviews,[15] our data demonstrates some potential benefits of local MMRCs. In our case, the city-level review of pregnancy-associated deaths facilitated a more granular review of data beyond what would typically be included in the standardized Maternal Mortality Review Information Application assessment. The frequency of hospital-based evaluations and prevalence of cardiac-related symptoms in the year prior to death for many individuals led to a focus on quality improvement interventions that could improve screening and identification of patients with CVD during pregnancy and postpartum at times they interact with the healthcare system. In addition, the city-based perinatal quality collaborative (PQC)'s existing relationships with stakeholders accelerated the development of community partnerships focusing on the impact of CVD in pregnancy and postpartum locally.

In our experience, a CAT was able to select and effectively tailor an intervention to the local context in response to the gaps highlighted by MMRC data. Responses to MMRC data are typically coordinated by PQCs that work by engaging stakeholder groups to build effective collaborations to support broad implementation. PQCs typically operate on the state or regional level and have historically focused more on health systems and providers than upon direct engagement and collaboration with community (31). There is growing appreciation of the necessity of lived experience expertise for implementation efforts, and some PQCs have recently deepened their community engagement efforts by building partnerships with community midwifery organizations and engaging marginalized patients who experience disproportionate harm as LEEs (32). In our case, the creation of a CAT helped to bridge the gap between engagement (i.e., feedback) and true co-creation and collaboration (i.e., direct, ongoing involvement in intervention modification) by LEEs.

LEEs played a critical role in guiding the CAT to focus on interventions aimed at improving diagnosis and screening for CVD, based on their experiences navigating healthcare systems in Philadelphia while experiencing cardiovascular complications in pregnancy and postpartum. After the tool was selected, they tailored the tool to avoid potentially harmful patient experiences of screening via pathologization of Black race. Finally, they provided key recommendations regarding implementation of the tool, specifically identifying additional education that would be supportive of patients undergoing the screening process and providing guidance regarding patient-centered counseling for individuals with a positive screen.

CATs may be an effective organizational strategy to center community perspectives and build partnerships for intervention development to address pregnancy-associated mortality in local contexts. The CAT's feedback around potential challenges with escalation of care and patient-centered communication around positive screens have also informed implementation priorities for our ongoing pilot.

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