

Recommendations
to reduce
Preterm Birth
in Colorado



COLORADO
Department of Public
Health & Environment

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Executive Summary

In the United States, 25,000 infants die every year, including nearly 400 in Colorado where prematurity and related conditions contribute to more than one-third (38 percent) of all infant deaths. Prematurity is a complex health problem; it is not a single disorder and does not have a single solution. Therefore, as part of a collaborative effort to reduce infant mortality, stakeholders from across Colorado convened to develop a set of medical and public health recommendations, including changes to state-level systems and policies in order to prevent and reduce preterm birth. In alignment with national, evidence-based guidelines, the work group identified the following recommendations:

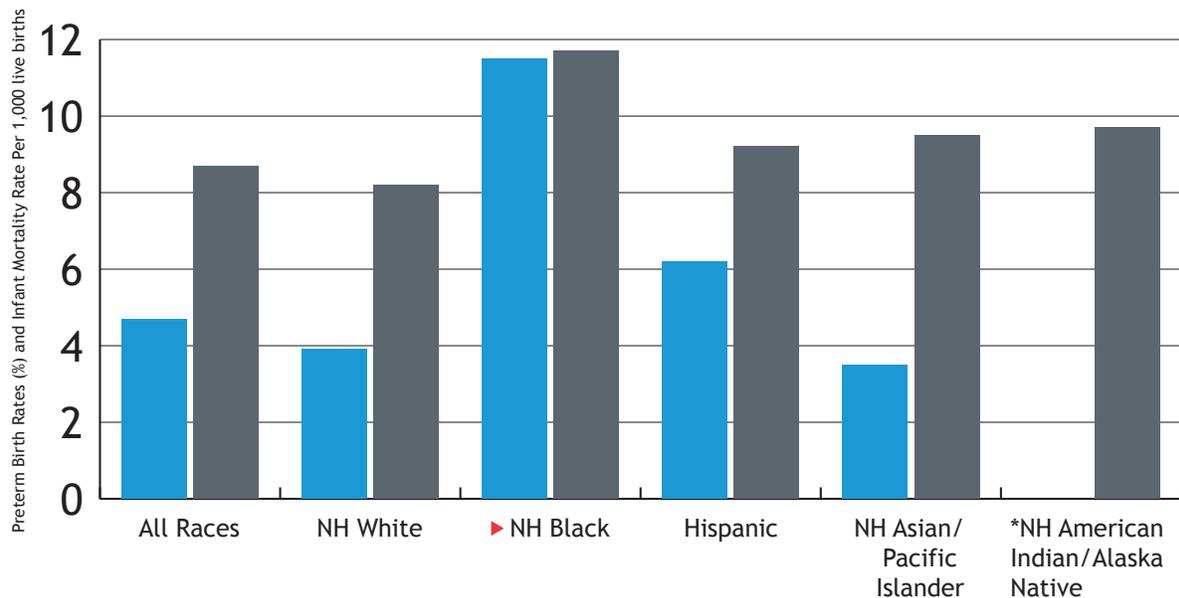
Chronic stress	Reduce root causes of chronic stress, including institutional racism, poverty, trauma, and violence.
Access to services	Ensure access to culturally relevant and needed healthcare services, with emphasis on high risk populations, using a patient-centered medical home approach.
Preventive care	Provide preventive care for women of reproductive age before, during, and after pregnancy to address modifiable risk factors for preterm birth.
Planned pregnancy	Promote planned pregnancy.
Contraceptive use	Increase access to and uptake of long-acting reversible contraceptives (LARCs).
ART risks	Increase provider and patient knowledge regarding the risks of Assisted Reproductive Technology (ART).
Tobacco use	Encourage cessation of tobacco and other substances.
Mental health	Improve access to and information on mental health and well-being.
Medical interventions	Support medical interventions to identify risk and prevent preterm birth.
Access to 17P	Promote appropriate access and use of 17 α -hydroxyprogesterone (17P) to help prevent preterm birth.
Technology	Promote use of technology to help healthcare providers optimally manage preterm birth risks.

Introduction

The infant mortality rate is one of the most important indicators of the health of a nation. The United States has one of the worst infant mortality rates, currently ranked 131st of 184 countries, falling between Timor-Leste and Thailand and far behind nations including Burkina Faso, Afghanistan, and Ethiopia. For every 1,000 babies born in the United States in 2010, six died before their first birthday.

Being born too soon is an unrecognized killer. Premature birth, or a birth before the 37th week of pregnancy, is the leading cause of newborn deaths in Colorado (38 percent) and can contribute to lifelong problems in health and development among survivors. While Colorado's preterm birth rate has decreased from 11 percent in 2009 to 8.4 percent in 2014, troubling and persistent disparities in preterm birth rates exist among different racial and ethnic groups (Figure 1).

