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Improving postpartum and long-term health after an adverse pregnancy outcome: Examining interventions from a health equity perspective

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Abstract

Gestational diabetes mellitus and hypertensive disorders in pregnancy are adverse pregnancy outcomes (APOs) that affect 15% of pregnancies in the United States. These APOs have long-term health implications, with greater risks of future cardiovascular and chronic disease later in life. In this manuscript, we review the importance of timely postpartum follow-up and transition to primary care after APOs for future disease prevention. We also discuss interventions to improve postpartum follow-up and long-term health after an APO. In recognizing racial and ethnic disparities in APOs and chronic disease, we review important considerations of these interventions through a health equity lens.

Keywords

Gestational diabetes mellitus; hypertensive disorders in pregnancy; chronic disease; cardiovascular disease; postpartum interventions

1. Adverse pregnancy outcomes and long-term health

Gestational diabetes mellitus (GDM) and hypertensive disorders in pregnancy (HDP) affect an estimated 15% of pregnancies in the United States (US).[1,2] GDM is defined as glucose intolerance developed during pregnancy; HDP include preeclampsia, gestational hypertension, and eclampsia. Individuals with GDM have an increased risk of HDP,[1,3,4] and

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these adverse pregnancy outcomes (APO) have overlapping long-term risks. Specifically, individuals with HDP have a 2-fold increased risk of developing cardiovascular disease (CVD) or type 2 diabetes (T2D), with even greater risk for those with more severe manifestations of HDP;[2,5,6] risk of T2D is 7-fold higher among those with a history GDM compared to those without.[1,6–8] Although the term APO captures these conditions as well as others, including preterm birth and small-for-gestational-age neonatal status,[9] GDM and HDP are major sources of morbidity during pregnancy and beyond. Thus, we are limiting our discussion of APOs to GDM and HDP.

Racial and ethnic disparities in APOs are well-established. Over half of pregnant people diagnosed with GDM identify as underrepresented racial or ethnic minorities. Non-Hispanic Black pregnant individuals bear a disproportionate burden of HDP, and the prevalence among Hispanic pregnant individuals increased at a steeper rate than all other ethnic groups between 2007–2018.[10–13] These disparities are expected to further widen, mirroring national rises in obesity, sedentary lifestyle, and poor nutrition.[14] The economic, environmental, political, and social conditions in which individuals are born, live, and interact with are recognized as social determinants of health. Minoritized groups more commonly experience multilevel structural disadvantages that contribute to health disparities, such as exposure to racism, food and housing insecurity, language barriers, low health literacy, and limited access to quality healthcare.[15–18] Therefore, in discussing these disparities, we recognize racial and ethnic disparities as differences in health outcomes by the categorization of individuals based on socially constructed definitions that have no genetic basis.[19] Addressing such disparities requires a focus on the promotion of health equity, defined as the absence of health disparities when every person has the opportunity to “attain his or her full health potential.”[20]

With rising rates and widening disparities of GDM and HDP in the US, the prevention of APOs and their sequelae are national priorities. Despite the acute issues related to these conditions typically resolving in the early postpartum period, the notion of “pregnancy as a window into future health” has been coined to illustrate that the development of APOs may be the first clinical signal of an increased future risk of hypertension, T2D, and CVD,[21–23] all of which affect minoritized individuals at disproportionate rates.[24,25 1–3] To achieve health equity in the postpartum period and beyond for the birthing individual, interventions addressing these disparities are of critical importance.

Thus, we aim to 1) review the importance of timely postpartum follow-up and transition to primary care after APOs, and 2) discuss interventions to improve postpartum follow-up and long-term health. In recognizing that interventions can reduce disparities only if they include those for whom health inequities are greatest, our goal is to discuss interventions through a health equity lens.

2. Barriers to postpartum and long-term health care after a pregnancy complicated by APOs

The American College of Obstetricians and Gynecologists (ACOG), American Academy of Family Physicians, American Diabetes Association, and other professional societies have

affirmed that postpartum care is an important healthcare episode to optimize long-term health.[26–29] Postpartum care is especially critical after APOs, as additional testing is recommended beyond routine follow-up.[1,2,30] Short-term care testing includes the 2-hour 75-gram oral glucose tolerance test (OGTT) after GDM and blood pressure monitoring after HDP. Administration of these tests is vital to prevent short-term morbidity (e.g., stroke) and secure appropriate long-term follow-up for the prevention of chronic diseases.

