Digitalizing Infectious Disease Clinical Guidelines for Improved Clinician Satisfaction

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Has no real or apparent conflicts of interest to report.
Learning Objectives

Define
- Define the process for development and build of a new CDS workflow

List
- List the pros and cons of a CDS system within an electronic health record regarding the demonstrated enhanced process

Identify
- Identify methods used to include clinicians in the CDS development and validation process for an enhanced infectious disease process
Background

• Emerging Infectious Diseases
  – Rapid Deployment Model
    • Ebola, Zika, Virus X?

• Quadruple Aim

• 21st Century Cures Act
  – Decreasing documentation burden

• Digitalizing Clinical Guidelines
  – CDC Kaizen 2018
  – Ongoing Workgroups
* The project’s goal was to balance aspects of the quadruple aim, including enhancing the patient experience and improving clinician EHR satisfaction by 5% by December 2018.
What Did We Do?

• Current/Future State Workflow Assessments
• Evidence Review
  – Integration of travel timeframe
  – Updates of current CDC/ISID travel hotspots
  – Updates of symptomology
  – Integration of exposure reporting and vaccine status
• Enhanced Functionality
  – Event set hierarchy changes
  – Change to HTML Alert format
  – Nursing intake documentations modifications
Design & Methods

- Plan-Do-Study-Act
- Focus Groups
- Current/Future State Workflows
- Pre & Post Surveys
• Plan-Do-Study-Act

• The PDSA structure of rapid cycle deployment with the Model for Improvement

• Supports strategies for shortening design, implementation and evaluation cycles

(Langley et al., 2009)
What Did We Do?

• Clinician Focus Groups
  – NIC/ANICS
  – ID Providers

• Governance
  – NIC and ANIC Committees
  – Infectious Disease CDS
  – Rules & Alerts Committee
  – Use & Standards
Existing:
- Ebola
- Zika

New:
- Yellow Fever
- Measles
- Tuberculosis (TB)
- Generic Travel Alert

Later, by request:
- MERS (for the Hajj, seasonal)
Nursing Intake Enhancements
Design – HTML Alerts

Evoke
- Inpatient versus Outpatient
- Provider versus Non-Provider
- Open Chart

Functionality
- Message to Infection Control
- Communication of alert
- Orders links
- Evidence-based guidelines
  - CDC
  - IDSA
Pre & Post Implementation Surveys

• Survey – Clinician Satisfaction
  • Pre and Post-implementation (open 45 days each)
  • Qualtrics
  • Anonymous, voluntary
  • Randomized eGift card drawing to voluntary email submissions
    • $10 X 50 eGift cards

• Quality Improvement Review Board (QIRBs) approval and

Institutional Review Board (IRB) exemption was determined
Pre & Post-Implementation Surveys

• 2280/2277 Recipients
  • Staff (nursing assistants/medical assistants)
  • Nurses (registered nurses/licensed vocational nurses)
  • APPs, residents, fellows, PharmD, and faculty

• Responses
  • Pre: \( n = 465 \) (20.4%)
  • Post: \( n = 394 \) (17.3%)
Pre & Post Implementation Surveys

- Demographics

- CISIES 2.0 (Clinical Information Systems Implementation Evaluation Scale)
  - 34-question six-point Likert scale
  - Ranges from Strongly Disagree to Strongly Agree
  - CISIES 2.0 is an updated version of the 2006-2011 CISIES 1.0 and 1.1

- Qualitative Textual Questions
Data Analysis – CISIES 2.0

<table>
<thead>
<tr>
<th>Questions</th>
<th>Subscale name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 6</td>
<td>Dependability</td>
<td>Errors, compliance, information loss</td>
</tr>
<tr>
<td>7 to 9</td>
<td>Training</td>
<td>Preparation for the transition</td>
</tr>
<tr>
<td>10 to 14</td>
<td>Workload</td>
<td>Efficiency, stress, time use</td>
</tr>
<tr>
<td>15 to 18</td>
<td>Patient Care</td>
<td>Quality, practice, outcomes</td>
</tr>
<tr>
<td>19 to 24</td>
<td>Design &amp; Troubleshooting</td>
<td>Initial design, support, problem-solving</td>
</tr>
<tr>
<td>25 to 31</td>
<td>Teamwork</td>
<td>Mutual support, communication</td>
</tr>
<tr>
<td>32 to 34</td>
<td>Overall</td>
<td>General summary for validation</td>
</tr>
</tbody>
</table>

(Gugerty & Carlson, 2016)

**Interpretive guide**

Score range from

Below -0.5 (clear dissatisfaction), to 4 to 5 (very high degree of satisfaction)