Infant Mortality and Preterm Birth Rates by Race/Ethnicity
Colorado Births, 2015



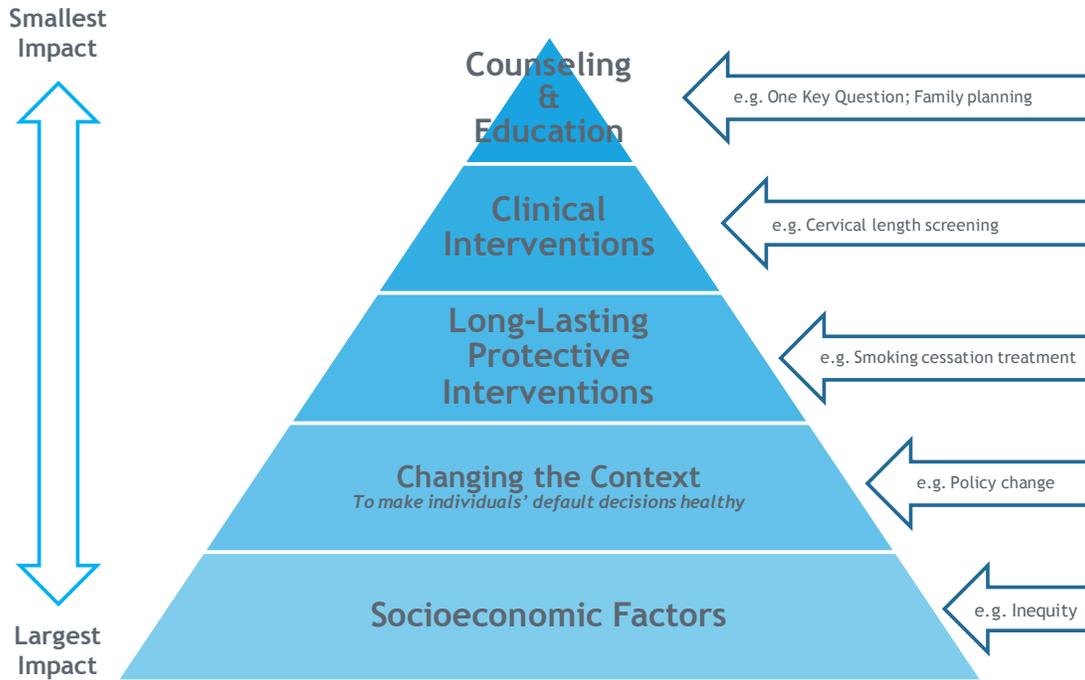
● Infant Mortality Rate ● Preterm Births (%)

NH = Non-Hispanic
*Data Suppressed due to low numbers
Source: Vital Statistics Program,
Colorado Department of Public Health
and Environment

Prematurity is a complex health problem; it is not a single disorder and does not have a single solution. Prevention strategies need to address contributing factors at every level - from racism to clinical interventions. Therefore the Colorado Department of Public Health and Environment and March of Dimes convened a group of multi-disciplinary stakeholders from across the state to develop a set of evidence-based medical and public health recommendations, including system and policy changes, to prevent and reduce preterm birth in Colorado.

A host of socioeconomic, biological, and environmental factors contribute to a woman's risk for preterm delivery. To address the many variables, the Work Group developed a series of multi-disciplinary recommendations that mirror the comprehensive range of approaches presented in the U.S. Centers for Disease Control (CDC) Health Impact Pyramid [i].

CDC Health Impact Pyramid



Frieden, TA. Framework for Public Health Action: The Health Impact Pyramid. *AM J Public Health*. 2010; April; 100(4): 590-595.

Each recommendation has a role in preventing preterm birth; some can be incorporated into one-on-one clinic visits with women and others require broader, societal changes to improve policies and systems that contribute to health.

Citation

1. [i] Frieden T (2010). A Framework for Public Health Action: The Health Impact Pyramid. *Am J Public Health*. 2010 April; 100(4):590-595.

Recommendations

Chronic Stress

Reduce root causes of chronic stress, including institutional racism, poverty, trauma, and violence.

Across the span of the past thirty years, infant mortality rates have decreased in Colorado, yet racial gaps still persist. In 2014, the African American infant mortality rate (13 percent) was still nearly three times the rate of White, non-Hispanic (3.4 percent), Hispanic (3.7 percent), and non-Hispanic, Asian infants (4.5 percent) [1]. Such racial and ethnic disparities have endured for decades. Historically, researchers regarded this as an outcome of socioeconomic or behavioral differences given the impact an environment has on an individual's health [2, 3]. In fact, it is estimated that the vast majority (70 percent) of health disparities are driven by factors like education, housing, and economic status [4].