Despite its importance, attendance at postpartum visits varies from 5.7% to 95.4% completion.[26,31] Rates are especially low among individuals of minoritized racial and ethnic groups or those with limited resources,[32,33] despite the disproportionate risk of T2D and CVD.[34–36] Additionally, individuals with suboptimal prenatal care utilization are less likely to receive postpartum blood pressure screening,[37] suggesting that those with decreased access to prenatal care are less likely to remain engaged in the healthcare system, compounding existing disparities.

Barriers to receiving postpartum care are well documented, with contributing factors at the clinician, patient, and societal levels.[32,38–41] In fact, one study from 2015 found that both internal medicine and obstetric and gynecologic clinicians failed to consistently identify and provide appropriate follow-up for patients who experienced APOs.[42] At the patient level, barriers include lack of access to quality healthcare, limited childcare, and low health literacy. Low health literacy is associated with inadequate health service utilization,[43–45] which in this population could limit understanding of chronic disease risk or result in confusion regarding instructions.[38,46] Additionally, some postpartum individuals may understand their elevated risk for chronic disease but feel anxious about future complications and potential diagnoses.[45] On a societal level, structural racism - defined as public policies, institutional practices, cultural representations, and other norms that work in various, often reinforcing ways to perpetuate racial group inequity - contributes to and exacerbates existing disparities in postpartum health.[19,47] Interventions that aim to increase postpartum follow-up must improve clinician education, ease patient-level barriers, and recognize the role of social determinants.

Further, the transition from obstetrics to primary care after an APO requires care coordination for counseling, monitoring, and treatment to optimize short- and long-term cardiometabolic health. Only half of individuals successfully transition from obstetric care to primary care within the first year postpartum, with lower rates of primary care engagement among individuals of minoritized racial and ethnic groups compared to non-Hispanic White postpartum individuals.[48] This gap in care amplifies racial and ethnic disparities in chronic illness,[48] and represents a missed opportunity for prevention. In recognition of this gap, ACOG and the American Heart Association released a joint statement to promote risk identification and reduction of CVD by encouraging collaborations bridging obstetrics and cardiology.[49]

Barriers to this transition are compounded by the fragmentation between obstetric health care and other subspecialties.[50] Among those who do transition, some will continue to see their obstetrician-gynecologist for well-woman care, but many will transition to a general internist or family medicine clinician. Advocates for care coordination have

called for a “warm hand-off” between the obstetrician and new clinician to facilitate this transition, which can be done via electronic health records (EHR), written or verbal communication, or postpartum transition clinics.[51,52] Fragmentation, combined with the structural barriers to quality healthcare that minoritized individuals are more likely to experience, perpetuates racial and ethnic disparities in long-term health.[50,51] Additionally, structural and interpersonal racism, unequal treatment in the healthcare system, and lack of culturally-tailored health services are among a few of the reasons that individuals of color avoid seeking care,[53–55] which is particularly detrimental after an APO. Experiences of racism impact pregnancy outcomes and chronic illness.[54,56,57] Due to these complex, multifactorial inequities, it is imperative to address disparities on multiple levels, which are outlined by the socioecological model in Figure 1.

Although we emphasize the importance of bridging the postpartum to primary care gap, the role of primary care is not limited to one year after birth. In fact, establishment of care can improve preconception health, if future pregnancy is desired; individuals who have a preconception primary care visit are 3-fold more likely to receive optimal monitoring and care in the immediate postpartum period and 3 years after giving birth.[58] Improved transition of care may facilitate access and utilization of preconception care and monitoring, thus promoting lifelong individual and family wellness.

3. Interventions to improve postpartum monitoring, screening, and follow-up after an APO

Multiple interventions aimed to improve postpartum follow-up after APOs have attempted to address health disparities, including technology and healthcare clinic-based interventions. These interventions are outlined in Table 1. This is not an exhaustive review, but instead a discussion of interventions with preliminary success which are most applicable to the US healthcare system. In recognizing the importance of health policy initiatives on expanding access to healthcare, we have summarized selected policies in Table 2. Although a full discussion of these policies is beyond the scope of this manuscript, health policies aimed at improving postpartum health must exist in tandem with the individual and system-level interventions we describe below.

Technology-based interventions

Technology provides a promising avenue for public health interventions to both optimize the nearly universal use of smartphones and allow for healthcare information to be readily accessible.[59] Examples include virtual reminders and mobile health (mHealth) applications.