* Note: there was minimal incidence of “straight-lining” issues
<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
<td>55</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>246</td>
<td>82</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>18-25</td>
<td>22</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td>26-30</td>
<td>40</td>
<td>12.9</td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>75</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>41-50</td>
<td>65</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>51-60</td>
<td>73</td>
<td>23.6</td>
</tr>
<tr>
<td></td>
<td>61+</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td><strong>Professional Role</strong></td>
<td>CMA/Nurse Aide</td>
<td>27</td>
<td>8.7</td>
</tr>
<tr>
<td></td>
<td>RN</td>
<td>159</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td>LVN</td>
<td>52</td>
<td>16.8</td>
</tr>
<tr>
<td></td>
<td>Advanced Practice Provider</td>
<td>9</td>
<td>2.9</td>
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<tr>
<td></td>
<td>PharmD</td>
<td>1</td>
<td>0.3</td>
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<tr>
<td></td>
<td>Resident/Fellow</td>
<td>21</td>
<td>6.8</td>
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<tr>
<td></td>
<td>Faculty</td>
<td>38</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Computer Experience</strong></td>
<td>Novice</td>
<td>8</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Competent</td>
<td>51</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td>Proficient</td>
<td>179</td>
<td>57.9</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td>71</td>
<td>23</td>
</tr>
</tbody>
</table>
Did We Make a Difference?

YAAAS!!!

memegenerator.net
CISIES Total Score

Pre-Implementation

Moderately to Highly Satisfied: 41%

Somewhat Satisfied: 39%

Neutral: 11%

Very Satisfied: 3%

Very Dissatisfied: 6%
Somewhat Satisfied
37%

Very Satisfied
9%

Neutral
8%

Very Dissatisfied
5%

Moderately to Highly Satisfied
41%
# CISIES 2.0 Independent t-test

## Group Statistics

<table>
<thead>
<tr>
<th>Survey</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISIES_Score</td>
<td>Pre</td>
<td>308</td>
<td>1.6669</td>
<td>1.38151</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>271</td>
<td>1.9615</td>
<td>1.41325</td>
</tr>
</tbody>
</table>

## Independent Samples Test

<table>
<thead>
<tr>
<th>Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
</tr>
<tr>
<td>CISIES_Score</td>
<td>Equal variances assumed</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
</tr>
</tbody>
</table>

(IBM SPSS Statistics, Version 25.0, 2017)
# Mann-Whitney U

## CISIES Overall

### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>The distribution of CISIES_Score is the same across categories of Survey.</td>
<td>Independent-Samples Mann-Whitney U Test</td>
<td>.025</td>
<td>Reject the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>The distribution of 32. Overall, I prefer using the new system rather than the old way of doing things is the same across categories of Survey.</td>
<td>Independent-Samples Mann-Whitney U Test</td>
<td>.000</td>
<td>Reject the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.
What were the clinicians thoughts?

Textual Responses

• How useful have you found the infectious disease model in the electronic health record to your clinical practice?

• Is there anything else you would like to tell us about the infectious disease design to improve functionality within your clinical workflow?
Textual Responses – Negative

“It is difficult to obtain the information when the patient is nonverbal and no family present”

“Not helpful and confusing to patients”

“I think it will be very misleading. You need to trust human contact and human thinking”

“It will not help in any way in my practice”

“Presently EMR consumes far too much time in the workday as it is. Adding more is met with suspicion”
Textual Responses – Positive

• “Very helpful, the one used now is not as expanded as we need it to be”
• “Will improve monitoring and reporting of infectious disease concerns”
• “Will update the information on my patient instantly to improve outcome of patient care”
• “VERY-I work in the EC and when we have an infectious disease case it can sometimes be chaotic”
• “It has been very helpful with the students who study abroad”
Did We Make a Difference?

• Yes and no…
  – Almost all scores higher on the post-survey (improvement)
  – Not all were statistically significant
  – Preliminary data suggests RNs were much more impressed with the changes than MDs

• Profoundly difficult workflow to improve upon
  – It is an EHR/Alert fatigue
  – Emerging infectious diseases are moving targets
  – Change perceived as more work, even when it isn’t
  – Created a complex process that might be difficult to maintain
Limitations & Overall Issues

• Education and re-education
  – Nursing (in small pockets) had issues with understanding the functionality of the new form

• Adding the option of NA to new data fields (DTAs)
  – Had to be done
  – Gave too easy a way out

• Initially, Pediatrics had poor responses
  – Did not perceive benefit to their population

• Survey is more geared towards large scale system implementation as opposed to small custom functionality
Limitations & Overall Issues

• PDSA Cycle Work
  – Amended number of “firings” per encounter
    • Stop after 48 hours inpatient
  – Maintenance options for “US Areas at Risk”
    • Lack of proper usage
  – Removal of certain automated orders
    • i.e., isolation cart
    • $$$
  – Tightened rules regarding locations and symptomology
Next Steps

• Maintenance, maintenance, maintenance
  – New emerging infectious diseases (*not just travel related!*)
  – Intermittent re-education (end-users **AND** informaticists)
  – Keep subject matter experts engaged

• Continue work with CDC and support the ONC initiatives
  – New clinical decision support functionality on the horizon
  – Easing documentation burden for both providers **AND** nursing

• Policy development
• Continued testing of usability
Conclusion

• Keep pushing – because it can work
  – Keep those stakeholders involved
    • They often start out strong and then dwindle

• Maintenance
  – Keep it evidence-based, safe, and simple

• Keep an eye on what is coming
  – CDC/ONC initiatives
  – Talk to your vendor
    • Is yours ready?
Questions

Do not forget to complete the online session evaluation, thanks!

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- Dr. Floyd Eisenberg

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References