However, contemporary research highlights that even when controlling for such differences, there is still wide variation in preterm birth rates among African American women and other races [5, 6]. Although the risk of preterm birth decreases with an increasing level of educational attainment among non-Hispanic white women, African American women with more than 16 years of educational attainment still have substantially higher preterm birth rates than non-Hispanic white women with less than nine years of education [5]. The impact of preterm birth on African American women is especially troubling given that the preterm birth rates among African women who immigrate to the U.S. are the same as non-Hispanic white women [6]. Yet, within one generation of living in the U.S. their daughters are at risk of having premature babies at rates on par with African American women [7]. An increasing body of research has found that a lifetime exposure to racial discrimination is largely responsible for the higher preterm birth rates [4, 5].

A lifelong accumulated experience of racial discrimination by African American women constitutes



an independent risk factor for preterm delivery [5]. Michael Lu and colleagues explain that the chronic stress associated with being a minority in the United States, particularly being African American, increases the risk of delivering a

African American women with more than 16 years of educational attainment still have substantially higher preterm birth rates than non-Hispanic white women with less than nine years of education

premature infant [8]. The risk of preterm birth among African American women may be related to increased exposures to stress during pregnancy and possibly related to the cumulative effects of stress over their life course. Therefore, closing the racial gap in birth outcomes requires a life course approach, addressing both early life disadvantages and the cumulative impacts of stress on women during pregnancy.

The factors contributing to preterm birth are multi-factorial. Rates reflect a society's commitment to the provision of high quality healthcare, adequate food and good nutrition, safe and stable housing, a healthy psychological and physical environment, and sufficient income to prevent poverty. To fully address such determinants, a "life course" perspective should be adopted in recognition that early influences have a lifelong and cumulative impact. Addressing social determinants broadly can improve health outcomes, including preterm birth.

Recommendations

Raise awareness by sharing information about the effects that racism and marginalization have on health outcomes.

Invest in and support communities through job-skills training, adequate housing, access to nutritional food sources, and family-centered support services.

Support policies that improve access to a livable wage, parental leave, and sick leave for working families.

Connect women to support systems throughout the prenatal and postpartum periods, including engagement with fathers, partners, family, and community.

Support preconception, prenatal, and inter-conception programs that address coping strategies.

Invest in mechanisms for dealing with chronic stress, poverty, and racism.

Citations for chronic stress section:

1. Colorado Department of Public Health and Environment [CDPHE] (2015). Colorado Infant Mortality Data Dashboard 2015. Vital Statistics Program. Available from: https://www.colorado.gov/pacific/sites/default/files/LPH_MCH_Infant-Mortality-Data-Dashboard.pdf.
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Access to Service

Ensure access to culturally relevant and needed healthcare services, with emphasis on high risk populations.

The disproportionately high burden of preterm birth among racial and ethnic minorities, considered alongside Colorado’s increasingly more diverse population, means healthcare providers, systems, and policy makers need to implement culturally competent services. Cultural competence is defined as the ability of providers and organizations to effectively deliver healthcare services that meet the social, cultural, and linguistic needs of patients [1]. While traditional medical interventions, like prenatal care, offer a means to identify and respond to problems that threaten the health of the fetus, they will not suffice.

Multiple studies have shown that increased levels of social support, especially for African American women, can significantly decrease the risk of delivering a baby preterm [2, 3]. Among other benefits, social support has been proven to decrease intermediary factors, like anxiety and depression, which are associated with preterm birth [3]. While it is difficult to quantify social support in studies, randomized controlled trials have found group prenatal care models to be an effective means of providing social support.



Through models like Centering Pregnancy®, women receive support from professionals, other pregnant women, family members, friends, or her partner, which ultimately improve outcomes such as anxiety, satisfaction with care, awareness and knowledge of risk conditions, and engagement in health-promoting behaviors [4].

...preterm delivery was lower in group care than traditional care, especially among African American women.

Similarly, studies have found preterm delivery was lower in group care than traditional care, especially among African American women [5]. The racial disparity in preterm birth for African American women enrolled, relative to Hispanic women and non-Hispanic white women, was diminished for the women in group care [6].

In Colorado, more than a third (38 percent) of the almost 1 million Colorado residents (n=798,923) who speak a language other than English, report they speak English less than “very well” [7]. Language and communication barriers can affect the amount and quality of

healthcare received, with nearly nine percent of the U.S. population at risk for an adverse event (e.g. misuse of medication) because of language barriers [8]. Studies have found that use of family members as translators has led to language and communication problems, poor comprehension and adherence, and lower quality of care [8,

9]. Medical terminology can be complicated and requires a trained medical translator to be present. Additionally there are not always one-to-one translations of words between different languages. For instance, the Spanish language does not have a specific translation for the word “stress”, meaning that without a trained translator present the provider may not be identifying critical risk factors [3]. Such cultural variations underscore the need for provider education opportunities to enhance cultural competency and better connect women to appropriate care.

Recommendations

Link families to additional social support and community resources, including home visitation programs.

Expand availability of group prenatal care programs, such as Centering Pregnancy®, which has been shown in the literature to reduce preterm birth, in particular among African-American populations.

Increase access to language translation services in healthcare settings.

