

2012 Prematurity Symposium Synopsis

Utah Department of Health and Utah Chapter of the March of Dimes

2012 Prematurity Symposium Synopsis

The State of Utah has accepted the 2011 Association of State and Territorial Health Officials (ASTHO) President's Challenge to reduce the rate of premature births by 8% by 2014. The first step in the process was to bring together champions in the field to identify key issues and recommendations in achieving this goal. The Utah Prematurity Symposium, organized by the March of Dimes and the Utah Department of Health, was held on November 12, 2012. The speakers addressed ways to improve the health of babies and families through the interventions using a systems approach to reduce the rate of premature births in the state of Utah. The conference brought together leaders in neonatology, maternal-fetal medicine, reproductive endocrinology, researchers, policy advocates, government leaders, families affected by premature births, educators and public health professionals with the intention of developing a collaborative that will identify key factors which can effectively decrease the proportion of babies who are born too early in Utah. **The 2013 challenge is to reduce the rate of preterm births in Utah from 9.8% to 8.9% by December 31st 2014. To achieve this goal would mean preventing 600 preterm births in the state of Utah by 2014.**

The Goals of the Symposium

1. Encourage collaboration between agencies and communities for the prevention of preterm births and its consequences
2. Raise awareness of the scope of the problem in the state of Utah
3. Identify specific characteristics associated with preterm birth and associated long term consequences in the state of Utah
4. Identify the areas of focus and make recommendations for future interventions

Impact of Prematurity in Utah

- 1 in every 9 babies in Utah is born premature
- Prematurity increases chances of long term health consequences such as cerebral palsy, intellectual disabilities, chronic lung disease, and vision and hearing loss.
- Between 1998 and 2009 the rate of infants born premature increased from 10.2% to 11.3% in Utah
- The birth of a premature baby impacts not only the family, but society. The annual cost associated with preterm birth in the United States in 2005 was \$26.2 billion.

Prevention Ideas

- Reduce late preterm births with a standardized protocol for elective delivery only after 39 weeks' gestation
- Identify women with previous preterm births (including >16 weeks) to optimize prenatal care and track cervical lengths
- Optimize use of Progesterone--17p among women with a history of preterm birth
- Reduce unplanned pregnancies and optimize pregnancy spacing--Long Acting Reversible Contraception
- Reduce number of twins/triplets--Single Embryo Transfer Agreement
- Patient education: smoking cessation, prenatal care, increase interpregnancy interval, pre and post pregnancy weight loss, methods to reduce risk of prematurity, such as progesterone

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Symposium Agenda

- 7:30-8:00 Registration & Light Breakfast
- 8:00-8:15 Welcome-Representative Ronda Rudd Menlove
- 8:15-8:30 "Health Department Challenge"
David Patton, PhD
- 8:30-9:40 Keynote Speaker—"We Can Make s Difference"
Jay Iams, MD, Maternal-Fetal Medicine, University of Ohio
Medical Center, Co-Director Ohio Perinatal Project
- 9:40-10:00 "How is Utah Doing?"
Nan Streeter, MS, RN
- 10:20-10:40 "The Role of Preconception Care"
David Turok, MD, MPH
- 10:40-11:00 "Predicting Who Will Have A Preterm Birth?"
Erin Clark, MD
- 11:00-11:20 "The NICU Experience "
Bradley Yoder, MD
- 11:20-11:40 "Neonatal Follow-up Care"
Sarah Winter, MD
- 11:40-12:00 "Disparities in Perinatal Outcomes in our Community"
April Young Bennett, MPA
- 12:00-1:20 "A Family's Perspective"
Misty Bott
- 1:20-1:40 "The Role of the Educator"
Debbie Ballard, & Shaun Mower, Jordan School District
- 1:40-2:00 "What Does Research Tell Us?"
Michael Varner, MD
- 2:00-2:20 "Twins, Triplets & More"
Matthew Peterson, MD
- 2:30-3:45 Panel Discussion
- 3:45-4:30 "Fitting All the Pieces Together- Where Do We Go From Here?"
Sean Esplin, MD
- 4:30 Adjourn

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“Health Department Challenge”

W. David Patton, PhD – Executive Director, Utah Department of Health

As a member of the Association of State and Territorial Health Officials (ASTHO), Dr. Patton was invited to participate in a challenge from the 2011 ASTHO President, Dr. David Lakey. The challenge set before the states is to decrease prematurity in the United States by 8% by 2014. Dr. Patton has accepted this challenge and has declared that Utah will reduce its prematurity rate of 9.8% in 2009 to 8.9% in 2014. While prematurity in Utah is slowly declining, infant mortality is increasing. Utah’s infant mortality rate rose from 4.8 deaths per 1,000 live births in 2010 to 5.5 deaths in 2011.

The Utah Department of Health has also undertaken, as part of its strategic plan, the goal to be the Healthiest People in the nation. Utah is currently ranked number seven in the country by one source, but many factors point to Utah taking over that number one spot, such as the environmental and outdoor opportunities and a culture supporting and emphasizing good health. In order to take the “Healthiest People” title, Utah must confront its prematurity situation.

To reduce prematurity in Utah, collaboration is a necessary and important step. The March of Dimes, the Utah Department of Health, the University of Utah, Intermountain Healthcare and other key partners have committed to confronting and addressing premature births in Utah.

These collaborators will work together to increase awareness of mothers, identify at-risk women, encourage preconception health, and engage providers to take part in the reduction in prematurity. State leadership has already committed to being a part of the solution. Since accepting this challenge, Utah’s Governor Herbert has issued a proclamation declaring November 11th -17th as Prematurity Awareness Week. With this symposium and the collaboration occurring among the attending entities, Utah will address and achieve this important goal in reducing prematurity.

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“We Can Make a Difference--Ohio Perinatal Project”

Jay Iams, MD - Maternal Fetal Medicine Specialist, Ohio State Department of Obstetrics and Gynecology, Ohio State University; Co-director, Ohio Perinatal Quality Collaborative (OPQC).

Dr. Iams discussed the need to change the model of care in the field of obstetrics and gynecology. The old model of individualized tailored care is not working. Providers need to attack this problem from a **systems point of view**. Ohio began addressing perinatal problems using the system oriented approach with the three efforts described below.

Ohio Collaborative to Prevent Infant Mortality:

- 1) Ohio Better Birth Outcomes (OBBO): The primary goal of the OBBO is to reduce NICU days in central Ohio.
- 2) Ohio Perinatal Quality Collaborative (OPQC): OPQC is a statewide project with the primary goal of improving perinatal outcomes in Ohio.
- 3) Ohio Collaborative to Prevent Infant Mortality (OCPIM): OCPIM's goal is to reduce infant mortality in response to the governor's task force on infant mortality.

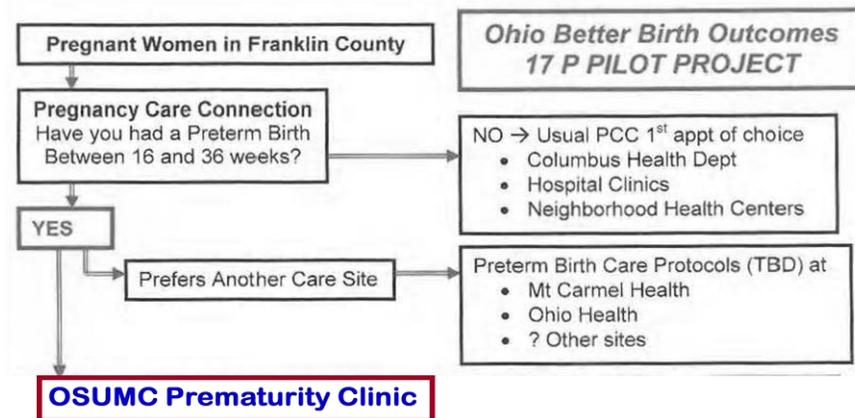
OBBO--Ohio Better Birth Outcomes

Central Ohio business leaders identified that high health care costs were creating barriers for the business climate. They identified that NICU care, specifically at the Children's Hospital, was the area with highest cost. Requests were made for the Central Ohio hospital council to identify the main issues and outline specific ways to reduce costs. The Children's Hospital found that neonatal abstinence syndrome and preterm births were the largest driver of NICU days and thus huge contributors to cost. The OBBO group, which consists of Central Ohio Hospital Council, Columbus Public Health, Columbus Neighborhood Health Centers, Franklin County Commissioners, Mount Carmel Health, Nationwide Children's Hospital, Ohio Department of Health, OhioHealth, and Wexner Medical Center selected the following outcomes as the focus of their efforts: NICU days and rates of infant mortality, perinatal mortality, preterm births (PTB) <37 weeks' and <32 weeks', school matriculation, and graduation. These outcomes are being analyzed by zip code, race/ethnicity, and trended over time.

