Preventing Birth Defects—a Collaborative Effort

Information about Preventing Birth Defects

Joan Ehrhardt, Coordinator
Genomics & Birth Defects Program

Hillary Turner, MPH
Data Coordinator
Michigan WIC
Goal

Reduce the number of Michigan WIC babies born with a birth defect by increased awareness of preventable factors and adoption of healthy behaviors.
Objectives

✓ To describe causes of birth defects with a focus on preventable risk factors in the Michigan WIC population;

✓ To recognize the increased risk of birth defects to WIC clients through the review of WIC client health indicators; and

✓ To identify prevention strategies for WIC clients that improve reproductive outcomes and reduce the occurrence of birth defects; and

✓ To emphasize the importance of good preconception and interconception health practices in lowering the risk for birth defects and other adverse reproductive outcomes in the Michigan WIC population.
Please Note

This presentation:

- Is intended for information purposes only and does not constitute medical advice.
- Includes technical terms for medical conditions and abnormal development.
- Includes pictures and photographs of birth defects.
WIC’s Role

A. Client and staff awareness.
B. Aid client access to health care.
C. Encourage and support continuity of care with primary care provider (PCP).
What is a birth defect?

"Birth defect, congenital malformation, and congenital anomaly are synonymous terms used to describe structural, behavioral, functional, and metabolic disorders present at birth."

*Langman's Medical Embryology, ed. 9*

“…an abnormality of the body's structure or inherent function present at birth, whether the abnormality is detected at the time of delivery or becomes apparent at a later date."

*MBDR Reporting Manual*
How common are birth defects?

- 3-5% of live births are affected by birth defects
- 5-10% of conceptions have a chromosome abnormality
- 30-50% of post-neonatal deaths are due to birth defects
- Most recurrent (≥3) miscarriages and most sporadic early miscarriages to women over 35 yrs of age have chromosome abnormalities
How common are birth defects?

Birth defects are rare.

But they are a common cause of serious problems, including lifelong disability and death.
Examples of Birth Defects

Congenital Heart Defects (CHDs)

Ventricular Septal Defects (VSD)
Normal
Tetralogy of Fallot (TOF)
Examples of Birth Defects

Neural Tube Defects (NTDs)
- Anencephaly
- Spina bifida

Orofacial Clefts (OFCs)
- Cleft lip
- Cleft palate
What causes birth defects?

Some result from factors outside of our control.

Some have a genetic component or are due to unknown causes.
Genetic Causes of Birth Defects

- Inherited genes from both parents (Sickle Cell Disease) and other syndromes
- New single gene changes (mutations) or spontaneous chromosome abnormality (Down Syndrome)
- Genes and syndromes inherited from one parent
- Unknown
Family History

Every woman should--

Know her and her partner’s medical and family history

- Be aware of birth defects, genetic disorders, and developmental disabilities
- Know history of miscarriage, stillbirth, and chronic illness
- Share this information with her healthcare provider
Some birth defects are preventable

Certain medications, drugs, chemicals, infections, and other avoidable factors may cause birth defects.
Client Behaviors & Indicators

Focus on Five

- Drinking
- Smoking
- Multivitamin Consumption
- Nutrition & Physical Activity
- Overweight/Obese
What about Michigan WIC Mothers?
2010 Michigan WIC Enrollment

- Total: 398,260
- Infants & Children: 284,436
- Women: 113,824

2000 Enrollment: 427,252
2010 Enrollment: 121,055

Potential reach
Michigan WIC Mothers by Race/Ethnicity

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>55.4</td>
<td>56.3</td>
<td>56.8</td>
<td>56.8</td>
<td>57.1</td>
<td>56.7</td>
</tr>
<tr>
<td>Black</td>
<td>27.3</td>
<td>28.1</td>
<td>28.2</td>
<td>27.7</td>
<td>27.2</td>
<td>27.5</td>
</tr>
<tr>
<td>Hispanic</td>
<td>11.3</td>
<td>11.5</td>
<td>11.2</td>
<td>10.7</td>
<td>10.5</td>
<td>10.4</td>
</tr>
<tr>
<td>Native American</td>
<td>0.5</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Asian</td>
<td>1.7</td>
<td>1.7</td>
<td>1.5</td>
<td>1.6</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Multiple</td>
<td>1.9</td>
<td>2</td>
<td>2.7</td>
<td>2.5</td>
<td>2.6</td>
<td></td>
</tr>
</tbody>
</table>