Virtual reminders, via phone calls or EHR patient portals, may improve patient awareness regarding the OGTT, blood pressure surveillance, and appointments.[40,60–66] Postpartum individuals have competing demands for their attention. As a result, virtual reminders are appealing in terms of low cost, preliminary success, and ease of implementation. However, these reminders may be less successful among those experiencing high perceived barriers; for example, individuals may be aware of the importance of the OGTT after GDM but may not have the time or resources to attend a 2-hour appointment. A review article by Nielsen

et al. identified that postpartum individuals of high socioeconomic status found it easier to overcome barriers to OGTT completion which subsequently made it easier to prioritize the test, suggesting that reminders alone may not improve outcomes among those who are disproportionately affected by APOs.[67]

Further, there are racial and ethnic disparities in EHR portal use during pregnancy,[68] thus, systems must ensure that patients are universally introduced, offered, and taught how to navigate EHR portals. Despite initial success in trials of virtual reminders for OGTTs, the majority of data are among highly educated White patients, thereby limiting our knowledge of the efficacy among groups who are most likely to experience APOs.

Technology-based reminders provide an opportunity to improve postpartum test ordering and completion. Vesco et al. incorporated a checkbox into the EHR to remind clinicians to order a fasting plasma glucose test at the postpartum visit for patients who experienced GDM.[60] Education on the importance of the test was administered via regional department and local clinic meetings by a maternal-fetal medicine clinician. Using technology to remind and educate clinicians of the importance of postpartum testing after GDM may enhance patient-clinician discussions regarding the importance of such testing, subsequently improving rates of OGTT completion. Data on clinician technology-based reminders for postpartum blood pressure screening are limited.

Another technology-based intervention is mHealth, which refers to the use of mobile devices or Bluetooth technology in public health practice. mHealth may be particularly helpful among those with limited access to healthcare, as it enables health monitoring or education to occur virtually, overall reducing logistical barriers.[69] Postpartum remote blood pressure monitoring via Bluetooth systems linked to clinics for individuals with HDP have high retention rates and show improvements in postpartum visit attendance.[66,70–73] Many individuals report being satisfied with addressing health concerns at home rather than the clinic, which may be particularly burdensome among those with limited transportation or childcare. Heart Safe Motherhood, a postpartum text message-based at-home blood pressure surveillance program, demonstrated a 50% reduction in racial differences in compliance with blood pressure measurement attainment.[74] These findings were similar when implemented at another institution,[72] indicating that high adherence in blood pressure monitoring may be achieved with the combination of text message reminders and Bluetooth-enabled home blood pressure cuffs.

Nevertheless, Rhoads et al. identified that non-users of a remote blood pressure monitoring system reported barriers to access, including limited number of minutes on their cellular phones and disruptions in internet connectivity in rural communities.[73] These barriers have been well documented among non-pregnant populations,[75] subsequently contributing to the digital divide in which the benefits of technology bias towards White, high socioeconomic status, and highly educated individuals. Additionally, affordability of devices in clinical settings outside of research or philanthropy may be limited. If patients are expected to buy devices themselves, this adds a financial burden, highlighting the importance of the role of payors or institutions to support technology-based monitoring devices.[76]

Few postpartum mHealth education and support interventions after an APO exist. SweetMama, a smartphone app for individuals with GDM, extends up to 6-weeks postpartum with appointment reminders and resources such as recipes, educational videos, and links to local and federal resources to improve health literacy and self-efficacy among this population.[77,78] This app was specifically designed according to feedback from qualitative interviews among the target patient population.[77,79] In order to be culturally appropriate for the target audience, the acceptability, efficiency, and effectiveness of the app are designed in accordance with patient preferences. Similarly, Social Ties to Encourage Physical activity among Postpartum Mothers is designed specifically for postpartum individuals with HDP;[80] participants are enrolled in a mobile, team-based gamification intervention with points, levels, and small prizes to encourage daily step count goals. Further study is required to determine whether mHealth interventions can improve postpartum health and reduce disparities on a larger scale.

Despite disparities in use, technology-based interventions have the potential to reach a wide audience due to the growing number of individuals with access to a smartphone in the US. To narrow the racial and socioeconomic gap in use of mHealth, interventions must account for barriers specifically identified by marginalized communities, ensure universal offer by health systems and clinicians, and include culturally-tailored features based on user preferences.