Identify and implement provider education opportunities to enhance cultural competency, including culturally and linguistically appropriate service delivery and training on implicit bias.

Citations for access to service section:

1. Betancourt JR, Green AR, & Carrillo JE (2002). Cultural competence in health care: Emerging frameworks and practical approaches. New York: The Commonwealth Fund.
2. Dole N, Savitz D, Hertz-Picciotto I, Siega-Riz AM, McMahon MJ, & Buekens P (2003). Maternal stress and preterm birth. *Am J Epidemiol* 2003. 157(1):14-24.
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9. Georgetown University Health Policy Institute (2004). Cultural Competence in Health Care: Is it important for people with chronic conditions? Issue Brief No. 5, Feb 2004. Available from: <https://hpi.georgetown.edu/agingsociety/pubhtml/cultural/cultural.html#1>.

Preventive Care

Provide preventive care for women of reproductive age before, during, and after pregnancy to address modifiable risk factors for preterm birth.

Prematurity is a complex health issue, with many contributing factors. Extensive research however, has found that certain modifiable conditions like nutritional status, substance use, and diabetes can increase a woman's chance of delivering preterm if not addressed [1]. Prevention of preterm birth can best be accomplished if these conditions are addressed prior to pregnancy. Ideally, a woman's reproductive needs are addressed during a preconception health visit. However, because women often do not seek care until they are already pregnant, it is important for practitioners to use all healthcare encounters as an opportunity for preventive preconception healthcare and education [2].

The prevention of each modifiable risk factor requires a different set of interventions, often across many healthcare disciplines, including visits to the dentist as even poor oral health is associated with preterm birth [3, 4]. Thus, it is important for all providers to ask a woman about her pregnancy intention to more fully support her reproductive health goals and reduce the risk of adverse health



Conditions like nutritional status, substance use, and diabetes can increase a woman's chance of delivering preterm if not addressed.

outcomes for the woman and her offspring.

Because reproductive capacity spans almost four decades for most women, optimizing women's health before and between pregnancies is an ongoing process that requires access to and the full participation of all segments of the healthcare system (ACOG Committee Opinion No.313) [5]. As concluded by Lu and colleagues, preterm birth cannot be effectively prevented by prenatal care in its present form. Preventing preterm birth requires a reconceptualization of prenatal care

as part of a longitudinally and contextually integrated strategy to promote optimal development of a woman's health not only during pregnancy, but over the life course [6].

"It is not a question of whether you provide preconception care, rather it's a question of what kind of preconception care you are providing."

- Joseph Stanford and Debra Hobbins, *Family Practice Obstetrics*, 2nd ed. 2001 [7]

Recommendations

Implement “The One Key Question®” initiative so providers are asking women at every medical visit ‘Would you like to become pregnant in the next year?’ (e.g. Every Woman California campaign) [8, 9].

Discuss risks for preterm birth and counsel women on lifestyle choices, comorbidities, and healthy body weight.

Counsel parents following a preterm birth on ways to reduce the risk of a preterm delivery in future pregnancies (e.g. 17P, birth spacing, and contraceptives).

Screen for food insecurity, tobacco and substance use, and interpersonal violence and refer to services when indicated [10, 11].

Promote use of the Guideline for Preconception and Interconception Care among providers [12]

Citations for preventive care section:

1. Hendler I, Goldenberg RL, Mercer BM, Iams JD, Meis PJ, Moawad AH, et al. (2005). The Preterm Prediction Study: association between maternal body mass index and spontaneous and indicated preterm birth. *Am J Obstet Gynecol.* 2005;192:882-6.10.1016/j.ajog.2004.09.021
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Planned Pregnancy

Promote planned pregnancy

According to the most recent published estimates, 42.8 percent of pregnancies in Colorado were unintended [1]. This was even higher among some groups, with nearly two-thirds (63.3 percent) of women on Medicaid reporting their pregnancies were not planned [1]. Unintended pregnancies are associated with an increased risk of adverse pregnancy outcomes, including preterm birth and delivery of low birthweight infants [2]. In a large systematic review, researchers found increased odds of preterm birth among those with unintended pregnancies ending in live birth compared with intended pregnancies [3].

Women with inter-pregnancy intervals of less than 18 months are 14 to 47 percent more likely to have premature infants than those who waited longer to conceive [4, 5]. For each month that the inter-pregnancy interval was less than 18 months, preterm births increased 1.9 percent, low birthweight increased 3.3 percent, and poor intrauterine growth increased 1.5 percent [4, 5]. Therefore, promotion of planned pregnancies at appropriate intervals serves as an opportunity to reduce the subsequent incidence of preterm delivery.

Recommendations

Support preconception planning across the reproductive life course, including patient and provider understanding of contraceptive methods.

Support and educate women and men on their ability to plan the number and timing of children.

Promote standard educational messages for women and men, including youth, regarding pregnancy planning and appropriate birth spacing through use of educational websites, phone applications and other resources.