Dr. Iams focused on a progesterone project which has already reduced preterm births in Ohio. The Progesterone Promotion Project's main goal is to improve 17P access for women with an increased risk for a preterm birth. The Progesterone Promotion Project targets women with a previous spontaneous premature delivery early in their next pregnancy. Previous preterm birth, for this project, is defined as any pregnancy ending between 16 weeks and 36 weeks. The expanded definition of preterm birth, to 16 weeks, is important for the purposes of data collection and creating systems change. Providers should use this criterion as a history of previous preterm birth when looking at risk factors for pregnant women. In this project, women at highest risk are given better access to early care. The Pregnancy Care Connection (PCC) is a phone service that schedules appointments, they ask every caller if they have had a previous premature birth and arrange expedited visits with an OBBO provider for those women. Earlier use of 17P among appropriate women has resulted in a significant reduction in the rate of recurrent preterm birth in Ohio.

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Figure 1. Patient Flow in the OBBO 17P Program



Who: Women with a prior spontaneous PTB due to the high recurrence rate 20-50% repeat PTB

Why: Appropriate 17P use can result in a 35% reduction in recurrent PTB (more effective than diet, prenatal care, vitamins, or stress reduction)

How: Identify the women at risk, provide education, and treat at-risk women aggressively.

Obstacles: Early access to prenatal care, access to medications, and provider uncertainty about who will benefit from 17P and when and how to prescribe 17P. There is a need emphasize the severity of preterm births among patients, providers, and the public.

Methods: Early first prenatal visit for women at risk (accelerated appointment for women with previous preterm births as determined by the Pregnancy Care Connection. Women can begin prenatal care at 7-8 weeks, the provider is to order 17P at 12 weeks and start it by 16 weeks.

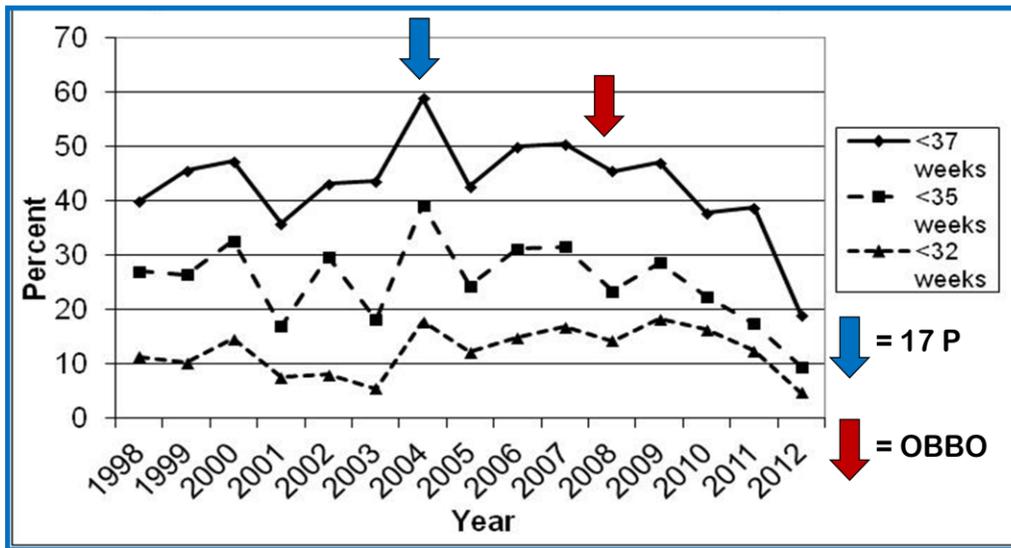
Lessons Learned:

- Design a 17P protocol tailored to site population
- Increase access to 17P and vaginal progesterone through the use of compounded formulas
- Continuous trouble shooting of problems as they arise
- Phone consultations as needed and creation of a common database.
- Collect data including process and outcomes from all sites.
- Share the data in a community website between collaborators--progesterin protocols, nursing protocols
- Develop an algorithm for who is eligible, how to give, and where to get progesterone.

Results: The rates of prematurity and the number of NICU days are decreasing for the first time in Ohio's history. OBBO is continuing the expansion of the Moms2Be program, the clinical prenatal education program as well as The Progesterone Project.

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Figure 2. Preterm Birth Trends - OSU Prematurity Clinic



OPQC--Ohio Perinatal Quality Collaborative

Dr. Iams emphasized the fundamentals of Quality Improvement (QI) science—identifying that 85% of unintended consequences result from the system itself; only 15% of consequences result from the individual. He stressed that we need to see “Variation in Outcomes” as an opportunity for improvement and understand that these variations are not typically explained by differences in population. Through ambitious goal setting and collaborative efforts we can accomplish more than if any single site tries to make these changes and the result will be larger improvements system wide.

Dr. Iams suggested the use of Key Driver Diagrams and Plan-Do-Study-Act (PDSA) Cycles in order to make changes for the better. He emphasized the need to ask the following questions:

1. What do we want (measurable outcome)?
2. What will make it happen (key drivers)?
3. How do we change the drivers (interventions)?

Dr. Iams emphasized the importance of rapid data collection and return of information using data so that systems can be accountable and more effective in their efforts.

2007	Conceived by Ohio Vermont Oxford Network Neonatologists
2008	Startup Grant funds from U.S. Department of Health and Human Services, Centers for Medicare and Medicaid Services Later grants from Ohio Dept. of Health, Centers for Disease Control, and March of Dimes
2008	Initial projects chosen by the sites <ul style="list-style-type: none"> • 24 level III NICUs - decrease NICU infections • 20 large OB hospitals - decrease inappropriate scheduled births less than 39 weeks
2010	Disseminate 39 week, birth certificate, antenatal steroid projects

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Ohio has partnered with their Department of Job & Family Services, State Department of Health, Vital Statistics, Medicaid, the American College of Obstetricians and Gynecologists (ACOG), the American Academy of Pediatrics (AAP), pediatricians, obstetricians and QI leaders to create the OPQC Central, which serves as a secure central de-identified data processing center. He stressed the importance of each of the participating hospitals having people regularly involved in the process including administrators, clinicians, and QI experts. QI experts can direct providers back to the key drivers and PDSA cycles. The collaborative holds monthly webinars and conference calls and joint learning sessions which encourage continued involvement in the process.

Lessons Learned: Dr. Iams emphasized the importance of person-to-person contact and forming relationships between sites and providers as well as the need to improve communications among pediatrics, obstetrics, data collectors, data users, data analysts. Dr. Iams suggested the use of birth certificate data as a QI instrument, with the understanding that use promotes accuracy, which in turn promotes use.

Challenges: It is important to have a well connected, committed clinical leadership in both obstetrics and pediatrics, population-based rapid response data system, access to one or two years of baseline data, support by state agencies and professional groups, centralized administrative infrastructure, and access to rigorous improvement science.

Goals and Outcomes of Current Projects: The current foci of the OPQC are the Obstetrics Antenatal Corticosteroids Project (ANCS), the 39-Week Delivery Charter Project, the 39-week/ Birth Registry Accuracy Project, Decreasing Bloodstream Infections, and the Human Milk Project.

The ANCS project is focused on increasing the use of antenatal corticosteroids as an evidence-based therapy shown to reduce mortality and morbidity among preterm infants to >90% of all eligible Ohio births at 24 0/7 to 34 0/7 weeks' gestation.

The 39-Week Delivery Charter Project, aimed at reducing unnecessary scheduled births less than 39 weeks gestational age in the 20 largest hospitals in Ohio, delayed an estimated 6,000 preterm births and avoided 180 NICU admissions in 2008.

The Registry Accuracy Project is aimed at approaching birth certificate inaccuracies in hospitals participating in the "39-week project" using a Quality Improvement (QI) framework. The neonatology decreasing bloodstream infections project is focusing on reducing bloodstream infections in premature infants in the NICU.

The Human Milk Project is currently a work group aimed at practice changes to begin to give human milk for most infants 22-29 weeks' gestation within 72 hours of delivery and educate on the benefits of human milk specifically for preterm high risk infants.

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Table 2. Key Features of a Successful Statewide Perinatal Improvement Collaborative.
Well-connected, committed, <u>clinical leadership</u> in both obstetrics and pediatrics ($\geq 25\%$ effort)
<u>Population-based</u> rapid response data system
Access to one or two years of <u>baseline data</u>
Support by <u>state agencies & professional groups</u>
Centralized <u>administrative infrastructure</u>
Access to rigorous <u>improvement science</u> expertise
Integration of <u>community and academic</u> providers
Open to idea of <u>transparent sharing</u> of results

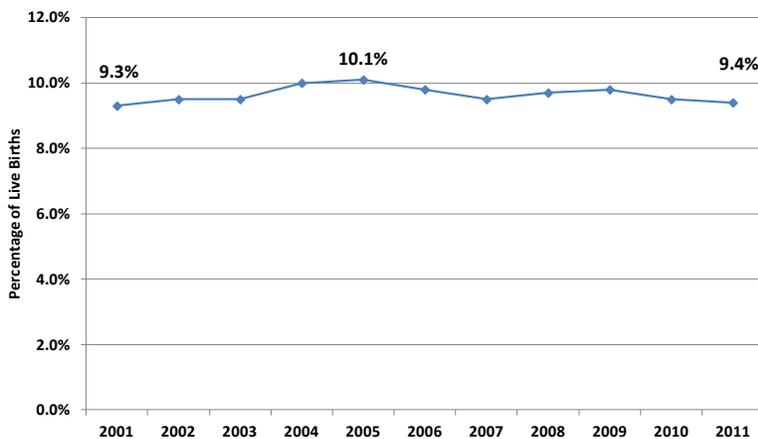
“The State of Prematurity in Utah”

Nan Streeter, MS, RN - Deputy Division Director, Family Health and Preparedness; Director, Maternal and Child Health Bureau, Utah Department of Health.