Healthcare system-based interventions for postpartum follow-up

Healthcare system-based interventions may improve rates of postpartum follow-up after an APO. These interventions target health disparities by specifically addressing multilevel barriers. For instance, the medical home model can allow the postpartum visit and infant's 2-month check-up to be scheduled at the same time and location.[30,81] This addresses a logistical burden (e.g., one drive to the doctor's office instead of two) and changes the current system of postpartum care in recognition of parental tendency to prioritize the neonate over themselves; however, there are limited data on this application after an APO, with only one study reporting null results.[81] This intervention may be particularly successful at clinics that are family medicine-focused or multispecialty health systems. Feasibility and coordination may be difficult at clinics with fragmentation between obstetricians and pediatricians or for patients who receive primary care in the internal medicine environment where pediatric care is often separate. Nevertheless, this is a promising intervention, particularly considering the length of the OGTT, as postpartum individuals with GDM commonly cite time as a major barrier to completing the test.

Originally implemented for oncology, patient navigation is a barrier-focused, patient-centered intervention employing trained personnel to identify patient-level barriers and facilitate complete and timely access to health services.[82,83] It has been adapted to postpartum care demonstrating preliminary success with improvements in postpartum visit attendance, receipt of contraception and depression screening, and high perceived utility among stakeholders.[82,84,85] The principles of patient navigation as adapted to individuals with GDM are currently under investigation in an ongoing feasibility trial by our team

designed to promote connectivity to primary care, enhance patient awareness of T2D risk after GDM, and engage patients in diabetes prevention activities.[86]

Postpartum transition clinics, initially piloted in Canada, have aimed to improve postpartum follow-up, cardiovascular screening, and patient education among individuals with a history of HDP.[87] Importantly, Canada has universal healthcare coverage which accounts for the reimbursement system that postpartum transition clinics are funded upon, whereas the payment environment in the US healthcare system limits equitable access for those living in states with short-term loss of Medicaid after giving birth.[88] Nevertheless, data at a single academic institution in the US are promising, including among those with public insurance with high rates of insurance approvals.[89] Future adaptations of multidisciplinary transition clinics may be led by various types of providers, including primary care clinicians, endocrinologists, cardiologists, dietitians, or behavioral lifestyle coaches. If postpartum transition clinics are to be implemented in the US, it is vital to ensure universal healthcare, along with continued advocacy for expanded postpartum insurance coverage (Table 2).

4. Interventions to improve long-term health and transition to primary care after an APO

There are a number of evidence-based interventions to improve long-term health after an APO. Existing interventions can be grouped into lifestyle and healthcare system-based interventions (Table 3).

Lifestyle interventions

Lifestyle interventions are designed to prevent chronic disease by promoting a healthy diet, exercise, and weight loss. Perhaps the most widely known is the Diabetes Prevention Program (DPP), a national program created by the Centers for Disease Control in 2010 following a core curriculum with lifestyle coaching to prevent T2D. The original study required one risk factor for enrollment, including history of GDM.[90] The DPP was designed to include an ethnically diverse population, and indeed, 45% of the participants were from racial and ethnic minority groups. The DPP partnered with community stakeholders, “case managers,” who identified as the same racial or ethnic group as the participant to tailor the intervention to be culturally adaptive. To address social determinants of health such as language or health literacy, the modules were available in Spanish and English and the pace of the program components (i.e., speed that new information was introduced) could be modified.

The DPP has been adapted for postpartum individuals with GDM via in-person, web-based, and phone call platforms. Despite preliminary success in improving postpartum weight loss, the extent to which original efforts to individualize the intervention have been maintained is unclear. Non-profit organizations, such as Chicago CARES to Prevent Diabetes,[91] have attempted to increase the visibility of community-based DPP programs, yet the success of these programs is unknown. Further, there are often not enough DPP spots available for patients, so scalability remains an issue. To ensure that the original DPP principles are maintained throughout adaptations, policy must fund preventive health - rather than

management of current chronic illness - in a culturally adaptive manner to ensure relevancy and usefulness to those seeking lifestyle change.

Another lifestyle intervention example is the Heart Health 4 Moms program, which is a virtual lifestyle intervention to reduce cardiovascular risk after a pregnancy complicated by preeclampsia.[92] This intervention includes personalized lifestyle coaching, online community forums, and resources such as videos of exercises that can be done with infants, whose presence may compound barriers to physical activity. Although this intervention demonstrated considerable success across the US, many participants were White with high levels of education, thus limiting the generalizability to minoritized racial and ethnic individuals who bear the largest burden of APOs.