To reduce the incidence of teen births:

Educate youth about available contraceptive methods and their effectiveness, including emergency contraception and long-acting reversible contraceptives (LARC).

Educate providers around the statutes regarding parental consent for administration of birth control methods to those younger than 18 years.

Expand access to school-based health centers and promote their use as platforms for education.

Citations for planned pregnancy section:

1. Colorado Pregnancy Risk Assessment Monitoring System [PRAMS], Colorado Department of Public Health & Environment [CDPHE], 2013.
2. Institute of Medicine (US) Committee on Understanding Premature Birth and Assuring Healthy Outcomes; Behrman RE, Butler AS, editors. Preterm Birth: Causes, Consequences, and Preventing. Washington (DC): National Academies Press(US); 2007. 3. Behavioral and Psychosocial Contributors to Preterm Birth.
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Contraceptive Use

Increase access to and uptake of long-acting reversible contraceptives (LARCs).

Long-acting reversible contraceptive (LARC) methods - namely intrauterine devices (IUD) and implants - are the most effective forms of reversible contraception currently available (ACOG practice bulletin No. 121) [1]. Use of highly effective methods of contraception, such as LARC, has a significant impact on rates of unintended pregnancy. National studies have found that half of unintended pregnancies occur among women using a less effective form of birth control [2, 3].

In 2009, the Colorado Family Planning Initiative was launched, providing funding for 28 Title X Family planning agencies across the state to support the provision of LARC. This initiative reported an unprecedented 29 percent drop in births to low-income teens, and a subsequent decrease in preterm births [4]. When comparing birth outcomes to Colorado women in 2008 and 2012, researchers found a 12 percent decrease in the adjusted odds of preterm birth among women who received these services across the state [5].

It is estimated that 30 percent of girls across the United States will become pregnant before age 20, a number that jumps to 50 percent for African American or Latina teens [6]. In 2010, this resulted in a public cost of \$9.4 billion nationally [7]. Teen mothers are more likely than mothers over age 20 to give birth prematurely [7]. In Colorado, the overall preterm birth rate is 8.4 percent compared to 9.7 percent for women under the age of 20 [8]. Provision of LARC to reduce the prevalence of teen and unplanned pregnancies would lead to a decrease in the prevalence of preterm birth.

Recommendations

Support postpartum insertion clinical trainings to expand administration during the in-patient postpartum period and prevent rapid repeat pregnancies.

Increase provider education regarding LARC, especially for reimbursement and billing processes.

Publicize the cost and societal benefits of LARC to reduce preterm birth, especially among youth.

Citations for LARC section:

1. American Congress of Obstetricians and Gynecologists [ACOG] (2015). ACOG Practice Bulletin no. 121: Long-Acting Reversible Contraception: Implants and Intrauterine Devices. *Obstet Gynecol* 2011, reaffirmed 2015;118:184-96.
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ART Risks

Increase provider and patient knowledge regarding the risks of Assisted Reproductive Technology (ART).

Assisted Reproductive Technology (ART) services have increased steadily in the United States. ART is the technology to assist reproduction through fertility treatments in which both eggs and sperm are handled [footnote]. In Colorado, 3,262 women received infertility treatment between 2013 and 2014 [1]. While ART has enabled thousands of infertile couples to achieve pregnancy, it poses significant risk to both mother and infant, including preterm birth. In 2012, rates of prematurely born infants

While ART has enabled thousands of infertile couples to achieve pregnancy, it poses significant risk to both mother and infant

were almost 4 times (38 percent) higher among infants born through use of ART techniques than in the general population (10.4 percent) [2,

3, 4]. Central to this contribution has been an increase in the incidence of multiple

pregnancies due to ART. Women who undergo ART procedures, compared with those who conceive naturally, are more likely to deliver multiple infants [6, 7]. Being pregnant with more than one child poses substantial risks to both mother and infants, including obstetric complications, preterm delivery, and low birth weight infants [2 - 7].

Almost half (48.8 percent; n=562) of mothers who received ART in Colorado conceived twins or multiples in 2012 [7]. Compared with ART singletons, ART twins are approximately 4.5 times more likely to be born preterm, and approximately 6 times more likely to be born at a low birthweight [7]. Multiple pregnancies are not the only pathway by which fertility treatment can lead to preterm birth. Births conceived naturally after ART procedures are also associated with increased risks, like prematurity, independent of maternal age and fetal numbers [8]. Research has identified other obstetric and perinatal complications that may be a result of ART treatment, including an excess risk of birth defects when compared to spontaneously conceived children, further increasing the chance of obstetric intervention and preterm birth [9]. Therefore, the contribution of ART to preterm births in Colorado is a key concern.

Prematurity and Multiple Births		
Type of Pregnancy	Average Gestational Age at Time of Delivery	Average Birth Weight
Singleton	40 weeks	7 lbs (3,300 grams)
Twin	35 weeks	5.5 lbs (2,500 grams)
Triplet	33 weeks	4 lbs (1,800 grams)
Quadruplets	29 weeks	3 lbs (1,400 grams)
American Society of Reproductive Medicine, 2004		

Recommendations

Encourage single embryo transfer, especially among women under the age of 35.