PNSS 2010
Michigan WIC Mothers by Age

<table>
<thead>
<tr>
<th>Age Range</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>15-17</td>
<td>6.8</td>
<td>7.1</td>
<td>7.0</td>
<td>6.6</td>
<td>6.1</td>
<td>5.6</td>
</tr>
<tr>
<td>18-19</td>
<td>12.9</td>
<td>13.2</td>
<td>13.5</td>
<td>13.0</td>
<td>13.0</td>
<td>12.6</td>
</tr>
<tr>
<td>20-29</td>
<td>60.7</td>
<td>60.8</td>
<td>60.4</td>
<td>60.4</td>
<td>60.4</td>
<td>60.5</td>
</tr>
<tr>
<td>30-39</td>
<td>17.9</td>
<td>17.4</td>
<td>17.5</td>
<td>18.3</td>
<td>18.6</td>
<td>19.2</td>
</tr>
<tr>
<td>=&gt;40</td>
<td>1.3</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
<td>1.4</td>
<td>1.4</td>
</tr>
</tbody>
</table>

PNSS 2010
### Michigan WIC Mothers

**Program Participation**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=High School</td>
<td>37</td>
</tr>
<tr>
<td>High School</td>
<td>65.8</td>
</tr>
<tr>
<td>&gt;High School</td>
<td>11.6</td>
</tr>
</tbody>
</table>

**Poverty**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=150% FPL</td>
<td>88.1</td>
</tr>
</tbody>
</table>

**Education**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;High School</td>
<td>27.2</td>
</tr>
<tr>
<td>High School</td>
<td>43.2</td>
</tr>
<tr>
<td>&gt;High School</td>
<td>29.7</td>
</tr>
</tbody>
</table>

*PNSS 2010*
<table>
<thead>
<tr>
<th>Indicators</th>
<th>2000</th>
<th>2010</th>
<th>Progress Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester Entry into WIC</td>
<td>31.0</td>
<td>37.5</td>
<td>▲</td>
</tr>
<tr>
<td>Birthweight:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• LBW  &lt;2500 g</td>
<td>7.1</td>
<td>8.5</td>
<td>▼</td>
</tr>
<tr>
<td>• Full Term LBW</td>
<td>----</td>
<td>3.6</td>
<td>▲</td>
</tr>
<tr>
<td>• HBW &gt;4000 g</td>
<td>9.0</td>
<td>7.2</td>
<td>▼</td>
</tr>
<tr>
<td>• % Preterm Infants</td>
<td>----</td>
<td>12.0</td>
<td>▲</td>
</tr>
<tr>
<td>Breastfeeding:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Initiation</td>
<td>46.9</td>
<td>59.8</td>
<td>▲</td>
</tr>
<tr>
<td>• 6 Months Duration</td>
<td>12.4</td>
<td>17.8</td>
<td>▲</td>
</tr>
<tr>
<td>Prenatal Weight Gain:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• &lt; Ideal</td>
<td>30.8</td>
<td>18.1</td>
<td>▼</td>
</tr>
<tr>
<td>• &gt; Ideal</td>
<td>44.2</td>
<td>50.9</td>
<td>▼</td>
</tr>
<tr>
<td>Anemia, Low Hgb, 3rd Trimester</td>
<td>30.2</td>
<td>35.9</td>
<td>▼</td>
</tr>
<tr>
<td>Anemia, Low Hg, 6 months - 5yrs</td>
<td>14.6</td>
<td>15.6</td>
<td>▼</td>
</tr>
<tr>
<td>Prenatal Smoking-Last Trimester</td>
<td>26.9</td>
<td>17.3</td>
<td>▲</td>
</tr>
<tr>
<td>First trimester Prenatal Care</td>
<td>71.9</td>
<td>80.9</td>
<td>▲</td>
</tr>
<tr>
<td>Prepregnancy:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Overweight</td>
<td>48.2</td>
<td>54.7</td>
<td>▼</td>
</tr>
<tr>
<td>• Underweight</td>
<td>6.1</td>
<td>4.3</td>
<td>▼</td>
</tr>
<tr>
<td>Body Weight:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 85th-&lt;95th%, ≥2 years</td>
<td>15.5</td>
<td>16.3</td>
<td>▼</td>
</tr>
<tr>
<td>• ≥95th%, ≥2 years</td>
<td>12.0</td>
<td>13.3</td>
<td>▼</td>
</tr>
</tbody>
</table>
Michigan WIC Five Year Plan