Healthcare system-based interventions to promote long-term health

Many healthcare system-based interventions that occur in the early postpartum period, described previously, are also relevant for long-term health and connection to primary care. For instance, a mutual goal of patient navigation and postpartum transition clinics is to connect postpartum individuals to primary care.[86,89] In one study, patient navigators directly connect patients to a primary care office and provide the clinician with a high-level summary of the patient's immediate and long-term clinical needs via the EHR.[86] Postpartum transition clinics operate in a similar fashion.[89] However, a unique advantage of patient navigation is that it can be successfully implemented without requiring clinicians to perform duties beyond routine clinical care, thereby improving clinic efficiency.[82] Additionally, the patient navigator routinely checks in with the patient regarding individual barriers to care and clinical goals such as postpartum weight loss, thus helping patients achieve their goals and provide resources, such as nutritionist referrals, local DPP programs, or lifestyle medicine resources.[83]

In 2018, the Bridging the Gap program was developed at an urban, academic medical center; postpartum individuals with APOs were routed through a referral pathway to a general internal medicine practice via a warm handoff between the obstetrician and primary care clinician.[93] This program was well received and demonstrated pilot success in connecting patients to care, yet disparities in receipt of primary care persisted, suggesting that more intensive strategies to identify and address social determinants of health are needed in concordance with institutional referral pathways. The bundling of multiple strategies - such as variations of navigation along with referral pathways - may be the optimal next step to reduce inequities for patients at greatest risk.

5. Conclusions and future directions

Racial and ethnic disparities in APOs are well documented, yet evaluation of interventions to optimize care after birth and eliminate these disparities are limited. In this review, we center on promising interventions that clinicians may be interested in implementing. Making significant strides in postpartum and long-term health after APOs requires consideration of the unique needs of marginalized populations and subsequently developing targeted interventions. We have outlined key recommendations (Box) to consider when looking to implement an intervention in one's community. Additionally, it is essential that health

care policies, such as insurance coverage, paid parental leave, and funding for maternal health research, remain focused on the importance of this life stage and the unique needs of populations at risk for adverse long-term health outcomes after APOs. To achieve health equity, continued research must recognize and prioritize addressing racial and ethnic disparities in postpartum and long-term health after an APO.

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Box.

Key recommendations for the development of an equity-focused intervention targeted to improve postpartum follow-up, care coordination, and long-term health after an adverse pregnancy outcome

Key Questions	Recommendations
How can community perspectives remain forefront in intervention development?	Engage stakeholders (e.g., patients, physicians, social workers) in the development, implementation, and evaluation of the intervention. Consider community leadership and/or community advisory boards.[19]
Is the intervention designed to be adaptable and flexible?	Consider the importance of constant adaptation through continuous evaluation. Changing social, medical, financial, and structural contexts may alter needs.
How can interventions be extend beyond pilot and research phases?	Develop interventions with a focus on long-term sustainability, funding, leadership, and infrastructure. Implementation characteristics such as sustainability features must be a component of initial planning.
Is the intervention improving health outcomes or reducing health disparities?	Improving health and reducing health disparities are not synonymous. Remember that not all health promotion interventions reduce inequities if the intervention does not consider those with disproportionate burden of disease risk.