Develop materials to assist providers in counseling women on the risks of ART, especially the increased chance of having multiples and preterm birth.

Identify and advocate for effective policies regarding infertility coverage among health plans.

Encourage providers to follow the American Congress of Obstetricians and Gynecologists recommendations regarding ART [10].

Citations for ART section:

Footnote: The definition used here is the one adopted by the U.S. Centers for Disease Control and Prevention based on the 1992 Fertility Clinic Success Rate and Certification Act. ART includes fertility treatments such as in vitro fertilization (IVF), gamete intrafallopian transfer, and zygote intrafallopian transfer. Approximately 99% of ART cycles performed are IVF. ART does not include treatments in which only sperm are handled (e.g. intrauterine insemination) or procedures in which a woman takes drugs only to stimulate egg production without the intention of having eggs retrieved.

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Tobacco Use

Encourage cessation of tobacco and other substances.

Smoking during pregnancy has long been known to be detrimental to the health of the fetus, including increasing the risk of preterm birth [1, 2]. In the US, about 1,000 infant deaths a year are attributable to prenatal smoking [3]. The percent of mothers who reported smoking during their pregnancy has declined in Colorado, from 9 percent in 2007 to 7 percent in 2013 [4, 5]. However, major disparities still exist. In 2013, 11 percent of births in rural counties occurred to women who smoked while pregnant, which is more than twice that of women in urban and mixed urban communities [4, 5]. In Sedgwick County, more than a quarter of all babies born in 2013 were to mothers who smoked while pregnant, in contrast to Eagle County where only 1 percent of births fell into this category [4, 5]. In Colorado, almost 1 out of every 10 babies (9.9 percent) born between 2013 and 2014 to mothers who smoked during pregnancy was premature [4, 5].

Smoking during pregnancy is the most serious and preventable cause of infant morbidity and mortality and has enormous economic and societal costs. Research has found that prenatal smoking is directly correlated to adverse infant outcomes, contributing to 5-8 percent of preterm deliveries, 13-19 percent of term low birthweight deliveries, 5-7 percent of preterm related deaths, and 23-34 percent of SIDS cases [6]. However, successful treatment of tobacco dependence can have a significant effect on pregnancy-related outcomes. In fact, a review of clinical outcomes for pregnant women who quit smoking revealed a 20 percent reduction in the number of low birthweight babies, a 17 percent decrease in preterm births, and an average increase in birthweight of 28 grams [7, 8]. Alcohol consumption during pregnancy negatively impacts fetal development and has been linked to an increased risk of preterm birth [9].

Smoking during pregnancy is the most serious and preventable cause of infant morbidity and mortality

Other illicit substances have also been shown to increase the risk for negative birth outcomes. The impact of cocaine has been most intensively studied, with cocaine users experiencing an approximately two-fold increased risk of preterm birth compared with non-users [9]. Emerging substances, like e-cigarettes, also pose a significant risk to the fetus [10, 11, 12, 13]. Just like regular cigarettes, these contain nicotine, and exposure to nicotine during pregnancy can increase the likelihood of delivering preterm. In Maryland, only 57 percent of pregnant women knew that e-cigarettes contained nicotine and less than two thirds thought that they could be addictive [10]. While many people view e-cigarettes as being safer than regular cigarettes, they are not regulated, so the chemical make-up and potential health risks are inconsistent and not well documented [14].

Psychosocial interventions like counseling, provision of health education, and increased social support have effectively increased the proportion of women who stop smoking in pregnancy. In a substantial number of studies (n=14), women who received psychosocial interventions had an 18 percent reduction in low birth weight infants and preterm birth [15]. In Colorado, there is considerable room to implement such interventions. While more than three quarters (77.4 percent) of women reported their prenatal care provider advised them to stop smoking during pregnancy, less than half (47 percent) of women who smoked during the three months before pregnancy discussed with their provider how to quit smoking, and even fewer were referred to counseling for help quitting (17.7 percent) or had it suggested that they set a specific date to quit (19.9 percent) [16].

Recommendations

Educate patients about the risks of substance use and abuse, including tobacco, and screen to identify such behaviors before and during pregnancy. Refer to services when indicated [17].

Educate providers about Medicaid tobacco cessation benefits for pregnant women who smoke.

Use the ACOG Clinician’s Guide to Helping Pregnant Women Quit Smoking to educate providers on the brief, evidence-based “5 A’s” model (Ask, Advise, Assess, Assist, and Arrange) for smoking cessation [18].

Provide pregnancy-tailored tobacco cessation counseling through continued implementation of the Colorado Quit Line’s pregnancy protocol [19].

Increase public awareness of the risks that emerging substances, like e-cigarettes, present to mother and fetus.