Health Outcome Indicators
January 2009 to December 2013

- Increase first trimester entry into the WIC program from 32.5% to 35.0%.
- Increase ideal prenatal weight gain from 28.8% to 31.5% among Michigan WIC mothers.
- Reduce the percent of low birthweight infants born to women enrolled in Michigan WIC from 8.4% to 8.0%.
- Increase breastfeeding initiation rate from 57.2% to 65.0% and the six-month duration rate from 18.5% to 24.0%.
- Decrease the prevalence of early childhood obesity, in children 2 to 5 years of age, from 13.7% to 12.0%.
- Decrease the prevalence of low hemoglobin level from 15.0% to 13.0% among children less than five years of age.

The projections are based on the 1994-2009 trend data from Michigan PNSS and PedNSS. 2009 data is used as the baseline for a five-year-plan from Jan. 2009 to Dec. 2013.
Trimester of WIC Enrollment

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>32.6</td>
<td>33.5</td>
<td>32.2</td>
<td>32</td>
<td>32.5</td>
<td>37.5</td>
</tr>
<tr>
<td>2nd</td>
<td>34.1</td>
<td>34.2</td>
<td>35</td>
<td>32.6</td>
<td>33.5</td>
<td>30.7</td>
</tr>
<tr>
<td>3rd</td>
<td>18.6</td>
<td>18.6</td>
<td>18.8</td>
<td>17.2</td>
<td>16.6</td>
<td>15.4</td>
</tr>
<tr>
<td>Postpartum</td>
<td>14.7</td>
<td>13.7</td>
<td>14</td>
<td>18.3</td>
<td>17.4</td>
<td>16.4</td>
</tr>
</tbody>
</table>

PNSS 2010
37.5% of Michigan WIC women enroll during the first trimester compared to 34.1% nationally.
Michigan WIC & Birth Defects

- WIC Client Data was combined with Michigan Birth Defects Registry (MBDR) Data from 2003-2007
- Mothers with babies with BD compared to mothers with babies with no BD
- 39.3% of infants reported to MBDR were linked to a WIC Mother
- Relationship found between a mother’s BMI prior to pregnancy and BD
Risks for Neural Tube Defects (NTDs)

<table>
<thead>
<tr>
<th>Weight category*</th>
<th>Increase above background risk**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight (BMI ≥25)</td>
<td>1.2 x</td>
</tr>
<tr>
<td>Obese (BMI ≥30)</td>
<td>1.7 x</td>
</tr>
<tr>
<td>Severely Obese (BMI &gt;35)</td>
<td>3 x</td>
</tr>
</tbody>
</table>

*As defined by IOM 2009

**1-2/2000 births

The chance increases with the degree of overweight.

Risk also increases for heart defects and many other types of birth defects with the degree of overweight.

Rasmussen et al., 2008
Prepregnancy BMI and Birth Defects

Increased odds of a birth defect if prepregnancy BMI >26

Increased odds* of birth defects:

- 10% increase for any birth defect
- 20% increase in CNS (brain and spine) BD
- 10-30% increase in Heart BD
- 10-40% increase in Respiratory BD

*Adjusted for maternal race and age, gestational age, maternal weight gain, and parity
Trends in Prepregnancy Weight

Current BMI Definition: from 2009 IOM, underwt. BMI is <18.5 and overwt. BMI is >25.0

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>11.1</td>
<td>45.8</td>
</tr>
<tr>
<td>2006</td>
<td>11.1</td>
<td>46.1</td>
</tr>
<tr>
<td>2007</td>
<td>10.7</td>
<td>46.4</td>
</tr>
<tr>
<td>2008</td>
<td>10.3</td>
<td>47.1</td>
</tr>
<tr>
<td>2009</td>
<td>4.2</td>
<td>54.2</td>
</tr>
<tr>
<td>2010</td>
<td>4.3</td>
<td>54.7</td>
</tr>
</tbody>
</table>
Prepregnancy Overweight, by County

54.7% of Michigan women enrolled are overweight or obese prepregnancy compared to 52.9% nationally.