In order to approach the challenge set by ASTHO, one must be cognizant of what is happening in Utah in regard to preterm birth. First, however, the stage must be set by looking at Utah’s fertility and birth rates. Utah has both the highest fertility rate and birth rate in the United States. Utah’s fertility rate in 2011 was 83.6 per 1,000 women, where the United States’ overall fertility rate was 63.2 per 1,000 women. While Utah’s birth rate is declining, the state still experiences the highest rate at 18.2 per 1,000 residents compared to the United States at 12.7 per 1,000 residents. Both of these figures are relevant when discussing birth outcomes.

During 2001 to 2011 Utah's prematurity rate rose from 9.3% in 2001 to a high of 10.1% in 2005 and then declined back to 9.4% in 2011.

Figure 1. Preterm Birth Rates, UDOH, 2001-2011.

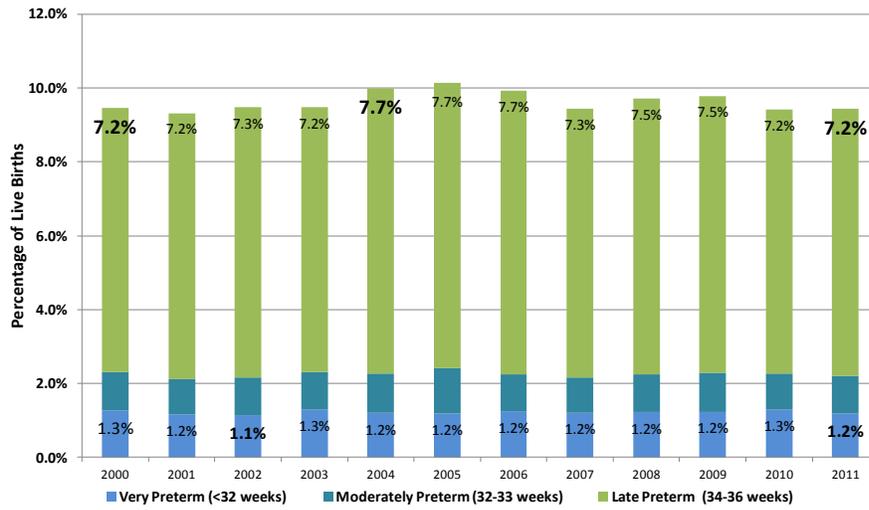


Source: Utah Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health.

Preterm birth is categorized into three age groups: very preterm (<32 weeks’), moderately preterm (32-33 weeks’), and late preterm (34-36 weeks’). Most of Utah’s preterm births occur in the late preterm period, with 7.2% of births occurring between 34 and 36 weeks’.

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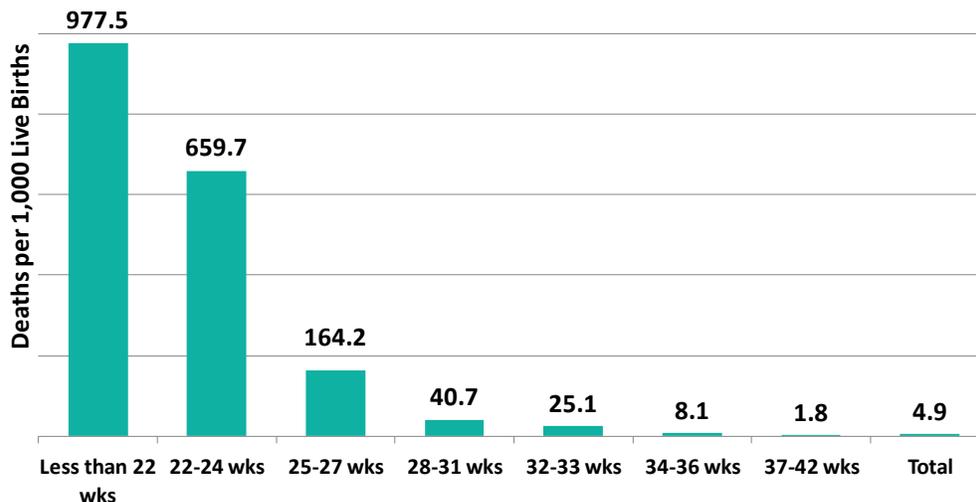
Figure 2. Preterm Birth by Gestational Age, Utah, 2000-2011.



Source: Utah Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health.

Infant mortality among preterm babies is much higher as compared to term infants. The highest mortality occurs in infants born at less than 22 weeks' (978/1000) and those who are born at 24 weeks' (660/1000). Chances of survival dramatically increase as gestational age increases. And while Utah has the fourth lowest rate of infant mortality in the country, the rates have slowly been increasing. Additionally, infants born prematurely are more likely to spend time in a Neonatal Intensive Care Unit (NICU). In Utah, 60% of preterm infants were admitted to the NICU and roughly 50% of NICU admissions of preterm infants were fourteen days or more.

Figure 3. Infant Mortality by Gestational Age at Birth, Utah, 2009-2010



Source: Utah Birth Certificate Database, Utah Death Certificate Database, Office of Vital Records and Statistics, Utah Department of Health.

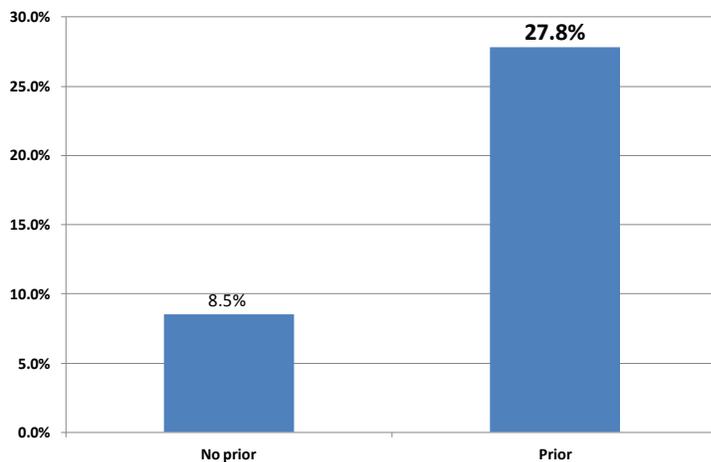
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Several factors are associated with higher preterm birth rates in Utah which pave the way for potentially targeted interventions. Women who are at increased risk of preterm birth tend to have the following characteristics:

- ⇒ Have had a previous preterm birth
- ⇒ Have multiple gestations
- ⇒ Have an unintended pregnancy
- ⇒ Have pregnancies spaced less than six months apart
- ⇒ Have undergone fertility treatments
- ⇒ Be of a race other than white
- ⇒ Be unmarried
- ⇒ Be older than 35 (especially those between 45 and 49)
- ⇒ Be of younger age (15-17)
- ⇒ Be enrolled in Medicaid
- ⇒ Use tobacco
- ⇒ Be obese or underweight prior to pregnancy
- ⇒ Have had no prenatal care

History of a previous preterm birth is a significant contributor to subsequent preterm birth.

Figure 4. Preterm Birth by History of Preterm Birth, Utah, 2010-2011

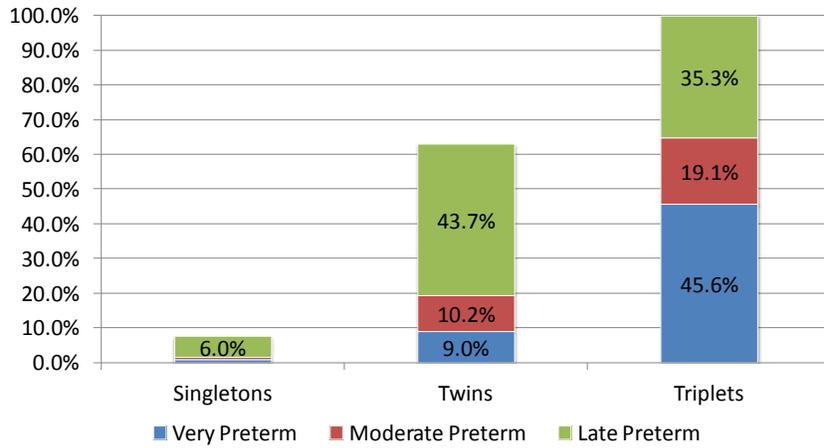


Source: Utah Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health.

