# Evaluation of REDCap for Ebola Virus Disease Monitoring in Tennessee

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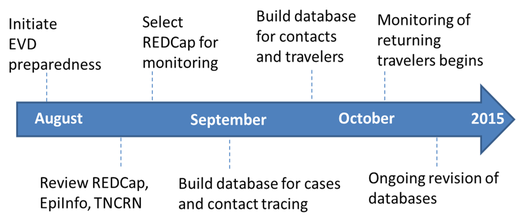
TN Department of Health

## Background




## Methods

**Reviewed the strengths and weaknesses of the systems available at TDH:**

**Research Electronic Data Capture (REDCap) is a *mature, secure web application for building and managing online surveys and databases, …specifically geared to support data capture for research studies.* (Vanderbilt University)**

**EpiInfo is *a suite of lightweight software tools…for data collection, analysis, visualization, and reporting using epidemiologic tools.* (CDC)**

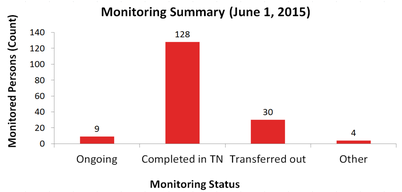
**Tennessee Countermeasure Response Network (TNCRN) is a *web-based system for patient management…during public health emergencies, integrated into the national system for patient tracking.***

**Further applied the surveillance evaluation framework from CDC**

## Results

**REDCap was selected for managing data related to the EVD response**

**A database was developed to manage contacts and travelers, for the primary purpose of symptom monitoring**




## Research Electronic Data Capture - Strengths and Limitations

### Strengths

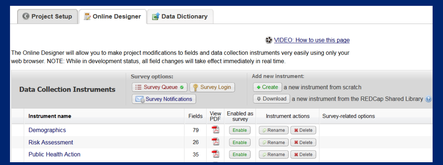
- Free application (only server cost)
- Real-time, remote data entry
- Not a relational database
- Point and click development
- Survey delivery options: automated, individualized or public, URL, QR code
- Project templates as guides
- Data dictionary allows for offline edits
- Codebook automatically generated
- Single and repeated measures
- Mobile view for desktop
- Mobile application for offline entry (coming May-June 2015)
- Code for Application Programming Interface (API)

### Limitations

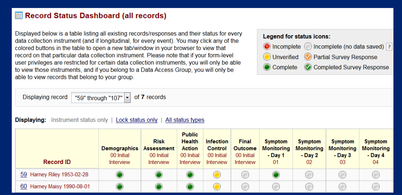
- No tailored buttons or menus
- Busy user interface
- Reports limited to linelists via filters
- Limited data access group flexibility
- Analysis at the variable level only
- No visualization dashboard
- No automated alerts

## REDCap Screenshots

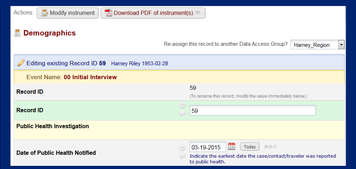
### List of Data Collection Instruments



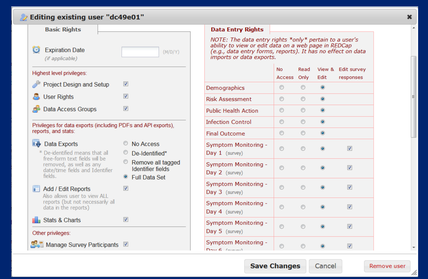
### Status Dashboard for All Records



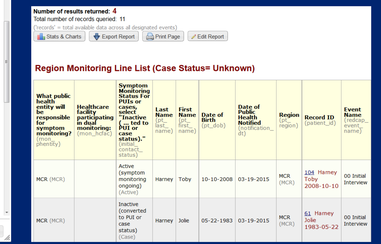
### Demographics Form



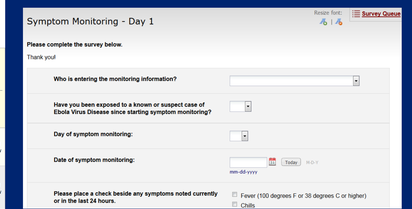
### User Rights Menu



### Report (Linelist via Filters)



### Survey for Symptom Monitoring



### Resources

**REDCap homepage: www.project-redcap.org**

- Technical Overview (under the Software tab)
- Video Resources: Detailed Overview of REDCap (78 minutes)
- Become a Partner (Terms of use and agreement)

**Leveraging REDCap for Ebola Response Readiness Plans:**
**https://starbrite.vanderbilt.edu/rocket/index.php?doc_id=8990**

Study data were collected and managed using REDCap electronic data capture tools hosted at Tennessee Department of Health.[1] REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

[1]Paul A. Harris, Robert Taylor, Robert Thielke, Jonathon Payne, Nathaniel Gonzalez, Jose G. Conde, Research electronic data capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support, J Biomed Inform, 2009 Apr;42(2):377-81.