2008-2010 PNSS
Trends in Maternal Weight Gain

<table>
<thead>
<tr>
<th>Year</th>
<th>&lt;Ideal Wt. Gain</th>
<th>&gt;Ideal Wt. Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>29.2</td>
<td>43.3</td>
</tr>
<tr>
<td>2006</td>
<td>29.3</td>
<td>43.6</td>
</tr>
<tr>
<td>2007</td>
<td>30.4</td>
<td>42.7</td>
</tr>
<tr>
<td>2008</td>
<td>30.9</td>
<td>41.8</td>
</tr>
<tr>
<td>2009</td>
<td>21.8</td>
<td>49.4</td>
</tr>
<tr>
<td>2010</td>
<td>18.1</td>
<td>50.9</td>
</tr>
</tbody>
</table>

PNSS 2010
50.9% of Michigan women enrolled have more than ideal weight gain during pregnancy, compared to 48.2% nationally.
Michigan WIC Behaviors
Nutrition and Exercise

<table>
<thead>
<tr>
<th></th>
<th>Fruits &amp; Vegetables %</th>
<th>Sweetened Drinks %</th>
<th>Fast Food, &gt;2x/wk %</th>
<th>TV Viewing, ≥2h/day %</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIC Mothers</td>
<td>88.9</td>
<td>45.3</td>
<td>10.2</td>
<td>ND</td>
</tr>
<tr>
<td>WIC Children 1-5</td>
<td>ND</td>
<td>30.3</td>
<td>10.9</td>
<td>19.7</td>
</tr>
</tbody>
</table>

MI-WIC: 3-9-2012
Data → Education

What can we do?
Diet and Exercise

✓ Get to a healthy weight before pregnancy
✓ Remain physically active
✓ Eat a healthy diet and meet the recommended daily values of vitamins and minerals
## Obesity & Birth Defects

### What can we do?

<table>
<thead>
<tr>
<th>Recommend pregnancy weight gain by weight status:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal = 25-35 lbs</td>
</tr>
<tr>
<td>Overweight = 15-25 lbs</td>
</tr>
<tr>
<td>Obese = 15 lbs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Screen for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
</tr>
</tbody>
</table>

Provide postpartum support for return to a healthy weight.
Healthy Diet

Follow individual nutritional guidelines for:
• a balanced diet,
• saturated fat and cholesterol,
• added calories needed in pregnancy,
• iron and calcium intake.

Prior to pregnancy: take a vitamin containing 400 micrograms of folic acid every day!
427.2 Consuming a diet very low in calories and/or essential nutrients; or impaired caloric intake or absorption of essential nutrients following bariatric surgery.

- Strict vegan diet;
- Low-carbohydrate, high-protein diet;
- Macrobiotic diet; and
- Any other diet restricting calories and/or essential nutrients.
Exercise

Every woman should--

• Take moderate exercise for 30 minutes most days,
• Walking, dancing, swimming, and yoga are great exercises,
• Avoid high-risk activities and sports in which she could get hit in the belly,
• Not perform exercises requiring her to lie on her back after the first trimester.
Medical Care

- Schedule and attend regular medical and dental examinations
- Avoid unnecessary x-rays
- Keep immunizations current
- Know and share family history
- Review lifestyle choices
- Evaluate medications
- Manage chronic conditions
Prenatal Check-ups

- **Schedule**
  - Weeks 4-28: every 4 weeks
  - Weeks 28-36: every 2 weeks
  - Weeks 36-40: one per week
- If mother has high-risk pregnancy or chronic condition, more frequent exams may be needed

✓ **Optimal time to make changes in treatment is often prior to conception**
Lifestyle Choices

Avoid using certain substances
✓ alcohol
✓ tobacco
  ▪ recreational drugs
  ▪ caffeine

Avoid using hot tubs and saunas before and during pregnancy

Make good nutrition and daily exercise a priority
Alcohol consumption during pregnancy can lead to:

- Fetal Alcohol Syndrome or FASD
  - Low birth weight
  - Heart and growth problems
  - Miscarriage or stillbirth
  - Cognitive, behavioral, and emotional impairment

FASD is 100% PREVENTABLE!