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Clearly, as illustrated by the Figure 5 and Table 1, plurality and fertility treatment types impact preterm births.

Figure 5. Preterm Birth by Plurality, Utah, 2010-2011



Source: Utah Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health.

Table 1. Preterm Birth by Fertility Treatment, Utah PRAMS, 2004-2008

Artificial Reproductive Technology	Artificial Insemination + Fertility Enhancing Drugs	Fertility Enhancing Drugs Only	Women Trying to Conceive - No Fertility Treatment
30.3% (19.2, 41.4)	21.2% (8.7, 33.7)	12.3% (8.5, 16.1)	7.2% (6.5, 7.9)

Source: Utah Pregnancy Risk Assessment Monitoring System, Utah Department of Health.

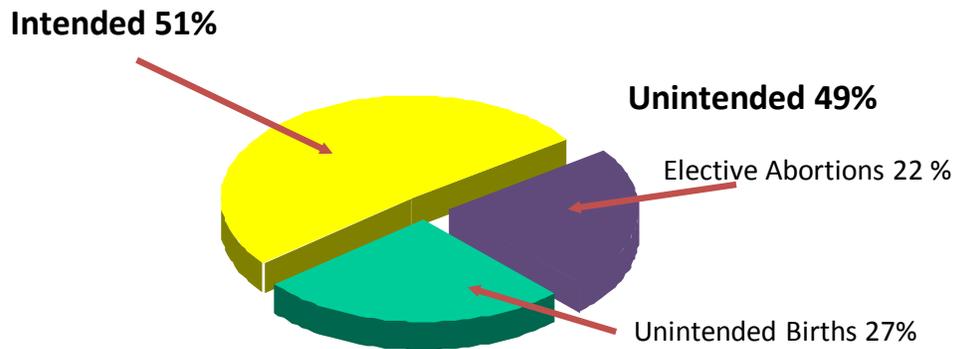
There are many factors at play with preterm birth. But knowing the risk factors associated with preterm birth, perhaps there are ways to target specific populations and begin reducing Utah's prematurity rate.

“The role of pregnancy planning”

David Turok, MD, MPH - University of Utah Department of Obstetrics and Gynecology

Family Planning can be used to reduce preterm birth. Women with unintended pregnancy, which includes mistimed and unwanted pregnancies, have higher rates of preterm birth (PTB) than women who have planned/wanted pregnancies. Although, this group of women is at a lower risk than the other large contributor to PTB, women with a history of PTB, the women who report unintended pregnancies make up a much larger pool. Thus, we can decrease the rates of PTB by providing the most effective contraception to women with the elevated risk of PTB. Reducing the number of unintended pregnancies through the use of highly effective contraception is an easy target to reduce the rate of PTB in Utah and improve birth outcomes.

Figure 1. Unintended Pregnancy in the United States



1.3 million abortions per year

Fam Plann Perspect 1996;28:140-147
 Perspect Sex Reprod Health. 2006;38:90-6
 Finer and Zolna. Contraception 2011;84:478-85.

Table 1. Reasons Unintended Pregnancy is Bad for Children
Increased rates of preterm birth
More NICU stays
More likely to die in the first year of life
Less likely to graduate high school
Lower opportunity for skill development
Fewer positive maternal-child interactions
Less likely to receive well child care
Less likely to be breast fed

Source: Brown & Eisenberg, The Best Intentions: Unintended Pregnancy and the Well-Being of Children and Families. Institute of Medicine, 1995. Baydar N. Consequences for children of their birth planning status. Fam Plann Perspect. 1995;27(6):228-34. Kost K, Landry DJ, Darroch JE. The effects of pregnancy planning status on birth outcomes and infant care. Fam Plann Perspect. 1998 Sep-Oct;30(5):223-30.

Effective family planning can lead to huge cost savings. Medicaid spending on family planning pays off; for every \$1 spent on family planning, \$7 are saved. These savings increase when the family planning is provided to women who are at an increased risk for PTB. Spending may be more effective if long term

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reversible contraceptive (LARC) methods are used. These include the Intrauterine Devices (IUD) and Implants. Evidence has shown that the birth control pill, although the most popular form of contraception, is not the most effective method and best practices in family planning should be evidence based. The St. Louis Choice Project (2011) provided 9,000 women with education and a choice of either LARC or a different method including the pill, patch, or ring. Findings were clear; women who were on the pill, patch or ring had a pregnancy rate 20 times higher than women using LARC methods.

Research from the Neonatal Follow Up Program (NFP) showed over a third of mothers of infants with recent prolonged NICU stays (resulting from being born <26weeks, birth weight <1250 grams, or other major complications) and thus at the highest risk for having another preterm birth were on less effective contraception or no method at all when seen at follow-up. Dr. Turok believes that it is imperative to offer these highly effective LARC methods to all women who want to delay pregnancy. Encouraging the use of LARC is already saving Utah money. One example that shows cost savings is the LARC Program which is an ongoing IUD and implant program for women within 10 weeks of pregnancy. The LARC program has provided over 1,500 IUDs and Implanon devices to Utah. Initial estimates suggest that these devices have already saved Utah Medicaid \$1.4 million and prevented 340 unintended pregnancies.

Table 2. Highly Effective Contraception Can Play an Important Role in Reducing Preterm Birth
By identifying women at risk of preterm birth
And offering them the most effective methods of contraception
To optimize pregnancy planning

Lessons Learned:

- Identify women at high risk of PTB and offer them the most effective methods of contraception to optimize planning and timing of future pregnancies.

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“Predicting Who Will Have a Preterm Birth”

Erin Clark, MD - Assistant Professor of Obstetrics and Gynecology, University of Utah Health Sciences Center.

When trying to effectively predict preterm birth (PTB), a history of previous PTB still remains the greatest factor. This risk increases with the number of previous preterm births, earlier gestational age for previous pregnancies, if the most recent delivery was preterm, and a shorter pregnancy interval.

Table 1. Prediction of Preterm Birth.
History of preterm birth is the greatest risk factor
Risk increases <ul style="list-style-type: none"> • by the number of preterm births • by earlier gestational age • if it was the most recent delivery • by shorter pregnancy interval
History of preterm birth increases the risk 2.5-3 fold
Utah data suggests a recurrence risk of: <ul style="list-style-type: none"> • ~30% after 1 spontaneous preterm birth • ~45% after 2 spontaneous preterm births • ~50% after 3 spontaneous preterm births

However, predicting a *first* preterm birth becomes more difficult as only 15% of PTB occurs in women with a history of prior preterm birth. Other risk factors include:

- multiple gestation
 - neither progesterone, nor cerclage has been found to reduce the risk of preterm birth
 - no effective preterm birth prevention strategies, except to decrease the rate of multiple gestations
- chronic maternal disease
 - women with chronic disease, particularly poorly controlled disease, have a higher rate of preterm birth
 - optimal control of disease before conception and during pregnancy likely decreases the risk
- short mid-trimester cervical length.

There are several proposed strategies in the conversation to prevent preterm birth. Two involve the collaboration of family planning professionals along with Maternal Fetal Medicine (MFM) providers to prevent unintended pregnancies, and to improve outcomes for the first and subsequent pregnancies with appropriate referral to MFM specialists.

Table 2. Biggest Bang for the Buck in Reducing Prematurity
Identification of pregnancies at particularly high risk for preterm birth with focused care
Educating women and providers about recurrence risk and effective preventative strategies
Reduction in 'un-indicated' later preterm birth
Lower rates of multiple gestation

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There are several specific strategies for preventing preterm birth. Women who have an asymptomatic short cervix at their mid-trimester ultrasound or women who've had a prior spontaneous preterm birth are excellent candidates for the administration of progesterone during their pregnancy. Progesterone, when administered appropriately and effectively, has shown a reduction in PTB by 30-50% and a reduction in neonatal morbidity and mortality.

Cervical cerclage is an effective procedure to prevent PTB in women who have shown a history suggestive of cervical insufficiency or for women who have a history of PTB and short mid-trimester cervical length. Cerclage is expected to reduce PTB more than 30% as well as a reduction in neonatal morbidity and mortality. However, in approaching multiple gestation pregnancies, neither cervical cerclage nor progesterone administration has been shown to be effective in the reduction of PTB. The only effective method in preventing preterm birth among multiple gestation pregnancies is to decrease the rate of multiple gestations when possible.

The treatment of maternal chronic disease is another important strategy in preventing preterm birth. Women with poorly controlled chronic disease have a higher rate of PTB. Control of chronic disease before conception and then during pregnancy decreases the risk of preterm birth.

Putting the above strategies into practice in Utah will come with challenges, but there are several proposals with measurable benchmarks to effect change.