Link to article: http://www.sciencedirect.com/science/article/pii/S1532046408001226

## Challenges

**The record status dashboard does not readily indicate each person's progress in monitoring or when a person transfers in/out of Tennessee.**

**The report functions are limited and therefore outside software has been used to generate more sophisticated or polished reports.**

**Because the application does not create related tables, separate databases have been created and then "linked" using MySQL code in dropdown menus.**

**Data have been exported for visualization in another web-based application for communications and situational awareness.**

## Conclusion

**To date, TDH has utilized the contact and traveler databases to monitor a total of 171 persons. Although Tennessee requires telephone or in-person monitoring, REDCap offers the possibility of self-monitoring through surveys.**

**Because data are collected at the local level and managed at the state level, having a web-based application that allows for remote, real-time data entry and aggregation has been a necessity.**

**State and local users have found the system easy to use (with minimal training) for form and survey creation, data entry/export, and template reports.**

**Forms and surveys may be revised in development or production, allowing for on going updates as new guidance is released. (flexibility)**

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**Graphics: Annuitystraighttalk.com**

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# Comparison for REDCap – EpiInfo – TNCRN (Handout)

+ = present, O = absent

| | REDCap | EpiInfo | TNCRN |
|---|---|---|---|
| **Database Management** | | | |
| Security of PHI | + | + | + |
| Cost | $0 for application<br>$ for server | $0 for application<br>$ desktop/server | Funded for TEMA |
| Technical assistance | Consortium<br>FAQs<br>Training Videos | Online tutorials<br>User guide<br>Videos | Tutorials<br>Past webinars |
| Development and production sides | + | O | + |
| Data dictionary | Data dictionary for offline design/project sharing<br>Codebook | Data dictionary as the codebook | O |
| **Database Development** | | | |
| Single measure | + | + | + |
| Repeated measures | + | O | O |
| **Data Collection Tools** | | | |
| Create data collection forms | Multiple forms | Single form<br>Page breaks | + |
| Print empty data collection forms | + | + | + |
| Print data collection forms with data | + | + | + |
| Variety of field types, including text, character, numeric | + | + | + |
| Optional or required fields/formats | + | + | + |
| Skip/branching logic | + | + | + |
| Survey functions | Scheduled<br>Public<br>Survey queue | EpiInfo Survey | O |
| **Data Collection/Entry** | | | |
| Web-based, real-time data entry | + | O* | + |
| Desktop data entry | Online only | Offline data entry only | Online only |
| Mobile application | Mobile version for tablets - Coming May 2015<br>(Will allow offline data collection) | Mobile version iOS, Android | O |
| **User Controls** | | | |
| Data access groups to control access to a group of records | View records assigned to the users group | View entered records only or all records | View all records |
| Users rights controls | Forms<br>Identifiers<br>Functions | Limited | Limited |
| **Data Communications** | | | |


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| | | | |
|---|---|---|---|
| Record dashboard for all records | + | Gadget | Linelist (interactive) |
| Record dashboard within the record | + | O | O |
| Reports | Linelists via filters | Linelists via filters | Linelists via filters |
| Visualization dashboard | O | Summary stats<br>Analysis gadgets | Map<br>Tables<br>Pie chart |
| **Data Analysis** | | | |
| Variable level for quality control | + | + | + |
| Aggregate level | O | + | O |
| Export data | Raw or with labels<br>Fromats: csv, xls, SAS, SPSS, R, STATA | Formats: csv, dBase, Excel, Stata | Formats: csv, xls |
| **Specific Strengths** | | | |
| | Data dictionary to share projects and revise offline<br><br>Codebook<br><br>API to communicate directly with other applications | Designed for epidemiology<br><br>Dashboard gadgets for summary statistics and visualization<br><br>Customizable forms<br><br>Analysis options<br><br>Mapping capabilities | Triage color-coding of persons entered<br><br>Coordination with emergency management<br><br>Dynamic map from Google Maps<br><br>Patient triage pie chart<br><br>Buttons for different forms<br><br>Searchable interface |
| **Specific Weaknesses** | | | |
| | No customizable menu or buttons<br><br>Limited functionality with reports<br><br>No aggregate analysis | No real-time data entry online | Limited form capabilities<br><br>No survey function |

* CSTE has offered server space to states to host databases and data. This may help with the costs of hosting the application and data.

## Resources

REDCap: http://www.project-redcap.org/
Epi Info7: http://wwwn.cdc.gov/epiinfo/7/index.htm
TNCRN: http://health.state.tn.us/TEMARR/PatMgt.shtml


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