Workflow Analysis
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Deloitte Consulting

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Workflow Analysis Overview

1. Pre-Pilot Analysis
   - April-2012
   - 13 Sites Evaluated
   - 2D Barcode Scanning Impact

2. End-Pilot Analysis
   - Feb-2013
   - 10 Sites Evaluated

Workflow Analysis

- Process Mapping
- Time Measurements
- Staff Interviews
Immunizer Demographics

Practice Type
- Private: 8
- Public: 2

Specialty
- Pediatrics: 9
- Family Practice: 1

Practice Size
- 1 - 5: 5
- 6 - 10: 2
- 11+: 3

EMR Vendor
- Office Practicum: 5
- eClinicalworks: 1
- Allscripts: 1
- Epic: 2
- Practice Partner: 1
Process Observations

1. There is limited supply of 2D barcoded vaccines in the practices

2. Single doses are given less frequently than combination vaccines

3. The location of EMR data entry can impact user adoption

4. Delaying EMR data entry increases the possibility of entering incorrect information

5. EMR integration with 2D barcode scanning improves usability, which increases adoption

6. Adding NDC documentation when scanning can incentivize use

7. Adding 2D barcodes to the vaccine package/box allows for a more seamless transition

8. User product preference may influence technology acceptance
Vaccine Documentation Location & Timing

EMR Data Entry Location
- Vaccine Prep Station
- Nursing Station
- Mobile Laptops
- Exam Room

Vaccine Prep Station
- Proximity to inventory fridge has minimal disruption on workflow
- Document during vaccine prep

Nursing Station
- Data entry hub

Mobile Laptops
- Plug/unplug scanner
- Scanner location dictates data entry location

Exam Room
- Physician practices
- Multi-dose vials returned to fridge
- Document after patient has left room

EMR Data Entry Timing
- Before Admin
- After Admin
- Mix
Clinician Feedback

“The lot number and expiration date are hard to read on some of the vaccines we get. When those vaccines get barcodes we can scan, it will be a huge help.”

“I often see transcription errors where eight (8) and “B” or zero (0) and “O” have been mixed up. Scanning will fix these issues and reduce the number of times I can’t find the lot I’m looking for in our inventory.”
Clinician Feedback

“Some of the vaccines are easier to scan than others… I think it might have to do with size or darkness of the 2D barcode”

“Right now, I can only scan one out of the five vaccines I’m entering. It’s a pain and hard to always remember. Once I can scan all five, it will save me a lot of time.”
Summary Results of Efficiency Findings

- Inventory is initial point of vaccine data entry
- Lot number and expiration date manual transcription eliminated
- Experienced user maximized baseline process efficiencies
- Scanning efficiency will improve as the number of vaccines scanned per patient increases

* Overall average based on 10 sites with data from pre-pilot and end-state workflow analysis; NYS-2 excluded due inconsistent data from new staff

Preliminary results
**Inventory Management Efficiency Findings**

*Practices using their EMR system for inventory management all saw efficiency improvements when scanning 2D barcodes*

<table>
<thead>
<tr>
<th>Inventory by Pilot Site</th>
<th>MI-1</th>
<th>MI-2</th>
<th>NYC-1</th>
<th>NYC-2</th>
<th>NYC-3</th>
<th>NYS-1</th>
<th>NYS-2*</th>
<th>WA-1</th>
<th>WA-2</th>
<th>WY-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Time to Complete (sec)</td>
<td>32.1</td>
<td>25.5</td>
<td>36.8</td>
<td>44.6</td>
<td>40.7</td>
<td>35.6</td>
<td>52.3</td>
<td>38.4</td>
<td>32.4</td>
<td>30.7</td>
</tr>
<tr>
<td></td>
<td>28.5</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Inventory by EMR</th>
<th>EMR-2</th>
<th>EMR-3*</th>
<th>EMR-4</th>
<th>EMR-5</th>
<th>IIS-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Time to Complete (sec)*</td>
<td>36.7</td>
<td>20.5</td>
<td>38.4</td>
<td>18.9</td>
<td>33.5</td>
</tr>
<tr>
<td></td>
<td>36.8</td>
<td>25.4</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Phase:**
- Pre-Pilot / Baseline
- 2D Barcode

* Overall and EMR averages based on 10 sites with data from pre-pilot and end-state workflow analysis; NYS-2 excluded due inconsistent data from new staff

Preliminary results
Vaccine Administration Efficiency Findings

Improvements in vaccine administration efficiency were closely tied to a practice’s experience scanning 2D barcoded vaccines.