One: identify a first at-risk pregnancy. Implement universal cervical screening procedures at mid-trimester ultrasound. Women found to have a short cervical length would receive appropriate referrals and progesterone administration. This treatment would be measured by appropriate documentation by providers of cervical length and then referrals.

Two: educate women and providers about recurrence risk and effective prevention strategies. Studies in Utah have shown that women with the highest risk of PTB have poor knowledge of recurrence risk, preventative strategies, and their risk for unintended pregnancy or short interpregnancy interval.

All women who have experienced a preterm birth should receive a perinatal consultation within the first month after delivery of a preterm infant. This consult should include identifying the suspected etiology of the PTB, personalized recurrence risk, preventative strategies, and a recommendation for highly effective contraception. Furthermore, all women with a preterm birth would also receive a preconception consultation as well as perinatal consultations during subsequent pregnancies for risk stratification and reduction strategies.

While these strategies may be harder to measure, Utah clinicians and researchers could document the percent of women receiving this care, their pregnancy intervals, along with the rate of recurrent PTB and subsequently identify risk factors for future pregnancies. In identifying these women, a multi-tiered counseling approach should be considered that occurs in the period immediately following delivery, the post partum visit, pediatric appointments, and a preconception consultation, as well as appropriate care throughout subsequent pregnancies.

There are several unique opportunities in Utah. There should be a formal integration of MFM services into the Utah Department of Health's Neonatal Follow-up Program. This program could ultimately reduce recurrent PTB in a high-risk population of Utah women. Furthermore, the "high-risk family" must be the

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primary target for clinical intervention in preventing PTB. One can't just focus on the preterm baby and then separately on the high-risk mom. They should be approached as a high-risk family that should be treated as a unit to prevent further preterm birth.

In addition, Utah must address iatrogenic preterm birth. There must be legitimate maternal and fetal indications for a preterm delivery, as there is most likely a subset of PTBs that are actually due to inductions performed without a generally accepted medical indication. This mostly occurs with a late preterm birth, as later births (34-36 weeks) are generally more medically acceptable than early PTB. Late preterm birth is roughly 50% spontaneous and 50% iatrogenic. Thus the proposal to reduce iatrogenic PTB is the adoption and enforcement of criteria for accepted indications for these PTB, which will require the education of women and providers. This benchmark could be measured by an evaluation of compliance through chart review.

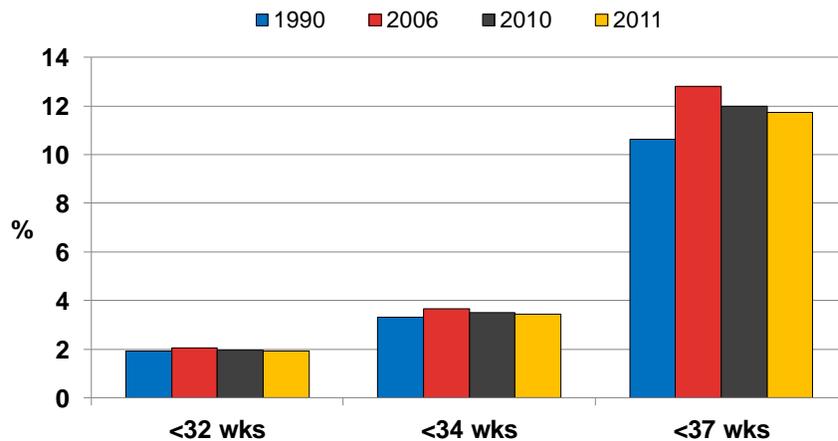
In summary, interventions to effectively impact PTB in Utah must include family planning and maternal fetal medicine expertise, a multi-tiered approach to targeting women for counseling and preventative strategies, algorithms and monitoring for late PTB, and efforts to reduce multiple gestation pregnancies.

“The NICU Experience”

Bradley Yoder, MD - Professor of Pediatrics, Medical Director of the Newborn Intensive Care Unit (NICU), University of Utah

The CDC reports that the preterm birth rate peaked in 2006 and is coming down. The reduction in the preterm birth rates can be attributed to a decline in the rate of late preterm births, or births between 34 and 36 weeks.

Figure 1. Preterm Birth Rates by Sub-Groups



Hamilton BE, National Vital Statistics Report, CDC, Oct 2012

In Utah, survival is about 80% by 25 weeks' gestation and reaches 90% at 27-28 weeks'. Most deaths above 29 weeks are due to congenital abnormalities, whereas under 28 weeks it is almost entirely due to prematurity. Risk factors for mortality include: gestational age, sex of the baby, the receipt of antenatal corticosteroids (ANCS), and birth weight. When a baby is less than 32 weeks' gestation, each additional gestational day resulted in decreased mortality risk by 2%. Gender also affects survival: female babies have the equivalent of 1 week higher gestation than a male baby. Receiving a full course of ANCS equates to >1 week higher gestation. Birth weight is also a predictor of survival; every 100 gram increase equates to 0.5 weeks and overall singletons tend to do better when born early than twins, triplets, or higher order gestation. However, it is important to remember that survival is not all that we are concerned about.

Premature infants are at an increased risk of neonatal respiratory distress syndrome (RDS), necrotizing enterocolitis (NEC), intraventricular hemorrhage (IVH), sepsis, and subsequent neurodevelopmental impairment (NDI). The risk for developing these conditions increases with lower gestational age.

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Table 1. Morbidities Among Extremely Low Birthweight Infant Survivors
Respiratory disease: >90%
Bronchopulmonary dysplasia: 50-75%
Retinopathy: 60-80% Severe: 25-40%
Nosocomial sepsis: ~30%
Necrotizing enterocolitis: 5-10%
Cranial bleeding: 25-40% Severe: 10-20%

The rates of these morbidities have decreased over the last 2 years in infants born less than 30 weeks' gestation. The cord milking practice seems to have benefited these PTB infants. Another important consideration is neurodevelopment. There is a several fold increase in brain size over the last trimester and the complexity of the brain increases as well. Preterm birth alters the subsequent development. NDIs are common in extremely low birthweight (ELBW) babies who are <1000 grams; even when no other morbidities are present there is still a 20% chance of long-term neurodevelopmental delays. Table 2 and 3 show the deficits in ELBW survivors.

Table 2. Neuro-Developmental Impairment	
<u>Impairment</u>	<u>Profound Impairment</u>
<70 on either index (Index range 50-150) Psychomotor Index Bayley Scale MDI	Bayley score <50
Moderate/severe Cerebral Palsy	Severe impairment of gross motor function Requires adult assistance to move
Bilateral Blindness	
Bilateral hearing loss requiring amplification	

Table 3. Adolescent Outcomes in Extremely Low Birthweight Infants
75% with "chronic" medical problem(s) 17% with cerebral palsy, blindness, hearing loss
Academic outcomes impaired 18% with an IQ <70 55% with an IQ <85
Early intervention programs 49% enrolled vs. 10% for term appropriate size for gestational age births
Impaired "executive" function - two times lower even with excluding the low IQ group Attention Memory Recognition Planning Information processing

There is substantial cost associated with prematurity. For the 250,000 preterm babies admitted to NICUs annually, equating to 0.1% of the US population, 2% of the US health care dollars are spent with an estimated societal cost \$26 billion over the lifetime.

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Figure 2. Median NICU Treatment Costs. Vermont Oxford Network Project: 1997-1998

EGA - birth	Cost/day	LOS	Total Cost	~2012 Cost
<24 wks				
Died (>1d)	\$ 3092	3	\$ 9398	(CF = 1.45)
Survived	\$ 1586	111	\$ 179,986	\$ 260,000
24-26 wks				
Died (>1d)	\$ 2598	8	\$ 20,367	
Survived	\$ 1408	87	\$ 117,412	\$170,000
27-29 wks				
Died (>1d)	\$ 2451	8	\$ 19,019	
Survived	\$ 1208	56	\$ 65,120	\$ 94,000
30-32 wks				
Died (>1d)	\$ 2636	10	\$ 25,407	
Survived	\$ 1032	36	\$ 34,564	\$ 50,000

Rogowski J, Pediatrics 2003

Opportunities for improvement in Utah include the use of more aggressive non-invasive support modes.