There is no safe level of alcohol consumption during pregnancy.
Smoking & Pregnancy

- Smoking during pregnancy can lead to:
  - Infant death
  - Decreased oxygen to the brain
  - Premature birth
  - Low birth weight
  - Decreased lung function of the baby
  - Childhood behavioral issues and learning disabilities

- Second hand smoke can also impact the health of the unborn baby
Smoking & Birth Defects

Risks increased for-

- certain heart defects = about 2 times background (highest for smoking > 1 pk/day)

- cleft lip and cleft palate = about 1.5-2.5 times background (higher with certain gene variants)
Smoking & Birth Defects

What can we do?

Help women quit smoking
• Find MDCH resources at www.michigan.gov/tobacco

National Resources
• March of Dimes (www.marchofdimes.com)
• Smokefree.gov (1-800-Quit-Now)
• Centers for Disease Control and Prevention (www.CDC.gov/tobacco)
Medical Conditions & Birth Defects

✓ Obesity
✓ Diabetes Types 1 and 2
  • Thrombophilia
  • Epilepsy
  • Cancer
  • Rheumatoid arthritis
  • Phenylketonuria
  • Hypertension
  • Maternal heart defect

Maternal medical conditions can cause birth defects.
Better control means better outcomes.
Best treatment may have risk.
Careful planning may be needed to protect mother’s health.
Medications & Birth Defects

- Women should continue taking medication as prescribed until changes are approved by their PCP.
- All medication, including over-the-counter (OTC), herbal and vitamin supplements should be considered.

Medical needs may favor use:

Some medicines are strongly associated with birth defects.

Some medicines have great benefit and little or no birth defect risk.

Many may increase the chance for birth defects or other poor pregnancy outcomes a little or in certain instances.
Diabetes Type 1 and Type 2 & Birth Defects

Major anomalies*

• Heart defects
• Neural tube defects
• Hydrocephaly
• Cleft lip with/without cleft palate
• Anorectal atresia
• Anotia/microtia
• Renal agenesis/hypoplasia
• Limb deficiencies

* Correa, et. al., 2008
Diabetes Type 1 and Type 2 & Birth Defects

Risks increased for--
- Any birth defect
- Multiple birth defects

Overall risk for birth defects among infants of diabetic mothers is about 2-4 times that of infants of non-diabetic mothers!

<table>
<thead>
<tr>
<th>Type of Birth Defect</th>
<th>Increase above background risk**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td>4.6 x</td>
</tr>
<tr>
<td>Heart plus (multiple)</td>
<td>10.7 x</td>
</tr>
<tr>
<td>Non-heart</td>
<td>2.3 x</td>
</tr>
<tr>
<td>Non-heart plus (multiple)</td>
<td>7.8 x</td>
</tr>
<tr>
<td>Background risk</td>
<td>1/33</td>
</tr>
</tbody>
</table>

Correa et al., 2008
Diabetes Type 1 and Type 2 & Birth Defects

**Exposure Potential**
- Nearly 3% of Michigan women 18-44 years have been told by a doctor that they have diabetes*
  - About 86% are overweight or obese
- About 1% of women who delivered a baby in the last year had problems with their blood sugar prior to pregnancy**

**Preventive Measures**
- Plan pregnancy
- Achieve and maintain control (monitor A1C; keep <7% prior to conception)
- Check blood sugar often
- Treat low blood sugar early

---

*Michigan Behavioral Risk Factor Survey (BRFS), 2008

**Michigan Pregnancy Risk Assessment Monitoring System (PRAMS), 2006
WIC Data & Birth Defects
Resources

- WIC training site ⇒ http://www.wichealth.org/
- MDCH Preconception Health Facts (Series) ⇒
  http://www.michigan.gov/mdch/0,1607,7-132-2945_5104-185449--,00.html
- March of Dimes (MOD) ⇒ www.marchofdimes.com
- Organization for Teratology Information Specialists (OTIS) ⇒
  www.OTISPregnancy.org
- Teratology Society ⇒ www.teratology.org
- National Toxicology Program (Center for the Evaluation of Risks to
- Food and Drug Administration (FDA) ⇒ www.fda.gov
- Center for Disease Control and Prevention (CDC) ⇒ www.cdc.gov
- National Center on Birth Defects and Developmental Disabilities
  (NCBDDD) ⇒ www.cdc.gov/ncbddd
Thank You,
Together, We Can Make a Difference!