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Mental Health

Improve access to and information on mental health and well-being.

A growing body of research suggests that maternal psychological stress is associated with an increased risk for preterm delivery [1, 2]. For instance, depression during pregnancy is known to lead to harmful prenatal health behaviors such as poor nutrition, late entry into prenatal care, smoking, alcohol or other substance misuse, and risk of suicide [3]. Several adverse obstetric complications have been reported with untreated prenatal stress and depression, including pre-eclampsia, preterm delivery, low birth weight, miscarriage, small-for-gestational-age infants, and neonatal complications [3]. Nearly 1 in 10 Colorado women (10.5 percent) who gave birth between 2009 and 2011 experienced postpartum depressive symptoms since their new baby was born -

meaning nearly 21,000 children were born to mothers experiencing depressive symptoms [4]. Since 2003, the number of Colorado women reporting poor mental health (stress, depression, and anxiety) has not improved. In 2012, nearly 1 in every 5 (18.7 percent) Colorado women of reproductive age experienced 8 or more days of poor mental health in the past 30 days [5]. Effective treatment for women includes counseling, behavioral therapy, exercise, and antidepressants. However, half or fewer of depressed women receive a diagnosis or treatment [6, 7, 8, 9, 10].

Significant barriers exist for women to access needed mental health services. In Colorado, nearly 1 in 7 (13.3 percent) women indicated that there was a time in the last year when they needed mental health care or counseling services but did not get them [11].

1 in 10 Colorado women who gave birth between 2009 and 2011 experienced postpartum depressive symptoms since their new baby was born

Statewide, 61 of 64 counties are designated as a mental health professional shortage area, which is an increase from 55 in 2012 [12]. Similarly, 60 percent of Colorado women between the ages of 15 and 44 said that concern about cost kept them from getting needed mental health treatment [9]. However,

even when women are screened and referred for treatment, studies have shown that high degrees of stigma act as a major barrier to women seeking out needed mental health treatment. In 2015, nearly half (48 percent) of Colorado women who did not seek out needed mental health treatment said they did not feel comfortable talking with a health professional about their personal problems and more than a third (35 percent) said they were

concerned about what would happen if someone found out they had a problem [9].

Untreated symptoms can have grave consequences for women living with mental health ailments and negatively impact their pregnancy outcomes.

Women with depression and anxiety might avoid disclosing their symptoms and instead adopt unhealthy behaviors to help them cope with their distress (e.g. smoking, excessive substance use, binge-eating). To decrease a woman's risk of delivering preterm, the root causes of these morbidities must be addressed.



Recommendations

Screen, assess, and address maternal mental health and well-being during prenatal and postpartum visits [13, 14, 15].

Support behavioral health integration in prenatal and postpartum settings.

Identify co-occurring substance abuse issues through standardized, combined screening.

Improve access to mental health services.

Improve education and understanding of women's social and emotional wellness.

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Medical Interventions

Support medical interventions to identify risk and prevent preterm birth.

Pregnant women with a previous spontaneous preterm birth or with a short cervix in their current pregnancy are at a higher risk of delivering preterm. In fact, women with a prior preterm birth are 5 to 6 times more likely to have another preterm birth [1]. Early identification of pregnant mothers is vital to allow expanded risk screening, case management, enhanced services, and connections to community services [2]. In 2014, the Society for Maternal-Fetal Medicine (SMFM), American Congress of Obstetricians and Gynecologists (ACOG), and American College of Nurse-Midwives (ACNM) issued a joint letter to the head of the U.S. Department of Health and Human Services which clearly communicated their strong support for universal cervical length screening as part of a much needed, expanded preterm birth prevention strategy [3].

Early identification of pregnant mothers is vital to allow expanded risk screening, case management, enhanced services, and connections to community services.

ACOG and SMFM define transvaginal ultrasound (TVU) as the modality to diagnose short cervix. However, concerns about

the availability of trained examiners and appropriate use of risk screening are valid - particularly because overuse adds cost and potentially unnecessary treatment for women. ACOG and SMFM recommend examiners receive training from a certification program to address these concerns. Two studies found that universal cervical length screening to identify those with a short cervix is cost-effective and, compared to other managements including

no screening, universal screening of singletons was predicted to result in a reduction of 95,920 preterm births annually in the United States, with the potential to save anywhere from \$12 million to \$13 billion nationwide [4, 5, 6].

Recommendations

Adopt standard education and credentials for persons who perform ultrasound examinations of the cervix in pregnancy, like the Cervical Length Education and Review (CLEAR) Certification, to ensure accuracy of cervical length measurement and identification of women at risk for preterm birth due to a short cervix [7].

Encourage providers to follow established American Congress of Obstetricians and Gynecologists guidelines to prevent preterm birth.

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Access to 17P

Promote appropriate access to and use of 17 α -hydroxyprogesterone (17P) to help prevent preterm birth.