**Administration by Pilot Site**

<table>
<thead>
<tr>
<th>Site</th>
<th>Avg. Time to Complete (sec) Pre-Pilot</th>
<th>Avg. Time to Complete (sec) 2D Barcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI-1</td>
<td>15.8</td>
<td>14.6</td>
</tr>
<tr>
<td>MI-2</td>
<td>21.5</td>
<td>27.9</td>
</tr>
<tr>
<td>NYC-1</td>
<td>14.5</td>
<td>14.3</td>
</tr>
<tr>
<td>NYC-2</td>
<td>14.6</td>
<td>18.4</td>
</tr>
<tr>
<td>NYC-3</td>
<td>3.2</td>
<td>40.8</td>
</tr>
<tr>
<td>NYS-1</td>
<td>16.1</td>
<td>33.7</td>
</tr>
<tr>
<td>NYS-2*</td>
<td>16.6</td>
<td>35.4</td>
</tr>
<tr>
<td>WA-1</td>
<td>18.1</td>
<td>28.3</td>
</tr>
<tr>
<td>WA-2</td>
<td>23.8</td>
<td>14.8</td>
</tr>
<tr>
<td>WY-1</td>
<td>14.8</td>
<td>18.2</td>
</tr>
</tbody>
</table>

**Administration by EMR**

<table>
<thead>
<tr>
<th>EMR</th>
<th>Avg. Time to Complete (sec) Pre-Pilot</th>
<th>Avg. Time to Complete (sec) 2D Barcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMR-1</td>
<td>21.5</td>
<td>27.9</td>
</tr>
<tr>
<td>EMR-2</td>
<td>12.6</td>
<td>15.7</td>
</tr>
<tr>
<td>EMR-3*</td>
<td>40.8</td>
<td>33.7</td>
</tr>
<tr>
<td>EMR-4</td>
<td>16.6</td>
<td>18.1</td>
</tr>
<tr>
<td>EMR-5</td>
<td>28.3</td>
<td>23.8</td>
</tr>
</tbody>
</table>

**Administration - Overall Avg**

<table>
<thead>
<tr>
<th>EMR</th>
<th>Avg. Time to Complete (sec) Pre-Pilot</th>
<th>Avg. Time to Complete (sec) 2D Barcode</th>
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<tbody>
<tr>
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<td>18.9</td>
<td>20.2</td>
</tr>
</tbody>
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* Overall and EMR averages based on 10 sites with data from pre-pilot and end-state workflow analysis; NYS-2 excluded due inconsistent data from new staff.

Preliminary results
## Enhancement Opportunities

<table>
<thead>
<tr>
<th>EMRs</th>
<th>Scanners</th>
<th>Manufacturers</th>
<th>Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Product identifying info</td>
<td>▪ Scanner tech</td>
<td>▪ Multi-level packaging barcode</td>
<td>▪ Data entry location</td>
</tr>
<tr>
<td>▪ Alerts</td>
<td></td>
<td>▪ Label direction</td>
<td>▪ Data entry timing</td>
</tr>
<tr>
<td>▪ Vaccine admin recognition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Multi-level barcode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Data entry requirements</td>
<td></td>
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</tr>
</tbody>
</table>
Key Study Findings

1. Increase industry adoption
   - Number of 2D barcoded vaccines
   - Practice awareness of vaccines with 2D barcodes

2. Increase data entry efficiency
   - Quicker data entry
   - Reduced error correction

3. Optimize practice workflow
   - Office layout and scanner locations
   - EMR software functionality
Questions?