Joan Ehrhardt, MS, CGC
Birth Defects Program
Coordinator
Ehrhardtj@Michigan.gov
517-335-8887
Genomics & Birth Defects Program

Hillary Turner, MPH
WIC Data Coordinator
TurnerH@Michigan.gov
517-335-3227
More to Come!

Medication: Before, During and After Pregnancy
Medications

Before, During and After Pregnancy

Joan Ehrhardt, MS, Coordinator
Genomics & Birth Defects Program
Objectives

✓ To describe causes of birth defects with a focus on preventable risk factors in the Michigan WIC population;

✓ To recognize the increased risk of birth defects to WIC clients through the review of WIC client health indicators; and

✓ To identify prevention strategies for WIC clients that improve reproductive outcomes and reduce the occurrence of birth defects; and

✓ To emphasize the importance of good preconception and interconception health practices in lowering the risk for birth defects and other adverse reproductive outcomes in the Michigan WIC population.
Goal

Reduce the number of Michigan WIC babies born with a birth defect by increased awareness of preventable factors and adoption of healthy behaviors.
Please Note

This presentation:

- Is intended for information purposes only and does not constitute medical advice.

- Includes technical terms for medical conditions and abnormal development.

- Includes pictures and photographs of birth defects.
WIC’s Role

A. Increase client and staff awareness.
B. Aid client access to health care.
C. Encourage and support continuity of care with primary care provider (PCP).
Medical Care

Work with a health care provider:

- Schedule and attend regular medical and dental examinations
- Avoid unnecessary x-rays
- Know and share family history
- Keep immunizations current

✓ Manage chronic conditions
✓ Evaluate medications
Prenatal Check-ups

- Schedule (routine)
  - Weeks 4-28: every 4 weeks
  - Weeks 28-36: every 2 weeks
  - Weeks 36-40: one per week
- If mother has a high-risk pregnancy or chronic condition, more frequent exams may be needed

✓ Optimal time to make changes in treatment is often prior to conception
Medical Conditions & Birth Defects

- **Epilepsy** (seizure disorder)
- **Thrombophilia** (blood clotting disorder)
  - Cancer
  - Rheumatoid arthritis
  - Phenylketonuria (PKU)
  - Diabetes (DM Type 1 and Type 2)
  - Obesity
  - Hypertension (high blood pressure)
  - Maternal heart defect

Maternal medical conditions can cause birth defects.

Better control means better outcomes.

Careful planning may be needed to protect mother’s health.
Medication & Birth Defects

• Women should continue taking medication as prescribed until changes are approved by their PCP.
• All medication, including over-the-counter (OTC), herbal and vitamin supplements should be considered.

Medical needs may favor use:

Some medicines have great benefit and little or no birth defect risk.

Many may increase the chance for birth defects or other poor pregnancy outcomes a little or in certain instances.

Some medicines are strongly associated with birth defects.
## FDA Classification of Drug Safety in Pregnancy

<table>
<thead>
<tr>
<th>Category</th>
<th>Description (shortened)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Controlled studies in women fail to show risk to the fetus in the first trimester (and no evidence of risk in later trimesters) and the possibility of fetal harm appears remote.</td>
</tr>
<tr>
<td>B</td>
<td>Either animal reproduction studies have not shown fetal risk but there are no controlled studies in pregnant women, or animal studies have shown an effect not confirmed in women in the first trimester (and no evidence of risk in later trimesters).</td>
</tr>
</tbody>
</table>
| C        | Either studies in animals have shown adverse effects on the fetus (teratogenic or embryocidal or other) and there are no controlled studies in women, or studies in women and animals are not available.  
✓**Drugs should be given only if the potential benefit justifies the potential risk to the fetus.** |
| D        | There is evidence of human fetal risk, but the benefits from use in pregnant women may be acceptable (e.g., if the drug is needed in a life-threatening situation or for a serious disease in which safer drugs cannot be used or are ineffective.) |
| X        | Studies in animals or human beings have shown fetal abnormalities or there is evidence of fetal risk based on human experience, and the risk of the use of the drug in pregnant women clearly outweighs any possible benefit.  
✓**The drug is contraindicated in women who are or may become pregnant.** |

