Factors Associated with Newborn Hearing Screening Follow-up

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The Colorado Infant Hearing Program

- Legislation passed in 1997
- CDPHE-HCP lead agency
- 56 birthing hospitals
- 70,000 births
Role of Public Health in EHDI Programs

- Using science as a basis for decision-making and action;
- Expanding the quest for social equity;
- Performing effectively as a service agency;
- Making efforts outcome-oriented; and
- Being accountable

* CDC Operating Principles for Program Evaluation
Initial Screen Results
- Infants who had 5 minute Apgar scores >7 were 9 times more likely to receive the screen
- Infants who weighted more than 2,500 gms were 3.5 times more likely to receive the screen

Rescreen Results
- Interaction between hospital rescreen rates, mother’s education, race/ethnicity
2005 Stats

- Births = 69,474
- Screened = 67,466 (97%)
- Hospital births screened = 67,261 (98.2%)
- Not Passed = 3,144 (4.6%)
- Rescreened = 2,531 (80.5%)
- Not Rescreened = 622 (19.8%)
- Confirmed Hearing Loss = 115
FACTORS THAT AFFECT RESCREEN RATES

- Demographic variables from the EBC
  - Race
  - Ethnicity=Hispanic, Non-Hispanic
  - Gender
  - Gestational Age=>36 wks, <36 wks
  - Birth Weight =>2500 gms, <2500gms
  - Apgar Score at 5 minutes=>7, <7
  - Mother’s age at birth=11-19, 20-24, 25+
  - Marital Status
  - Mother’s education=<12, >13
FACTORS THAT AFFECT RESCREEN RATES

- Hospital Variables
  - Number of births=4 groups
  - Nursery Level=Well baby, NICU II, NICU III
  - Audiologist Involved
  - Technology=OAE, AABR, Both
  - Refer Rates=0-5%, 5-10%, >10%
  - Screening Personnel=Nurse, Technicians, Volunteers
  - Scheduling the Follow-up Appt=Hospital, parents
  - Charge for the Outpatient Rescreen
  - Location of the Outpatient Rescreen=Nursery, Audiology, Community
  - Rescreen Rates=>90%, 80-90%, <79%
Regression Analysis for Whether an Infant Failed to Receive the Follow-up Outpatient Rescreen

- **Demographic Variables**
  - All significant at $p<.01$ except for birth weight and gestational age

- **Hospital Variables**
  - Significant at $p<.0001$
    - Audiologist Involved
    - Rescreen Rates (80-90%, <79%)
    - Parents scheduling the outpatient rescreen appt.
    - Refer out of the hospital for rescreen
HOSPITAL VARIABLES

- Infants born in hospitals without an audiologist involved are 63% less likely to receive the outpatient rescreen than those born in hospitals with an audiologist involved.
  - 56 Birthing Hospitals
    - 24 Yes (12 on staff)
    - 32 No
HOSPITAL VARIABLES

- Infants born in hospitals with rescreen rates between 80-90% are 2.4 times less likely to receive the outpatient rescreen than infants born in hospitals with rescreen rate >90%.

- Infants born in hospitals with rescreen rates <79% are 6.3 times less likely to receive the outpatient rescreen.
Audiologist & Refer Rates

Refer Rates

<table>
<thead>
<tr>
<th>Refer Rates</th>
<th>&lt;5%</th>
<th>5-10%</th>
<th>&gt;10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Not Rescreened</td>
<td>Audio</td>
<td>No Audio</td>
<td></td>
</tr>
<tr>
<td>&lt;5%</td>
<td>17</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>5-10%</td>
<td>18</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>&gt;10%</td>
<td>14</td>
<td>22</td>
<td>8</td>
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</tbody>
</table>
Audiologist & Rescreen Rates

- >90%
- 80-89%
- <79%

% Not Rescreened

Rescreen Rates

Audio
No Audio
AUDI OLOGISTS AND TECHNOLOGY

% Not rescreened

Audiologist | No Audiologist

OAE | AABR | Both

0 5 10 15 20 25 30 35 40 45
Rescreen Rates & Screening Personnel

![Bar chart showing rescreen rates for different groups.](chart.png)
Follow-up Scheduling

% Not Rescreened

- Hosp/audio
- Parents/audio
- Hosp/no audio
- Parents/no audio

Nurses, Techs, Volunteers
Location of the Rescreen

Rescreen Rates

- >90%
- 80-89%
- <79%

% Not Rescreened

- Nursery
- Audiology
- Refer out
Demographic Variables

Rescreen Rates

% Not Rescreened

- Hispanic >13
- Non-Hispanic >13
- Hispanic <12
- Non-Hispanic <12

Rescreen Rates:
- >90%
- 80-90%
- <79%
Demographic Variables

Rescreen Rates

% Not Rescreened

- >90%
- 80-90%
- <79%

Female/Moed>13
Female/Moed<12
Male/Moed>13
Male/Moed<12
Health Disparities at a Glance!

- **Mother’s age**
  - 11-19 Years
    - Population=8%
    - Not rescreened=14%

- **Education Level**
  - 12 years or less
    - Population=48%
    - Not rescreened=64%

- **Marital Status**
  - Unmarried
    - Population=27%
    - Not rescreened=39%

- **Ethnicity**
  - Hispanic
    - Population=32%
    - Not rescreened=46%
CONCLUSIONS

- Target specific populations for education
- Target specific hospitals for technical support
- Increase the role of the Audiology Regional Coordinator
- Increase the role of the Parent Coordinator
- Increase efficiencies in the data management system
- Engage the Medical Home!
FUTURE DIRECTIONS

- A true integrated data system
- Telemedicine for audiology, early intervention, and genetic consultation
- Increase State General Funds to support newborn hearing screening in Colorado
- Continue research on late onset hearing loss
Outcomes: Happy, Healthy Families

- Comprehensive
- Community Based
- Culturally Competent
- Seamless
- Knowledgeable Providers
- Parent to Parent Support