Table 4. Improving Neonatal Outcomes
<p>Lung Disease</p> <ul style="list-style-type: none"> Approach to lung support beyond surfactant Increased use of non-invasive support <ul style="list-style-type: none"> Newer modes of non-invasive ventilation: high frequency nasal CPAP Newer "drug" therapies: VAR, iNO, SOD, etc
<p>Brain Injury</p> <ul style="list-style-type: none"> Primary focus = prevention of IVH <ul style="list-style-type: none"> Protocols to maximize CV stability Umbilical cord "milking" ? early caffeine Rx Newer therapies <ul style="list-style-type: none"> EPO, melatonin, allopurinol, magnesium sulfate Follow up data back to NICU centers
<p>Infection</p> <ul style="list-style-type: none"> Adverse effect of histological chorioamnionitis <ul style="list-style-type: none"> Increases mortality risk Increases BPD/CLD risk Increases IVH risk Postnatal/Nosocomial infection <ul style="list-style-type: none"> Protocols to minimize central line infections Antibiotic stewardship Fungal prophylaxis in high-risk populations
<p>Optimal Nutrition</p> <ul style="list-style-type: none"> Early, aggressive protein supplementation Increased use of human breast milk <ul style="list-style-type: none"> Improves ND outcomes Reduces infection risk Minimizes NEC risk ? Probiotics/lactoferrin/EGF supplementation

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Lessons Learned:

- Morbidities increase as estimated gestational age (EGA) decreases
- Risk for NDI increase with the number of morbidities and there is potential for substantial long-term cognitive impacts associated with any preterm birth
- Median NICU treatment cost between \$50K-\$260K for babies who are born between 24 and 32 weeks' and survive without other morbidities.
- Umbilical cord milking has shown to reduce associated morbidity in EGALN.
- Emphasizing the use of human milk to support better outcomes and decrease the risk of NEC and other infections.

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“Neonatal Follow-Up Care”

Sarah Winter, MD - Medical Director, Neonatal Follow-Up Program, Utah Department of Health;
Associate Professor of Pediatrics, University of Utah

The Neonatal Follow-Up Program (NFP) at the Utah Department of Health Bureau of Children with Special Health Care Needs (CSHCN) offers 2 ½ - 4½ year interdisciplinary follow-up services to high-risk graduates from referring newborn intensive care units (NICU). While the program is not to be considered a child’s medical provider, it is designed to work in collaboration with a child’s medical home. The program provides valuable feedback to the referring NICU in the form of individual patient reports, research findings, and aggregate data.

Table 1. Enrollment Criteria for Neonatal Follow Up Program
Utah resident
Graduate of a NICU
Birth weight of 1250 grams or less (Very Low Birth Weight)
Gestational age of 26 weeks ⁷ or less
Required extracorporeal membrane oxygenation (ECMO) and/or
Identified with hypoxic ischemic encephalopathy (HIE)
May also be enrolled in the program through referral by a pediatrician

In Utah in 2010, 282 infants with birth weights of 1250 grams or less qualified and were enrolled in NFP. Of those, 254 children (90%) went through the initial intake process and 138 children (49%) had further cognitive testing suggestive of ongoing follow-up.

There are several objectives of the NFP: to provide periodic screening by a multidisciplinary team of providers; to assist with/or refer children to appropriate services, interventions and financial services; to provide psychosocial support to children and families as needed. A summary of each evaluation is sent to the families, medical homes, and to referring NICUs.

Furthermore, the NFP has program-specific priorities that will contribute to the improved care of high-risk infants. The program aims to increase the percentage of children seen in the NFP who qualify for services by broadening NFP presence throughout the community and increasing communication with referring NICUs and affected families. This goal is important because infants that do not attend Neonatal Follow-Up Programs have higher rates of motor and neurosensory disabilities, lower cognitive skills, and less access to needed services.

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	4 months	9 months	18 months	30 months	3.5 years	4.5 years
Pediatric and Neurological exam	X	X	X	X	X	X
Audiology	X	X	X	X	prn	prn
Dietician	X	prn	prn	prn	prn	prn
Ophthalmology	X	prn	prn	prn	prn	prn
Psychology		Bayley	Bayley	Bayley	x	WPPSI
Speech		X	X	X		X
OT/PT	PDMS	prn	prn	prn	prn	prn

Finally, the NFP is made up of a collaborative network of physicians and service providers not always available in the medical home. This program is essential and through collaboration the program will continue to make a difference in the lives of children and families.

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“Disparities in prenatal outcomes in our community”

April Bennett, MPA - Office of Health Disparities Reduction, Utah Department of Health

Ms. Bennett discussed the role that place and race disparities play in relation to infant mortality and preterm births. Utah has a unique demographic makeup as 83.6% of the population in Utah identifies as non-Hispanic white. Utah has a larger Native Hawaiian/Pacific Islander population (1.0%) than other states. It is one of nine states with more than 25,000 Pacific Islanders (PI) and one of 3 states in which PIs make up more than 1.0% of the population.

The pregnancy-related statistics that are often cited for minority groups do not necessarily encompass the experience of PI women. Pacific Islanders have the lowest rates of early prenatal care and very low rates of folic acid intake. They also have the highest rates of obesity during pregnancy, postpartum depression, and shortest interpregnancy intervals. The Office of Health Disparities Reduction (OHD) at the Utah Department of Health conducted focus groups in 2011 and found a low awareness of many of the basic health guidelines among the Black and Pacific Islander population.

In Utah, Black women had the highest rates of low birth weight (LBW) babies, unintended pregnancy, and smoking during pregnancy. Black focus group members were aware of the issues surrounding healthy pregnancy but the women identified late entry into prenatal care (PNC) as a main concern. These participants also acknowledge the fact that family planning education often came too late to be effective.

Additionally it is important to acknowledge that one size does not fit all when it comes to health disparities among minority populations in Utah. Research on the impact of preconception health care, father involvement, psychosocial needs, family planning, and breastfeeding support were found in a literature search when looking at health disparities; however, since much of the research focuses on Black and African American women, these findings do not necessarily apply to Pacific Islander women who may have different needs and risks. Focus groups of Pacific Islander women found that a unique barrier to breastfeeding for these women was fear of breast exposure. Additionally, the Mainland Pacific Islander study conducted in 2011 found that when the Behavioral Risk Factor Surveillance System (BRFSS) survey was conducted in English rather than the native languages of Tonga and Samoa, there were discrepancies in the reported rates of diabetes, obesity, and high blood pressure. Thus there is a need to create culturally appropriate surveillance tools in order to capture a more complete picture of what Pacific Islander women are experiencing surrounding pregnancy in Utah.

Lessons Learned:

- In the Pacific Islander community, new mothers value advice from older female relatives
- Personal outreach campaign materials are available on YouTube—“for Me, for Us”
- Energy can be focused through looking at health disparities by geography

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“The role of the educator”

Debbie Ballard, Med.Sp.Ed. & Shaun Mower MS, OT/L - Jordan School District

Services for families and children who were born preterm begin at birth and can last for decades. The Special Education Preschool Program in the Jordan School District serves 650 families and between 530 and 700 kids annually.

The early life experiences of these children between birth and 22 months are very influential. Jordan District serves a total of 6650 students birth-21 years. Of these kids using special services or in resource classes, approximately 12-15% were born prematurely and have a disability related to preterm birth. On average, 4 children in a standard class were born preterm. Currently there are 275 children between the ages of birth-5 attending school in the Jordan District. The estimated costs of these services are \$4,178 per child per year, which equates to \$1,148,950 per year in Jordan District alone based on morbidities associated with prematurity. Cost is a limiting factor for many early intervention services including resources provided in schools and at home, as well as the numbers served.

Services available in Utah consist of the Baby Watch/Early Intervention (Birth-3) and Special Education Preschool (Age 3-5) programs, as well as other resources for students from kindergarten until age 22 based on an individual need assessment. These programs are generally referred to as resource programs. The average cost for a resource program is \$1,922 per student/year. This cost can range from \$9,000-\$13,000 for education within a self contained classroom; and upwards of \$18,000-\$24,000 per student per year for placement in a school that is specialized.

Table 1. Utah Services

Early Intervention - Birth-3 Years

- Early Intervention is critical for long term outcomes
 - Statewide, an average of 36% each year of children enrolled in early intervention services improved enough to not need preschool special education services.
 - This relates to a cost savings of over \$20,321,792 in state funds.
- 15 programs statewide under the Utah Department of Health’s Baby Watch Program.
- Current qualification guidelines
 - 7% or below in one developmental domain
 - BWEI diagnosis list <http://www.utahbabywatch.org/docs/foreiproviders/btots/btots-medical-dx.pdf>

Preschool Programs - 3-5 Years

- Effective programming
 - Last year, out of 190 children served in our preschool who were turning five, 135 children went to a typical kindergarten class.
- Current qualifications
 - 1% in one developmental domain
 - 2% in two developmental domains
 - 7% in three developmental domains
- Minimal services with regards to specialized services

Early Intervention (EI) services (birth-3) are critical for reducing the need for long term services, but due to limited funding, requirements for program eligibility are getting more stringent. Baby Watch/Early Intervention requires that children fall in the 7th percentile or below in either self care, motor, or language

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developmental domains. Clinical or diagnostic determination may also qualify children for EI services. Special Education Preschool Programs (ages 3-5) which involve research-based curriculum are also getting more difficult for children to enroll with qualifications requiring <1 percentile in one, <2 in two and <7 in three domains for eligibility. These all represent severe deficits and the limited resources present barriers for child development, specifically of children who are born premature.

Table 2. Educational Implications
--

Children born prematurely have been found to have a 50% higher probability of presenting with special educational needs (de Rodrigues et al, 2006).