### References

Food and Drug Administration - Code of Federal Regulations Title 21 (official language): 
Prescription Medications

DO NOT USE OR USE WITH CAUTION

✓ Accutane (Isotretinoin)
  acne

✓ Coumadin (Warfarin)
  heart valve disease, clotting tendency

✓ Depakote (Valproic Acid)
  seizures, mental illness
  • Thalidomide
    certain cancers; certain skin conditions
  • Methotrexate
    certain cancers; rheumatoid arthritis
Retinoids (Vitamin A)

**Indications**
- Acne (severe, nodular, scarring)
- Melanoma (metastatic)
- Acute nonlymphocytic leukemia

**Medications**
- Isotretinoin:
  - Accutane®
  - Amnesteem®
  - Claravis®
  - Sotret®
- Etretinate:
  - Tegison®
- Acitretin:
  - Soriatane®

Oral form = major concern
Retinoids (Vitamin A)

Major anomalies
- Microtia/Anotia
- Heart defects
- Microcephaly, hydrocephalus

Minor features
- Flat nasal bridge
- Tooth enamel mottling
- Ocular hypertelorism (widely spaced eyes)

Growth and development
- Developmental delays and cognitive impairment
Retinoids (Vitamin A)

**Exposure potential**
- Lack of written medical recommendation = 64%
- Failure to use two contraceptive methods = 78%
- Lack of pregnancy test before prescribing = 66%
- Failure to wait for menstrual cycle to begin = 82%

**Risk estimates**
- Miscarriage ~ 40%
- Birth defects ~ 35%
- Pregnancy rate ~2.7/1000 using isotretinoin (US)

**Preventive Measures**
CONTRACEPTION
iPLEDGE: www.ipledgeprogram.com
Epilepsy & Antiepileptics

Indications

• Epilepsy (seizures)
• Mood disorders
• Headaches
Epilepsy & Antiepileptics

Medications

- Benzodiazepines
  - Clonazepam (Klonopin®)
  - Diazepam (Valium®)
- Carbamazepine (Tegretol®)
- Lamotrigine (Lamictal®)
- Levetiracetam (Keppra®)
- Oxcarbazepine (Trileptal®)

Medications (continued)

- Phenobarbital (barbiturate)
- Phenytoin (Dilantin®)
- Primidone
- Topiramate (Topamax®)
- Valproate (Depakote®)
- Vigabatrin (Sabril®)
- Zonisamide (Zonegran®) (sulfonamide)
Epilepsy & Antiepileptics

Major anomalies
• Cleft lip/palate
• Heart defects
• Spina bifida (~1-5% of exposed fetuses)

Minor features
• Midface hypoplasia
• Digit hypoplasia (fingers and toes)

Growth and development
• Low birth weight
• Developmental delays and cognitive impairment
Epilepsy & Antiepileptics

Exposure Potential

• About 0.5% (1/200) pregnant women have epilepsy.

Preventive Measures

Plan pregnancy; suggested preconceptional folic acid supplementation of up to 4 mg/day (prescription required).

Risk Estimates

• 4-10% overall risk for birth defects in children of women treated for epilepsy.

