

# **Healthy Start Prenatal Screening: Sensitivity and Positive Rate Compared for the Revised 2008 Prenatal Screening Criteria Versus the 1994 Prenatal Screening Criteria**

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## **Introduction and Background**

In April 1992, Florida's Healthy Start initiative was implemented from 1991 legislation. A major component of the Healthy Start initiative is prenatal risk assessment as outlined in the Florida Statute, 383.14(a), which states: "The department shall develop a multilevel screening process that includes a risk assessment instrument to identify women at risk for a preterm birth or other high-risk condition. The primary health care provider shall complete the risk assessment instrument and report the results to the Office of Vital Statistics so that the woman may immediately be notified and referred to appropriate health, education, and social services." This requirement of offering the Healthy Start Prenatal Risk Assessment Screen to all pregnant women at the first prenatal visit assures that pregnant women and their healthcare providers have the demographic, medical and psychosocial information necessary to assess potential risks and to plan for appropriate risk-based health care and services. The Healthy Start Prenatal Risk Assessment Screen also serves as a gateway into Florida's Healthy Start Program, which provides for a wide range of services and support for pregnant women, infants and children up to age 3.

The original Healthy Start Prenatal Risk Screen instrument was developed in 1991 by the Florida Department of Health in collaboration with the Healthy Start Advisory committee, which included representatives from Florida's county health departments, universities, the legislature and the private healthcare sector. The prenatal risk screening criteria were revised in 1994 and, although the design of the prenatal screening forms changed in the interim, the prenatal risk screening criteria were not revised until July 2008 in conjunction with a newly designed Healthy Start Prenatal Risk Screening form.

The screening criteria implemented in 2008 were developed over a period of two years by Department of Health staff in collaboration with perinatal health professionals and experts from Florida's county health departments, Healthy Start coalitions and universities. Extensive reviews of the research literature and analysis of available data were conducted with the goal of improving the effectiveness, ease of use and acceptability of prenatal risk screening.

For the prenatal risk screening revision process, one of the main goals was to develop screening criteria that would be more accurate in identifying pregnant women at increased risk of poor birth outcomes. The purpose of this analysis is to compare the performance of the revised 2008 prenatal risk screening criteria to the previous 1994 prenatal risk screening criteria.

## Methods

The new prenatal screening criteria were implemented in July 2008. From July 2008 to December 2009, both the 1994 and new 2008 prenatal screening criteria were being used to assess prenatal risk. For the comparison of the two screening criteria, January 2008 - March 2009 data were used for the 1994 screening criteria and July 2008 - March 2009 data were used for the 2008 screening criteria. There were 160,578 records for the 1994 screening criteria and 58,363 records for the 2008 screening criteria for a total of 218,941 records.

An unduplicating process was conducted on the 218,941 records due to instances when women were screened more than once within a pregnancy event or may have been pregnant more than once during the data period. The screening records were unduplicated so that each individual woman would be represented by one record in the data file. Twelve percent of the records were excluded as duplicates.

The unduplicated records were then linked to birth records and the linked records were checked for implausible screening dates and birth dates. Linked records with birth dates before screening dates or birth dates more than 9 months after screening dates were excluded. There were 9,100 (5.6%) records excluded for these reasons leaving 154,061 linked records for the analysis. Of these, there were 115,957 records with the 1994 screening criteria and there were 38,104 records with the 2008 screening criteria.

In summary, there were 218,941 screening records in the data file before unduplication, linking and logical exclusions. After all exclusions and linking, there were 154,061 (70.4%) screening records linked to birth records. Some of the prenatal screen records did not link to birth records because the pregnancies did not end with live births. In some cases, live births may have occurred in another state if the pregnant woman relocated after the screening but before the birth. Also, some prenatal screening records did not link to birth records due to a failure of the linking process. With the data available for this analysis, it is not possible to determine what proportions of the non-linked records are attributable to each of the previously listed factors.

## Results

As shown in the following table, the 2008 prenatal risk screening criteria had a slightly higher positive percentage at 29.0% compared to the 1994 prenatal risk screening criteria with a positive percentage of 27.8%. However, the new 2008 screening criteria was more likely to correctly identify women as having an increased risk of delivering a low birth weight (less than 2500 grams) or preterm (less than 37 weeks gestation) infant. This is called sensitivity. The new 2008 screening criteria correctly identified 47.1% of women who gave birth to a low birth weight (LBW) infant as positive for increased risk. In contrast, the 1994 screening criteria identified 40.7% of the women who gave birth to a low birth weight infant as high risk or positive. The results were similar for preterm births. 40.9% of the women who delivered preterm infants were correctly identified as positive by the 2008 screening criteria. In comparison, the 1994 screening criteria correctly identified a lesser percentage of 34.8% of the women that delivered preterm infants as positive.

