Using an Immunization Information System for Assessment, Feedback, Information, Exchange (AFIX)

New York City
Department of Health and Mental Hygiene
Bureau of Immunization

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New York City (NYC) and the Vaccines for Children (VFC) Program

- 8.3 million people - 1.9 million are 0-18 yrs
  - ~74% of 0-18 yr-olds eligible for publicly funded vaccines
    - ~66% VFC
    - ~1% 317 (underinsured, vaccinated at other than FQHCs)
    - ~7% SCHIP

- 88% (1,530) of all pediatric provider sites (1,737) enrolled in VFC

- ~3.3 million publicly funded vaccine doses costing ~$138 million distributed in NYC annually
Citywide Immunization Registry (CIR)

- NYC’s Immunization Information System (IIS)
  - State, City reporting mandate for immunizations administered to patients 0-18 years of age
  - ~ 4.9 million patient records
  - ~ 65 million immunizations

- In 2006, we linked CIR reporting to VFC distribution
  - Created CIR-generated VFC doses administered report (DAR): # doses reported to CIR in year / # doses received from VFC in year
    - Providers with DAR < 90% subject to a reduction of order
  - CIR reporting increased 70%, leading to more complete data
    - Coverage is within confidence intervals of Natl Imm Survey (NIS)
  - Transitioned to using CIR for 100% of AFIX from 2006-2010
AFIX in NYC

- AFIX visits conducted among VFC sites to improve coverage
  - Prioritize sites with childhood series coverage \(< 90\%\) and not visited in previous year
  - Conduct AFIX among 30\% of enrolled VFC sites

- Before 2006, AFIX based on chart review
  - Piloted AFIX using IIS at end of 2006
  - Transitioned to 100\% AFIX through IIS in July 2010

- In 2008, merged AFIX and VFC field ops teams
  - Conducts combined AFIX and VFC compliance site visits
  - \(\sim 2/3\) of VFC site visits include AFIX
Why Transition to Using IIS for AFIX?

- Consumes less time and resources than chart review
  - Less disruptive to provider’s practice
    - AFIX-IIS conducted in ½-1 day vs. 2-3 days
    - No data entry
  - Helps improve completeness of IIS data
    - Further incentive for providers to report to IIS
- Allows for assessment of all patients in age group (instead of sample)
- Facilitates expansion of age groups
Changes to Facilitate Use of IIS for AFIX

- Developed user friendly tool: Web Up-To-Date (UTD) Application
- Trained field staff to run Web UTD by site:
  - Summary report of coverage
  - Lists of children not UTD
  - % of invalid doses (age, interval)
- Improved patient de-duplication in IIS
- Added fields to IIS Online Registry: Moved or Gone Elsewhere (MOGE) and Disease History
Steps for Implementing AFIX Using IIS
**AFIX - Assessment**

- Field staff run immunization coverage through IIS Web UTD (instead of Co-Casa) before site visit
  - All patients in age range included
    - Age groups in 2012:
      - 19 to 35 months
      - 13 years
  - Identify and merge duplicate patient records
  - Re-run coverage after records are merged
  - Generate list of children not UTD for recall
  - Identify patterns of noncompliance with immunization schedule based on IIS clinical decision support
AFIX - Feedback

• Visit provider to conduct feedback sessions covering:
  – IIS-generated immunization coverage levels and areas of noncompliance with schedule
  – Recommendations for improving coverage, e.g.:
    • Evaluate patient immunization status at each visit based on age and interval not just vaccine dates
    • Use the IIS to obtain patient immunization history and recommendations of immunizations due now, in future
    • Recall and immunize children not UTD
AFIX - Incentives

- Give providers recall lists at site visit
- Send follow-up report to show provider results of assessment 3 to 4 months later
  - Sites with < 90% coverage and ≥ 25 patients in either age group
- Honor providers for high coverage
  - In person, at Childhood Coalition Meeting
  - Post name on BOI Web site
    - 2012 Criteria:
      - > 90% for 4 DTaP:3 polio:1 MMR:4* Hib:3 Hep B :1 varicella (4:3:1:4:3:1) among 19-35 mo-olds
      - > 80% for 1 Td/Tdap:1 Mening among 13 year-olds
      - > 90% VFC Doses Administered Report (DAR)
AFIX - eXchange