Eight hundred eighty out of 11,000 (8 percent) Colorado premature births are to mothers who have previously delivered preterm [1]. For women with a history of spontaneous preterm birth in a singleton pregnancy, appropriate use of 17- α -hydroxyprogesterone (17P) reduces the risk of recurrent preterm birth up to 42 percent [2]. Appropriate use of vaginal progesterone reduces the risk of preterm birth up to 50 percent for women with singleton pregnancies and premature cervical shortening in the second trimester [3]. Combined, obstetric history and mid-pregnancy cervical length shortening can identify more than 50 percent of patients who are at risk to deliver before 34 weeks if untreated [4]. Pooled data suggest that progesterone for women with previous preterm birth and with a shortened cervix can reduce composite adverse outcomes by 43 percent, neonatal death



by 52 percent, and neonatal intensive care unit (NICU) admissions by 61 percent [4]. An economic analysis concluded that \$19.6 million can be saved by screening 100,000 eligible pregnancies and treating short cervix patients with vaginal progesterone, taking into account pregnancy, neonatal, and longer term societal costs [5].

Progesterone has demonstrated efficacy in the reduction of recurrent preterm birth. Though difficult to measure, progesterone for this indication is likely underused. Colorado Medicaid health plans have covered progesterone for many years [6]. Efforts to improve preterm birth prevention should

include a review of potential or known barriers, including lack of awareness among providers, patient cost, and ease of acquiring the medication. Understanding the barriers to progesterone use can guide testable interventions to improve the care of women at risk.

For women with a history of spontaneous preterm birth in a singleton pregnancy, appropriate use of 17P reduces the risk of recurrent preterm birth up to 42 percent

Recommendations

Encourage providers to follow the American Congress of Obstetricians and Gynecologists [7], Society for Maternal-Fetal Medicine [8], and American College of Nurse-Midwives [9] guidelines regarding administration of 17P to increase knowledge about a patient's eligibility for 17P.

Increase insurance coverage for 17P.

Educate patients and providers on the eligibility and coverage for 17P across Colorado insurance plans.

Identify and remove barriers to administration of 17P, which may include lack of access to the medication at the health facility level, patient cost, barriers to the provision of 17P through home visitation programs, and other issues inhibiting access, such as geography. Work to address necessary policy or process changes.

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Technology

Promote use of technology to help healthcare providers optimally manage preterm birth risks.

The diverse landscape of Colorado encompasses rugged mountainous terrain, vast plains, desert lands, desert canyons, and mesas, introducing unique geographic obstacles to accessing healthcare throughout the state. Almost three quarters of Colorado's landmass (73 percent) is rural, with the average rural county covering nearly 1,670 square miles - a space larger than the state of Rhode Island [1]. Thirteen counties lack a hospital, two of which are also without a health clinic [1]. Access to healthcare for rural residents is complicated by patient factors as well as those related to the delivery of care. Rural residents are more likely to be poor, lack health insurance, or rely on Medicaid; they also travel longer distances to receive care or to access a range of medical, dental, and mental health specialty services [2].

In 2008, only 6.4 percent of the country's obstetrician-gynecologists practiced in rural settings [3]. By 2010, almost half (49 percent) of the 3,143 U.S. counties lacked an obstetrician-gynecologist [3]. This national trend extends to Colorado, where only 4 percent of the physicians who practice in rural areas are specialized in obstetrics or gynecology [4]. In some rural areas, family physicians provide obstetric care. Yet, wide variations exist in Colorado's primary care workforce.

Only 4 percent of the physicians who practice in rural areas are specialized in obstetrics or gynecology.

Nine regions face significant and ongoing challenges in establishing adequate levels of primary care physicians, making it difficult for women in these rural areas to receive any form of prenatal care [5]. In fact, only 76 percent of women in rural counties received prenatal care in their first trimester - much lower than the 84 percent of mothers in mixed urban counties [4].

Rural Coloradans also face barriers to accessing healthcare in case of an emergency. On average, it takes an emergency responder 30 minutes to arrive to a rural emergency compared to an average of five minutes for an emergency in an urban area [1].

Such diverse and endemic challenges to receiving adequate healthcare in rural areas impact a mother's ability to obtain early prenatal care or specialized care in case of an emergency. These barriers compromise prevention efforts aimed to identify and intervene for women at risk of delivering preterm. In a state where the majority of land mass has been designated

as either a Medically Underserved Area and/or a Medically Underserved Population, it is important to explore new ways to deliver better and more cost-effective healthcare to remote areas [6]. Connecting women and providers in rural areas to specialized support can serve to bridge such gaps and improve the delivery of prevention efforts.



Recommendations

Use technology to support outreach, education, and training for providers and patients (e.g. applications, preterm birth risk calculators).

Use telemedicine platforms to overcome geographic barriers to continued education for providers in rural areas.

Develop a support line staffed by nurses with an established referring physician as backup to offer rural healthcare providers non-acute consultation.

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