- | |
|--|
| <ul style="list-style-type: none">• Learning/cognitive functioning• Language delays - expressive & receptive• Sensory impairments - visual & auditory• Motor delays - cerebral palsy, Intraventricular hemorrhage• Social & emotional delays - behavior problems• Feeding delays, digestive problems• General health problems/respiratory concerns |
|--|

Table 3. Educational Needs

Specialized Staff

- | |
|---|
| <ul style="list-style-type: none">• Special Education teachers• Occupational therapists• Physical therapists• Speech therapists• Psychological services• Classroom aides |
|---|

Building, equipment and environmental adaptations

Lessons Learned:

- Funding- state and federal levels reducing eligibility--current needs are outpacing resources
- Lack of education for primary care providers and families on developmental milestones

Proposed Solutions

- Improved communication between providers
- Improved training
- Family education and support
- Increased awareness of services available
- Additional research with educational evidence-based interventions

“What Does Research Tell Us?”

Michael Varner, MD - Professor and Vice-Chair for Research, University of Utah Health Sciences Center, Department of Obstetrics and Gynecology.

The research community in Utah is committed to the issues of preterm birth. There are several research efforts funded by the National Institutes for Health (NIH) already underway that are tackling preterm birth. These are: The Genomic and Proteomic Network (GPN) for Preterm Birth Research, which focuses on global genomic and molecular research strategies and the dissemination of the data to the scientific community for secondary analyses; The NuMom2B Network recruits first-time mothers in their first trimester to learn more about markers that may predict complications women may face in their first pregnancies (without a prior birth history); The Maternal Fetal Medicine Units Network is a clinical trial network created by the National Institute of Child Health and Human Development (NICHD) to focus on clinical questions with respect to preterm birth, and finally the Developmental Origins of Disease Programs are pediatric studies that examine birth outcomes in relation to chronic disease later in life.

Additional research efforts, which are funded by other entities, are being conducted throughout the state. These involve biospecimen and clinical data repositories containing information on preterm birth (both spontaneous and indicated) and potential adverse neurodevelopmental outcomes; comparative effectiveness research; pharmacogenetic studies examining why some people respond to medications and others do not; utilizing data from the Utah Population Database; a program in personalized health care with the Utah Genome Project; and “Strong Start,” which involves the identification of at-risk pregnancies and evidence-based prevention and treatment algorithms, a mid-trimester cervical length assessment, and in-hospital recurrence risk and contraceptive counseling on highly effective methods.

There are several challenges in achieving the research goals in reducing preterm birth. These must be faced before real progress can be made. First, there is the existence of research “silos”. Individuals are in the field doing their ‘own’ research without the thought of real collaboration. Everyone is in this together and has the same end goal. Second, is ‘administrative density,’ which refers to all of the administrative red tape that is filtered down from federal agencies and institutional bodies that makes the process difficult and tedious. Third, is the lack of community awareness. There is very little knowledge within the community about the risk factors for preterm birth, the existence of recurrence risk, or family history risk of preterm birth. Fourth, we may be missing ensuing outcomes of preterm birth due to a lack of long-term follow-up. Fifth, cosegregation of disease impacts the research on preterm birth. Genes have different functions that contribute to different outcomes. There is no one gene that impacts preterm birth. We must take all contributing factors into account. Finally, premature birth research must encompass stillbirth. For every three neonatal deaths, there are four stillbirths. We are missing out on an entire cohort of women and babies in omitting these cases.

To confront these challenges, there are several proposed solutions. First, there should be encouraged inter/multi institutional collaboration among health care systems, government agencies, community groups, and non-governmental organizations (NGO). Second, improved infrastructure may contribute to improved research efforts. Interested researchers could be ‘housed’ at a neutral site. Furthermore, community advisory boards can be effective and influential in research, in that many times community groups are permitted to lobby, whereas government employees are not. Effective change may, and often

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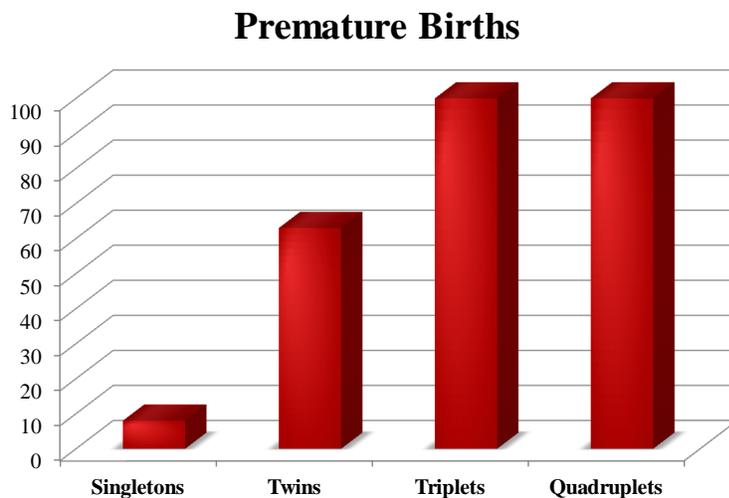
does, require this route. Third, is statewide engagement. Specifically, should preterm birth be a reportable disease? And should there be statewide pragmatic clinical trials with a web-based report function? Could these avenues result in a more collaborative and comprehensive picture of preterm birth in Utah as a whole? Finally, there should be efforts to increase public awareness surrounding preterm birth. The community should be aware of the importance of clinical research, what defines very high-risk families, and what specifically are the clinical risks and signs or symptoms of preterm labor. To ultimately affect the rate of preterm birth, the collaboration of the above entities in the aforementioned strategies may have a significant impact on the research into preterm birth and the ultimate reduction in prematurity.

“Twins, Triplets, and More--Proposal to Reduce Multifetal Gestations in IVF”

Matthew Peterson, MD - Chair, Department of Obstetrics and Gynecology, University of Utah and Interim Division Chief, Division of Reproductive Endocrinology and Infertility

Background: From the years 2000-2012, 9.5% of all births in Utah were premature. Of those early births 32% were twins, 1.3% were triplets and 0.8% triplets. Combining data from the Society for Assisted Reproductive Technologies (SART) and non-reporting clinics in Utah, it is estimated that 1% (500) of all Utah births resulted from In-Vitro Fertilization (IVF) and an additional 3.5% of births resulted from some type of fertility medications (1,750).

Figure 1. Premature Births, Utah, 2010



Source: Utah Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health.

The chances of getting pregnant using fertility treatment are improving. There is currently 65% “take home baby” rate for IVF when using single embryo transfer (SET). Assisted Reproductive Technology (ART) is contributing many extra babies to the twin rate which also increases the risk of moms and babies for prematurity when compared to singleton pregnancies. An estimated 33% of couples who are seen at the fertility clinic are good candidates for SET. Most insurance companies do not cover IVF and each cycle can cost around \$10,000. Thus, many couples will choose to transfer two embryos to increase their chances of conceiving despite the risks associated with a multiple gestation pregnancy. Even after being educated on the risks, many couples report a multiple gestation pregnancy is the preferred outcome.

The Utah Center for Reproductive Medicine (UCRM) conducted a study to see if couples were more likely to chose SET when incentivized with free embryo freezing in case the cycle did not work.

Goal: Reduce twin deliveries and their associated complications and cost.

Study Objective: To observe multifetal gestation rate and pregnancy outcomes between matched cohorts undergoing incentivized SET versus patient choice therapy. UCRM absorbed the cost of freezing second embryos. The cohorts consisted of 21 individuals that participated in the incentivized SET and 20

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individuals that had patient choice therapy (3 voluntarily chose SET)

Results: The patient choice group had a 45% twin rate compared to a 5% rate in the group that received SET. Additionally, the patient choice group had 55% Low Birth Weight (LBW) infants compared to 5% LBW infants in the incentivized SET group. The preterm birth rates differed among the two groups: 50% of the patient choice group were preterm compared to only 9.5% preterm deliveries in the SET group.

Lessons Learned: Incentives increased the percentage of couples choosing SET. SET can result in a huge cost differential both financial and societal by reducing the number of multiple gestations that result from IVF. The potential to reduce associated morbidity, mortality and cost by 1.7 to 3.8 fold for singleton delivery is potentially 115 deliveries arising from IVF.

Recommendations:

- All fertility centers should document adherence to American Society for Reproductive Medicine (ASRM) guidelines on number of embryos transferred
- All fertility centers should document adherence to SET and ASRM guideline benefits and this information should be reported to payers
- Limit fertility medications/ injections to reproductive endocrinologist

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“Next Steps”

Sean Esplin, MD - Associate Professor of Obstetrics and Gynecology and Maternal Fetal Medicine, University of Utah and Intermountain Healthcare.

As the ASTHO Challenge has previously been discussed, Utah has committed to decreasing the rate of preterm birth by 8% by the year 2014. The question remaining then, “Is this possible?” And what are the steps to reach this goal?