• At site visit, exchange information to facilitate improvement in coverage
  – Follow the ACIP Schedule
  – Use IIS reminder/recall system
  – Use Web sites:  www.immunize.org and www.cdc.gov for current VISs, other information
• Refer providers to IIS outreach staff
  – Training on IIS Online Registry reminder/recall system
  – Troubleshooting to resolve IIS reporting problems
Web UTD Application: Parameter-Driven Tool to Run Coverage by Facility
The Web Up-To-Date (UTD) application is an internal tool developed to run immunization coverage rates by site based on valid doses administered.
Parameter-Driven

• Specify Facility
• Facility population inclusion criteria: based on child receiving last series shot at that facility
  – After a certain age for each patient
    • 1 yr (361 days) for 19-35 mo-olds
    • 9 yrs for (3,287 days) 13 yr-olds
• Specify age range of population assessed
• Review date: date coverage is run - it can be run as of a date in the past
• Specify number of antigens for UTD
**New Job Wizard**

Select all vaccine groups to include:

<table>
<thead>
<tr>
<th>Code</th>
<th>Vaccine Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>100 (HepB)</td>
</tr>
<tr>
<td>4</td>
<td>200 (DTP)</td>
</tr>
<tr>
<td></td>
<td>Tdap (115)</td>
</tr>
<tr>
<td></td>
<td>Td (09, 113)</td>
</tr>
<tr>
<td></td>
<td>Tdap (115) / Td (09, 113)</td>
</tr>
<tr>
<td>4</td>
<td>300 (Hib) override</td>
</tr>
<tr>
<td></td>
<td>Merck Hib (49, 51)</td>
</tr>
<tr>
<td></td>
<td>non-Merck Hib</td>
</tr>
<tr>
<td>3</td>
<td>400 (Polio)</td>
</tr>
<tr>
<td>1</td>
<td>500 (MMR)</td>
</tr>
<tr>
<td></td>
<td>600 (Varicella)</td>
</tr>
<tr>
<td>4</td>
<td>700 (Pneumo. Conjugate) override</td>
</tr>
<tr>
<td></td>
<td>720 (Pneumo. Polysaccharide)</td>
</tr>
<tr>
<td></td>
<td>800 (Influenza)</td>
</tr>
<tr>
<td></td>
<td>810 (HepA)</td>
</tr>
<tr>
<td></td>
<td>820 (Rotavirus)</td>
</tr>
<tr>
<td></td>
<td>830 (Meningococcal)</td>
</tr>
<tr>
<td></td>
<td>MCV4 (114)</td>
</tr>
<tr>
<td></td>
<td>MPSV4 (32)</td>
</tr>
<tr>
<td></td>
<td>MCV4 (114) / MPSV4 (32)</td>
</tr>
<tr>
<td></td>
<td>840 (Human Papillomavirus)</td>
</tr>
<tr>
<td></td>
<td>890 (H1N1 Influenza)</td>
</tr>
</tbody>
</table>

**Review Date (Immunization):**

06/25/2013
Web UTD Output Files

- File with summary statistics
  - # of children assessed
  - # and % of children UTD for specified series and each antigen in the series
  - # of invalid shots

- File with list of children for recall
  - Names of children missing at least one shot from specified series
  - Type and dose number of shot missing
## Immunization Coverage Feedback Report, 2012 19-35 Month-Olds

<table>
<thead>
<tr>
<th>Series/Antigens</th>
<th>Assessment (N=47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:3:1:4:3:1</td>
<td>71%</td>
</tr>
<tr>
<td>4 DTaP</td>
<td>76%</td>
</tr>
<tr>
<td>3 Polio</td>
<td>95%</td>
</tr>
<tr>
<td>1 MMR</td>
<td>95%</td>
</tr>
<tr>
<td>Hib Full Series (Age/Interval-Adjusted)</td>
<td>95%</td>
</tr>
<tr>
<td>3 Hep B</td>
<td>90%</td>
</tr>
<tr>
<td>1 Varicella</td>
<td>95%</td>
</tr>
<tr>
<td>PCV Full Series (Age/Interval Adjusted)</td>
<td>90%</td>
</tr>
<tr>
<td>Hep A (2 doses)</td>
<td>29%</td>
</tr>
</tbody>
</table>
# Recall List, 2012