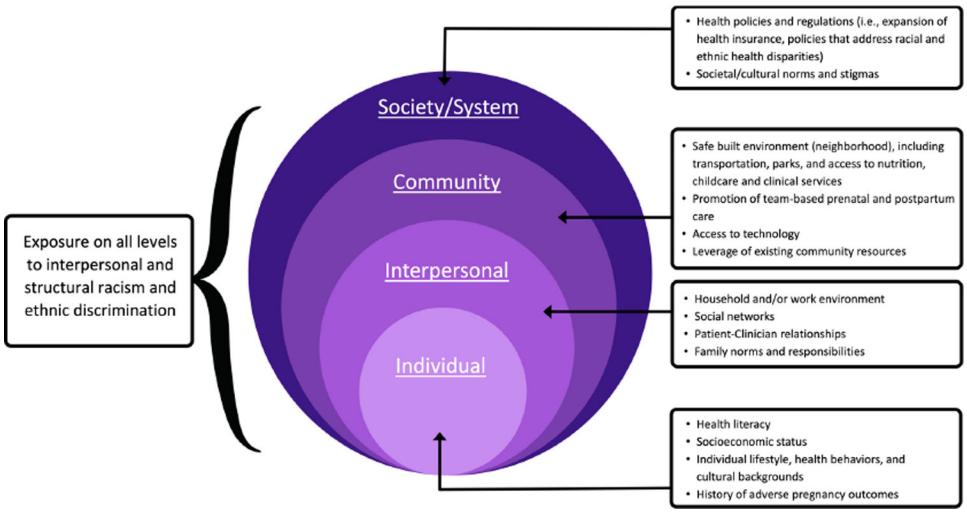

Figure 1.

Considerations for developing an intervention from a health equity perspective for postpartum individuals with APOs, guided by the socioecological model.

Table 1.

Characteristics of postpartum interventions to improve monitoring, screening, and follow-up among postpartum individuals after an adverse pregnancy outcome.

Category	Type of intervention	Definition	Postpartum population	Description of example interventions	Summary of results
Technology-based interventions	Virtual reminders	Text or EHR reminders for postpartum screening and follow-up testing; can be on the patient or clinician level	GDM[40,60–65] and HDP[66]	• Patient reminders: phone calls or SMS texts for OGTT or home blood pressure monitoring[60,62,63,66] • Clinician reminders: EHR notification for OGTT on patient's summary screen,[61] GDM coded at discharge diagnoses[65]	• Increase in completion of postpartum OGTT[60,62] • No change in postpartum OGTT completion[61]
	mHealth monitoring	Mobile health technologies for remote patient monitoring	HDP[66,70–73]	• Self-administered blood pressure and vital signs monitoring via Bluetooth systems linked to clinics[70,73] • Remote patient monitoring platform linked to EHR[71] • Text-based blood pressure monitoring using a home blood pressure cuff[66]	• Increase in return and follow up at medical facility[73] • High program retention rate[70,71] • Increase in postpartum visit attendance[71] • Text-based monitoring was more effective in obtaining blood pressures compared with traditional office-based follow-up[94]
	mHealth education and support	Mobile health technologies for patient education and support	GDM[78] and HDP[80]	• mHealth application with diabetes curriculum[78] – Appointment tracking and reminders; motivation and goal-setting activities – Connects patients to community-based food, exercise, and social support resources • Team-based gamification intervention encouraging step-count goals[80]	• High program retention rate • Positive patient feedback regarding usability, feasibility, and features • Increase in mean daily steps and achievement of step goals[80]
Healthcare system-based	Medical home model	Joint postpartum visits and 2-month well infant visits	GDM[81]	• Joint scheduling of postpartum visit and 2-month well infant visits[81]	• No difference in postpartum visit attendance, completion of OGTT, but small sample size and many participants actually were not jointly scheduled[81]
	Patient navigation	Barrier-focused, patient-centered intervention that offers support related	General population and GDM[82,86]	• Patient navigator works with the patient to reduce barriers and create a postpartum care plan	• Increase in postpartum attendance[82]

Category	Type of intervention	Definition	Postpartum population	Description of example interventions	Summary of results
		to general postpartum health and T2D prevention		• For patients with GDM: Assistance in scheduling and reminding patient of OGTT, assistance with T2D prevention lifestyle change[86]	• GDM-specific study is ongoing[86]
	Postpartum transition clinics	Specialized outpatient care clinics for individuals who had complicated pregnancies	HDP[87,89]	• Creation of a Cardiometabolic Clinic that is a postpartum transition program led by an internal medicine clinician – Home blood pressure monitoring with routine clinic review – Discussions about nutrition, heart healthy lifestyle, cardiovascular disease risk, and importance of primary care – Insurance reimbursement model	• High postpartum visit • Increase in the provision of blood pressure monitors

EHR, electronic health record; GDM, gestational diabetes mellitus; HDP, hypertensive disorders of pregnancy; SMS, short message services; OGTT, oral glucose tolerance test; mHealth, mobile health; T2D, type 2 diabetes.

Table 2.

Brief overview of selected US health policy initiatives to improve access to health care in the postpartum period.