Table 1. ASTHO Challenge
In 2011, there were 4,830 preterm infants <ul style="list-style-type: none"> • 3,756 singletons • 1,002 from twin gestations • 70 from triplet gestations
Goal is to prevent 280 preterm deliveries to reach 8.9%
Are there specific risk factors that could be targeted?

A majority of preterm births occur within the late preterm period (34-36 weeks). In 2009-2011, 50% of late preterm births were “indicated”, defined as a delivery including any of the following factors:

- Maternal risk factors (antiphospholipid syndrome, lupus, pre-existing diabetes, gestational diabetes, pregnancy associated hypertension, chronic hypertension, eclampsia, HELLP syndrome, severe heart disease, or cervical cerclage)
- Induction - both elective and therapeutic
- Complications of labor and delivery (cord prolapse, placenta previa, placental abruption)
- Any congenital anomaly of the child
- Elective cesarean section (cesarean section with no defined maternal risks or congenital anomalies)

Spontaneous deliveries are classified as those that did not meet the above criteria.

A retrospective cohort study of late preterm births from 2007-2009 at two tertiary care centers and two community hospitals in Salt Lake City found that roughly 19% of indicated late preterm births did not meet accepted medical indication criteria for induction due to medical indication.

Table 2. Late Preterm Births
Adoption of a community standard for indications for preterm birth <ul style="list-style-type: none"> • Would standardize the practice across the state • Reduce the number of non-indicated preterm births
There were 2,655 indicated preterm births in Utah in 2011 <ul style="list-style-type: none"> • 19% of these can be avoided by following specific guidelines • 504 preterm births may be avoided

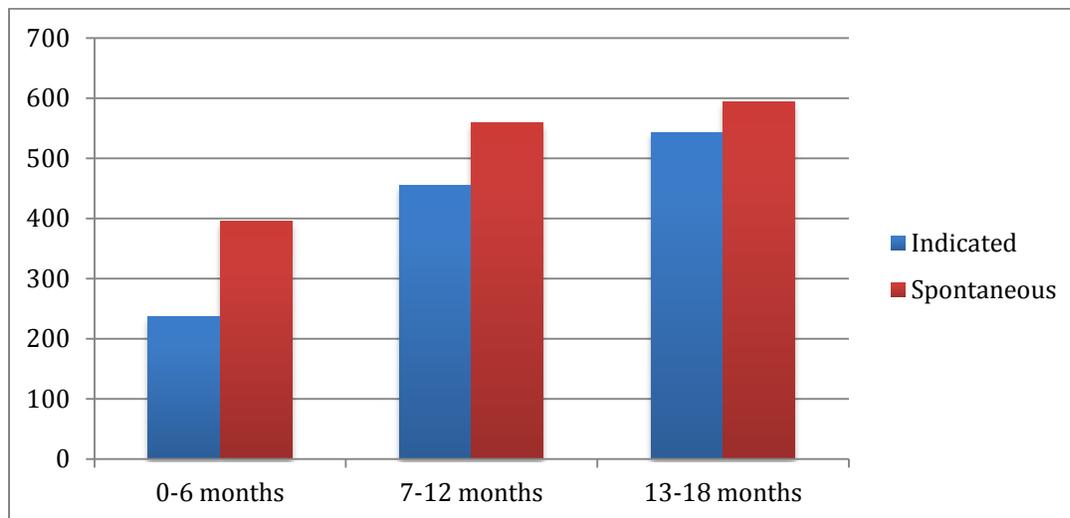
Beyond indicated late preterm birth are spontaneous preterm births with a 30% increased chance of recurrence. In 2011, there were 433 spontaneous preterm births among women with a previous preterm birth. From the PRAMS data, we know that 45% of women who reported a previous preterm birth were

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given 17P to prevent another preterm birth. Only 23% of any preterm births indicate use of the medication on the birth certificate. If 100% of those women were to receive 17P, it could result in a 30% reduction in spontaneous preterm birth, which equates to 192 fewer preterm births per year. Three things that would make the provision of 17P more effective: the education of providers, a standardized protocol for the use of 17P, and a registry of sources of 17P and the cost of the medication.

Another reason for preterm birth is multiple gestations. In Utah, 1,670 infants are born the result of multiple gestations each year. Many of these multiple gestation pregnancies are the result of fertility treatment. In order to understand and reduce the preterm births from multiple gestation pregnancies, one must examine the breakdown of prematurity by fertility treatment type. Artificial Reproductive Technology (ART) has a prematurity rate of 30%, 21.2% for artificial insemination and fertility enhancing medications; 12.3% for use of only fertility enhancing medications; and 7.2% among spontaneously conceived pregnancies. Thus, we must look at preventing multiple gestations with appropriate use of fertility medications, the use of single embryo transfers, and the appropriate use of ART including ovulation induction. These strategies could potentially prevent an additional 115 preterm births.

Figure 1. Birth Interval and Preterm Birth, Utah, 2010-2011



Short interpregnancy interval accounts for a segment of preterm births. During the two years from 2010-2011, 645 women with a preterm birth conceived within a year of their last delivery. A targeted intervention could make a tremendous difference in this cohort. With highly effective contraception provided at the time of delivery or soon thereafter, a large portion of future preterm births could be prevented.

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Table 3. Potential Interventions
Provide highly effective contraception at the time of delivery
Focus on high risk populations <ul style="list-style-type: none"> • Previous preterm birth • Low socio-economic status • Other specific medical risk factors
Provide education for providers and public about the benefit of longer inter-pregnancy intervals
Implement a plan to identify the women with highest risk of preterm birth in pregnancy and provide optimal care <ul style="list-style-type: none"> • Progesterone therapy • Steroids • Other interventions
Screening for risk factors at initiation of pregnancy <ul style="list-style-type: none"> • Performed by perinatal case managers • Risk factors: <ul style="list-style-type: none"> ○ Previous preterm birth ○ Twins/triplets ○ Diabetes ○ Hypertension ○ Renal disease ○ Antiphospholipid syndrome ○ Incidental short cervix

These strategies are the basis of the Strong Start Initiative, which would involve screening for preterm risk among women at the initiation of their pregnancy care. The care involves the screening of high-risk patients, cervical length screening, Maternal Fetal Medicine consultations for high-risk women, outcome monitoring, quality improvement, and the provision of highly effective contraception.

Furthermore, the establishment of specialized preterm birth prevention clinics may play a role in the ultimate reduction in prematurity. A study was conducted in Utah for three years comparing care of women with a singleton pregnancy that had at least one spontaneous preterm birth less than 35 weeks gestation and received either care in the Prematurity Prevention Clinic or usual follow-up care from caregivers. Table 4 illustrates results of the study.

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	Recurrent Preterm Birth Prevention Clinic N=70	Usual Care N=162	p-value
Gestational Age of earliest preterm birth (weeks)	30.6	30.1	0.43
Number of prior preterm births <37 weeks	1.7	1.6	0.45
Gestational age of immediately antecedent pregnancy (weeks)	33.0	32.4	0.32
Received 17OHPC	68.6	43.1	0.001
Number of cervical length measurements	2.45	0.97	<0.001
Delivery gestational age (weeks)	36.4	35.4	0.034
Preterm birth <37 weeks	48.6	64.2	0.026
Preterm birth <32 weeks	5.7	12.4	0.13
NICU admission	44.3	40.7	0.62
Composite neonatal morbidity	5.7	15.4	0.04

Manuck TA, Henry E, Gibson J, Varner MW, Porter TF, Jackson GM, Esplin MS. Pregnancy outcomes in a recurrent preterm birth prevention clinic. Am J Obstet Gynecol 2011 Apr;204(4):320

In addition, public education efforts must be a part of the ultimate strategy in preventing preterm birth. Education should address modifiable risk factors, such as smoking cessation, prenatal care importance, longer pregnancy intervals, progesterone provision, and appropriate weight before pregnancy as well as appropriate weight gain during pregnancy.

Finally, is it time for a Perinatal Quality Collaborative? There are several elements to confront before the establishment of a Collaborative. While the mandate has been established by the ASTHO Challenge, several elements require more attention before implementation: who gives the mandate, funding, committee membership, an overlying goal, priorities, and transparent accountability. In addressing these issues, there are key factors already established by other successful statewide Perinatal Improvement Collaboratives.

Well-connected, committed, <u>clinical leadership</u> in both obstetrics and pediatrics ($\geq 25\%$ effort)
<u>Population-based rapid response data system</u>
Access to one or two years of <u>baseline data</u>
Support by <u>state agencies & professional groups</u>
<u>Centralized administrative infrastructure</u>
Access to rigorous <u>improvement science</u> expertise
Integration of <u>community and academic providers</u>
Open to idea of <u>transparent sharing</u> of results

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Utah is well on its way to achieving many of the above elements for developing a Perinatal Improvement Collaborative. Now, it is the implementation of the above strategies and the formation of such a collaboration that will make a measurable difference in preterm birth.

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References:

link to audio and video stream

http://stream.utah.edu/m/show_grouping.php?g=1b8952de811ee32638