Additionally, the difference in the LBW percentages between women classified as positive and women classified as negative was greater for the new 2008 screening criteria compared to the 1994 screening criteria. This indicates the new 2008 screening criteria was more effective at categorizing women into high risk (positive) and low risk (negative) groups. In the table below, the LBW percentages for the 1994 screening criteria are 11.5% for positive women and 6.4% for negative women. The ratio of the two percentages is 1.79, which means women who were

positive by the 1994 screening criteria were 79% more likely to deliver a LBW infant compared to women who were negative by the 1994 screening criteria. In contrast, the LBW percentage for women who were positive by the new 2008 screening criteria was 12.4% and for women who were negative on the new screening the LBW percentage was 5.7%. This is a ratio of 2.18, which means women who were positive by the new 2008 screening criteria were 118% more likely to deliver a LBW infant compared to women who were negative by the same 2008 screening criteria.

The pattern is the same for the preterm birth outcome. Women who were positive by the older 1994 screening criteria were 39% (ratio = 1.39) more likely to deliver a preterm infant compared to women who were negative by the same 1994 screening criteria. In contrast, women who were positive by the new 2008 screening criteria were 64% (ratio = 1.64) more likely to delivery a preterm infant compared to women who were negative by the same 2008 screening criteria.

## **Limitations**

One potential limitation is the accuracy of the linking between the prenatal screening and birth records. It is not possible to determine precisely the accuracy of the linking. However, assuming the limitations of the linking process affected both the old and new screening records to the same extent, analytic comparisons between the old and new screenings would be relatively unaffected.

Another limitation is the accuracy of the birth record data. If the data on the birth record used to classify the births as preterm or low birth weight is incorrect, then infants could be incorrectly classified regarding low weight or preterm births. As with the other limitations, these potential misclassifications would likely affect records with the 1994 and the new 2008 screening criteria to the same extent, so that comparisons between the 1994 and 2008 screening criteria would be relatively unaffected by the misclassification errors.

## **Conclusion**

The revised 2008 Healthy Start Prenatal Screen criteria implemented in July 2008 is an improvement over the 1994 screening criteria in terms of identifying pregnant women at increased risk of delivering a low birth weight or preterm infant. The percentage of women classified as at-risk, or positive, as assessed by use of the screening instrument is essentially the same for both the 1994 and the 2008 prenatal screen criteria, but the sensitivity of the 2008 screening criteria for low birth weight and preterm labor is substantially higher for the new 2008 screening criteria compared to the 1994 screening criteria.

**Florida Healthy Start Prenatal Screenings Linked to Birth Records  
Comparison of New (2008) Screening versus Old Screening (1994)**

	<b>Old Prenatal Screen</b>	<b>New Prenatal Screen</b>	<b>New - Old Difference</b>	<b>p value of Difference</b>
<b>Total Women Screened</b>	115,957	38,104		
<b>Positive Screens</b>	32,192	11,056		
<b>Positive percent</b>	<b>27.8%</b>	<b>29.0%</b>	<b>1.25</b>	<b>0.000</b>
LBW with Positive Screen	3,691	1,366		
LBW with Negative Screen	5,369	1,534		
<b>LBW Sensitivity Percent</b>	<b>40.7%</b>	<b>47.1%</b>	<b>6.36</b>	<b>0.000</b>
LBW percent for Positive Screen	11.5%	12.4%		
LBW percent for Negative Screen	6.4%	5.7%		
<b>LBW Rate Ratio - Positive to Negative</b>	<b>1.79</b>	<b>2.18</b>	<b>0.39</b>	<b>0.000</b>
PTB with Positive Screen	5,359	1,908		
PTB with Negative Screen	10,048	2,840		
<b>PTB Sensitivity Percent</b>	<b>34.8%</b>	<b>40.2%</b>	<b>5.40</b>	<b>0.000</b>
PTB percent for Positive Screen	16.6%	17.3%		
PTB percent for Negative Screen	12.0%	10.5%		
<b>PTB Rate Ratio - Positive to Negative</b>	<b>1.39</b>	<b>1.64</b>	<b>0.26</b>	<b>0.000</b>

LBW = Low Birth Weight birth: birth under 2500 grams  
PTB = Preterm birth: birth before 37 weeks gestation