**Facility: 7777X01**  
Minimum DOB: 00/01/2010  
Maximum DOB: 12/31/2011  
Review Date (Immunization): 06/15/2013  
Date Produced: 08/15/2013 18:00:40

| FACILITY CODE | SELECTION METHOD | VACCINE GROUP | TOTAL PATIENTS EXCLUDING MOGEs | TOTAL PATIENTS INCLUDING MOGEs | TOTAL NUMBER OF MOGEs | COUNT OF PATIENTS WITH AT LEAST ONE INVALID SHOT | COUNT OF INVALID SHOTS-THIS FACILITY | COUNT OF INVALID SHOTS-ANY FACILITY | # OF PTS WITH MMR < 1 YEAR OF AGE | # OF PTS WITH VARICELLA < 1 YEAR OF AGE | # OF PTS WITH MMR AND VARICELLA < 28 DAYS APART | # OF PTS WITH 3RD HEPB < 6 MONTHS OF AGE | # OF PTS WITH 4TH DTaP < 4 MONTHS AFTER 3RD DOSE |
|---------------|------------------|---------------|-------------------------------|--------------------------------|-----------------------|-----------------------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|---------------------------------|----------------------------------------|-------------------------------------|---------------------------------|------------------------------------------|
| 2015X01       | LAST SERIES SHOT | ALL           | 225                           | 229                            | 4                     | 2                                             | 4                                   | 4                                 | 0                                 | 0                               | 0                                      | 0                                   | 0                               | 0                                        |
| 2015X01       | ANY SERIES SHOT  | ALL           | 254                           | 286                            | 32                    | 2                                             | 4                                   | 4                                 | 0                                 | 0                               | 0                                      | 0                                   | 0                               | 0                                        |

**Percent UTD (last series shot)**

- 431431 Series Percent: 96.40%
- 4 DTaPs: 96.90%
- 3 Polio: 100.00%
- 1 MMR: 100.00%
- 4 Hibs (Full Hib Series): 97.80%
- 3 Hep Bs: 100.00%
- 1 Varicella: 100.00%
- 4 PCV (Full PCV Series): 97.80%
- 2 Hep A: 86.70%

**Detailed List of Patients Not UTD (last series shot)**

<table>
<thead>
<tr>
<th>COUNT</th>
<th>CIR NUMBER</th>
<th>LAST NAME</th>
<th>FIRST NAME</th>
<th>DOB</th>
<th>GENDER</th>
<th>MEDREC</th>
<th>SERIES DUE</th>
<th>NOT UTD BUT NOT YET DUE SERIES</th>
<th>MMR &lt; 1 YEAR OF AGE</th>
<th>VARICELLA &lt; 1 YEAR OF AGE</th>
<th>MMR AND VARICELLA &lt; 28 DAYS APART</th>
<th>3RD HEPB &lt; 6 MONTHS OF AGE</th>
<th>4TH DTaP &lt; 4 MONTHS AFTER THE 3RD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1111</td>
<td>A</td>
<td>a</td>
<td>10/11/2011</td>
<td>F</td>
<td>11</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>2</td>
<td>1112</td>
<td>B</td>
<td>b</td>
<td>10/12/2011</td>
<td>N</td>
<td>12</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>1113</td>
<td>C</td>
<td>c</td>
<td>5/25/2011</td>
<td>N</td>
<td>13</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>4</td>
<td>1114</td>
<td>D</td>
<td>d</td>
<td>11/27/2011</td>
<td>N</td>
<td>14</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>1115</td>
<td>E</td>
<td>e</td>
<td>9/17/2011</td>
<td>F</td>
<td>15</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>6</td>
<td>1116</td>
<td>G</td>
<td>f</td>
<td>6/23/2011</td>
<td>N</td>
<td>16</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>7</td>
<td>1117</td>
<td>H</td>
<td>g</td>
<td>12/18/2011</td>
<td>F</td>
<td>17</td>
<td>DTP-2, HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>8</td>
<td>1118</td>
<td>I</td>
<td>h</td>
<td>5/28/2011</td>
<td>N</td>
<td>18</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>9</td>
<td>1119</td>
<td>J</td>
<td>i</td>
<td>12/21/2011</td>
<td>F</td>
<td>19</td>
<td>DTP-4, Hib-4* Pneum Con-4, HepA-3</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>10</td>
<td>1120</td>
<td>K</td>
<td>j</td>
<td>11/6/2010</td>
<td>N</td>
<td>20</td>
<td>Pneum Con-4</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>11</td>
<td>1121</td>
<td>L</td>
<td>k</td>
<td>11/5/2011</td>
<td>F</td>
<td>21</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>12</td>
<td>1122</td>
<td>M</td>
<td>l</td>
<td>11/7/2011</td>
<td>F</td>
<td>22</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>13</td>
<td>1123</td>
<td>N</td>
<td>m</td>
<td>10/6/2011</td>
<td>N</td>
<td>23</td>
<td>HepA-2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>14</td>
<td>1124</td>
<td>O</td>
<td>n</td>
<td>10/30/2011</td>
<td>N</td>
<td>24</td>
<td>DTP-4</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
# Immunization Coverage Feedback Report, 2012