• Results mixed concerning baseline risk in children of untreated women with epilepsy.
Warfarin (Anticoagulant)

Indications
- Heart valve disease
- Heart valve replacement
- Anti-phospholipid antibody
- Thrombophilia (blood clotting disorder)
- Deep vein thrombosis (DVT) (blood clot in leg veins)
- Pulmonary embolism (blood clot in lung artery)

Medication
- Coumadin®

Action
- Blood thinner
- Inhibits synthesis of Vitamin K dependent clotting factors II, VII, IX, X and proteins C, S
**Warfarin (Anticoagulant)**

**Fetal Warfarin Syndrome**

- Stippling of epiphyses of proximal femur (hip) and calcaneus (heel) (chondrodysplasia punctata)
- Hypoplastic distal phalanges (underdeveloped tips of fingers and toes)
- Low birth weight (usual catch-up)
- Increased risk for CNS anomalies seen with 2nd and 3rd trimester exposure (e.g., microcephaly, hydrocephalus)
- Fetotoxicity (miscarriage; stillbirth; neonatal death) ~50%

- Scoliosis
- Hypoplastic nose
- Depressed nasal bridge
- Hearing loss
- Eye anomalies; blindness
- Heart defects
- Cognitive impairment
- Seizures
Warfarin (Anticoagulant)

Exposure Potential

- Valvular heart disease affects <1% of all pregnancies
- Heart disease affects 1-4% of pregnancies

Risk Estimates

- 6% to 25% of exposed fetuses
- Susceptibility dependent on genetic variants/slow metabolizers

Preventive Measures

Plan pregnancy; decrease coumadin to $\leq 5$ mg/day; some suggest to use heparin in first trimester.
Over-the-Counter Medications

- Aspirin
- Ibuprofen
  - Cough syrup
  - Allergy medication
Aspirin (Salicylates)

**Indications**
- Pain management
- Rheumatic disease
- Heart disease

High dose risk near term:

**Mother** = prolonged gestation, complicated delivery, increased pre- and post-partum bleeding

**Fetus** = early closure of ductus arteriosus, increased risk for stillbirth, intracranial hemorrhage, low birth weight, transient renal failure and oligohydramnios (low amniotic fluid)

Low dose may be protective.
Ibuprofen

**Indications**
- Pain management
- Rheumatic disease

**Medications**
- Motrin®
- Advil®
- Nuprin®

High dose risk near term:

**Mother** = prolonged gestation, complicated delivery, increased pre- and post-partum bleeding

**Fetus** = early closure of ductus arteriosus, increased risk for stillbirth, intracranial hemorrhage, low birth weight, transient renal failure and oligohydramnios (low amniotic fluid)
Herbal Supplements

- Not regulated by FDA
- Manufacturers are not required to perform safety and effectiveness studies
- Improper labels or misguided information
- Few trials so not enough information on safety
- May be adulterated with other drugs or contaminated with heavy metals or bacteria
427.4 Inadequate vitamin/mineral supplementation recognized as essential by national public health policy.

- Consumption of less than 27 mg of iron as a supplement daily by pregnant woman.
- Consumption of less than 150 mcg of supplemental iodine per day by pregnant and breastfeeding women.
- Consumption of less than 400 mcg of folic acid from fortified foods and/or supplements daily by non-pregnant woman.
Talking Points

- Many birth defects develop early in pregnancy, before many women know they are pregnant
- Some birth defects are preventable
- Certain medical conditions in women can cause birth defects
- Certain medications can cause birth defects
- The best time to optimize medical management is before pregnancy
- Planning pregnancy gives time to make changes that increase the chances of a healthy pregnancy and healthy baby
- Medicines should be taken as directed; changes should be made with a health provider’s guidance
Resources

• Organization for Teratology Information Specialists (OTIS) ⇒ www.OTISPregnancy.org [Toll Free 866-626-6847 in English and Spanish]
• Teratology Society ⇒ www.teratology.org
• March of Dimes (MOD) ⇒ www.marchofdimes.com
• Food and Drug Administration ⇒ www.fda.gov
• MotheRisk ⇒ www.motherisk.org
• Dietary Supplements Database ⇒ http://dietarysupplements.nlm.nih.gov/dietary

• Teratogen Information System (TERIS) and Shepard’s Catalog of Teratogenic Agents ⇒ http://depts.washington.edu/terisweb/teris/ (annual subscription fee $150.00 3-2011)
Thank You
Together, we can make a difference!

Contact:
Joan Ehrhardt, MS, CGC
Birth Defects Program Coordinator
Ehrhardtj@Michigan.gov
517-335-8887

For birth defects prevention information and educational materials
Acknowledgements

Special thanks to the MDCH WIC Program for their interest and support for collaboration and continuing education.