Overarching aim	Name	Policy description and potential impact
Medicaid expansion and extending Medicaid coverage to one-year postpartum	Affordable Care Act 2014 Medicaid Expansion	State-dependent Medicaid expansion for adults at or below 138 percent of the federal poverty level and extended insurance eligibility preconception and 60 days postpartum; several studies have found that ACA Medicaid expansion increased postpartum Medicaid enrollment[100]
	American Rescue Plan Act of 2021	COVID-19 relief package facilitating the extension of pregnancy-related Medicaid coverage from 60 days to 1 year postpartum;[101] supports continuity of insurance coverage postpartum
Addressing racial disparities in maternal health	Preventing Maternal Death Acts of 2018	Authorizes $12 million a year in funds for 5 years for states to establish and financially support maternal mortality review committees; facilitates investigation of maternal deaths via review and the collection of data to study maternal mortality causes and avenues for prevention[102]
	Prematurity Research Expansion and Education for Mothers who deliver Infants Early (PREEMIE) Reauthorization Act of 2018	Aims to address birth outcome disparities among Black individuals; helps provide funding for federal services and research on preterm neonates and their families to close existing racial equity gaps in obstetric and postpartum health[103]
	Black Maternal Health Momnibus Act of 2021	Aims to address racial and ethnic disparities in maternal health outcomes and mortality with 12 standalone bills with goals such as improving data collection, investing in digital healthcare, and funding community-based initiatives[104,105]
State-specific policy initiatives for advancing maternal and child health	An Act Improving the Quality of Health Care and Reducing Costs through Increased Transparency, Efficiency, and Innovation 2012 (Massachusetts)	Aims to control healthcare costs via the adoption of novel delivery system and payment models, investments in preventive care programs, and implementation of assessment measures to ensure the quality of health care services[106]
	California Pregnancy Associated Mortality Review (CA-PAMR)	Funded by the California Department of Public Health and Maternal, Child and Adolescent Health Title V Maternal and Child Health Block Grant, the review committee that uses a mixed-methods approach for the investigation of maternal deaths in order to inform future prevention strategies and policies; promotes improved accuracy for identifying the cause of pregnancy-related deaths associated with racial disparities and further insight into cardiovascular disease as one of the primary causes of pregnancy-related mortality[107]

COVID-19, coronavirus disease 2019.

Table 3.

Characteristics of interventions to improve primary care transition and long-term health after an adverse pregnancy outcome.

Category	Type of intervention	Definition	Postpartum Population	Description of example interventions	Summary of results
Lifestyle interventions	Diabetes Prevention Program (DPP)	Adaptation of the DPP, a lifestyle modification intervention to prevent future T2D; can be web-based, in-person, or in print	GDM[95–98]	• Lifestyle modification program with core modules focused on dietary changes, increased physical activity, and diet and activity tracking with a lifestyle coach	• Reduced postpartum weight retention[96,97,99] • Increase in physical activity[96,97] • Decreased dietary fat consumption[96,97]
	Lifestyle intervention	Web-based intervention with modules on healthy eating and physical activity; personalized coaching with a dietician	HDP[92]	• Lifestyle modification program with modules focused on improving diet, physical activity, and identification of promoters and barriers to adopt a healthy lifestyle; community forum for peer support	• Improved knowledge of CVD risk factors[92] • Increased self-efficacy for healthy eating[92] • Decrease in physical inactivity[92]
Health care system-based interventions	Patient navigation	Barrier-focused, episode-specific, patient-centered intervention that offers support related to T2D prevention	GDM[86]	• [See Table 1 for additional description] • Navigators motivate patients on weight loss goals, provide primary care referral (if needed), assistance in scheduling appointments, generation of a primary care plan to share with clinician	• Study in progress
	Postpartum transition clinics	Specialized outpatient care clinics for individuals who had complicated pregnancies	HDP[89]	• [see Table 1 for additional description] • Patients were provided with a primary care referral (if needed), a letter from the internist to the primary care clinician with suggested guidelines, and patient reminders to schedule visit	• All patients received a primary care follow up plan
	Primary care transition task forces	Collaboration between obstetricians, diabetic nurses, and primary care clinicians	GDM, HDP[93]	• Development and implementation of a referral pathway to a primary care clinic for postpartum patients; system of warm handoffs between obstetric and primary care clinicians	• Improvements in receipt of primary care within 1-year postpartum • No change in racial and ethnic disparities

T2D, type 2 diabetes; GDM, gestational diabetes mellitus; HDP, hypertensive disorders of pregnancy