13 Year-Olds, Males and Females

<table>
<thead>
<tr>
<th>Series/Antigens</th>
<th>Total Children Assessed</th>
<th>Percent UTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Td/Tdap:1 Mening</td>
<td>267</td>
<td>91%</td>
</tr>
<tr>
<td>1 Td/Tdap</td>
<td>267</td>
<td>94%</td>
</tr>
<tr>
<td>1 Mening</td>
<td>267</td>
<td>93%</td>
</tr>
</tbody>
</table>
## Immunization Coverage Feedback Report, 2012
### 13 Year-Olds, Males and Females Separately

<table>
<thead>
<tr>
<th>Series/Antigens</th>
<th>Total Children Assessed</th>
<th>Percent UTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Td/Tdap:1 Mening:1 HPV, Males</td>
<td>120</td>
<td>36%</td>
</tr>
<tr>
<td>1 Td/Tdap:1 Mening:3 HPV, Males</td>
<td>120</td>
<td>21%</td>
</tr>
<tr>
<td>3 HPV, Males</td>
<td>120</td>
<td>28%</td>
</tr>
<tr>
<td>1 Td/Tdap:1 Mening:1 HPV, Females</td>
<td>147</td>
<td>56%</td>
</tr>
<tr>
<td>1 Td/Tdap:1 Mening:3 HPV, Females</td>
<td>147</td>
<td>43%</td>
</tr>
<tr>
<td>3 HPV, Females</td>
<td>147</td>
<td>45%</td>
</tr>
</tbody>
</table>
Coverage After Recall/ Follow-Up
Recall / Follow-Up, 2012
19-35 Month-Olds
Coverage Comparison: At Assessment (N=28,375) vs. Recall/Follow-up (N=28,614)
237 Provider Sites
Average of 5.7 Months Later

Bar chart showing coverage comparison for 19-35 month-olds:
- 4:3:1:4:3:1: At Initial Assessment = 58%, After Recall = 69%
- PCV: At Initial Assessment = 75%, After Recall = 82%
- Hep A: At Initial Assessment = 36%, After Recall = 49%

Legend: □ At Initial Assessment  ▪ After Recall
Recall / Follow-Up, 2012

13 Year-Olds
227 Provider Sites

- 1:1 Series - Males and Females at Assessment (N=21,635) vs. Follow-up (N=21,870)
  - At Assessment: 82%
  - After Recall: 85%

- 1:1:3 Series - Females at Assessment (n=11,197) vs. Follow-up (n=11,662)
  - At Assessment: 14%
  - After Recall: 20%
AFIX: 2012

- Total of 491 provider sites received AFIX
  - 34% of enrolled, active VFC provider sites (1,454)
- Most sites had AFIX for 2 age groups
- Total of 83,024 children assessed
  - 50,570 were 19-35 mo-olds; 32,454 were 13-yr-olds
- Estimate these numbers are ~ 1/3 of total population in each of the 2 age groups
### 2006 Versus 2012

<table>
<thead>
<tr>
<th></th>
<th>2006 (Chart Review)</th>
<th>2012 (IIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of sites assessed</td>
<td>197 (15% of VFC sites)</td>
<td>491 (34% of VFC sites)</td>
</tr>
<tr>
<td>Number of children assessed</td>
<td>8,001*</td>
<td>83,024**</td>
</tr>
</tbody>
</table>

* 24-35 month olds
**50,570 19-35 month-olds; 32,454 13 -year-olds
Conclusions

• AFIx through IIS allowed us to improve our efficiency by:
  – Increasing # of provider sites assessed
  – Increasing # and age groups of children assessed
    • Age groups can be added quickly
    • Additional single antigens and series can be added quickly
  – Increasing coverage at follow-up in large populations
Next Steps I

• Enhancements in 2013
  – Added 4 PCV to series for 19-35 mo-olds
  – Expanded adolescent group: 13-17 yr-olds
    • Assessing males, females separately for 1, 3 HPV
  – Follow-up with sites with <90% coverage and 10 patients in either age group (was 25 patients in 2012)
Next Steps II

• Enhancements planned for 2014
  – Assess males, females combined for adolescent series and 1, 3 HPV
  – Add 1 HPV to adolescent series for Honor Roll: 80% for 1:1:1 in addition to other criteria
Special Thanks

- Paul Schaeffer, Deputy Director, CIR
- Mikhail Golender, MPH, Data Coordinator, PQA