



Government of **Western Australia**
Child and Adolescent Health Service



REDCap Data Migration and Creation Project Guide

Touchstone, CAMHS



Compassion

Accountability

Excellence

Equity

Collaboration

Respect

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1.0 Project Scope

1.1 Purpose

The purpose of this document is to provide an overview and guide on how Touchstone's research database was migrated from Microsoft Excel to REDCap. This involved the transfer of all paper-based data collection instruments and tools to the online version on REDCap for future data collection, and the transfer of all archived data stored on MS Excel to REDCap for secure storage. This document provides a step-by-step guide on the process undertaken and highlights key lessons learnt for the purpose of providing additional information to support other services who may also be migrating to REDCap.

1.2 Background

Touchstones Existing Process

Touchstone CAMHS is an intensive six-month day therapy service based at Bentley Hospital. Touchstone's research department collects a range of client information to support a diversity of research projects, support clinical decision making and future service planning. With the client and family's consent, data collected includes self-reported questionnaires, parent-reported questionnaires, clinician ratings and audio and video assessments. All the information collected is collated and held in Touchstone Research Register, which provides a databank for further research. The Register currently consists of over 20 measures, scales and assessments that are collected over the course of the six-month intervention period. The Register increases by an average of 20 complete data sets per year.

Prior to the completion of this migration project, all self-report questionnaires were administered on physical, paper-based questionnaires at assessment, midway and discharge. This data was then manually entered onto an excel spreadsheet, and automatic calculations were produced.

Continuing with this process is deemed as high service risk for the following reasons:

- Paper based questionnaires can allow participants to skip questions or circle values that are not on the scale
- Paper based questionnaires can be lost or not processed
- Manual data entry leaves room for a high proportion of human error
- Excel is not a stable long-term data storage solution. It is prone to bugs and errors, and it is very easy to destroy your data irrevocably
- Only one person can access an excel file at a time, and when the spreadsheet is full of a large amount of data it is very slow.
- It has very few validation rules (limits capability) and can't do logic checks.
- As a 'tier four' service, Touchstone clients have often been through a number of different mental health services for a number of years. To avoid adding to the large amounts of paperwork for clients and their families to complete, research is often left off the list of priorities.
- If this were a quick and easy online format that can be completed securely on a client's own device, it is predicted that this is more likely to be completed.

Introducing REDCap

REDCap is a secure, web-based tool for data collection and management and was developed specifically for clinical research purposes. REDCap is used internationally with a high presence within the academic research community and is currently used in Western Australia by The University of Western Australia (UWA), Curtin University, Telethon Kids Institute and WA Health Translation Network. All WA Health employees now have free access to REDCap and there has been a drive to migrate all research projects to the system across WA Health. REDCap provides several advantageous features including:

- Simple, powerful interface for building surveys, forms and databases
- Free to use by all WA Health employees
- Secure and web-based – integrated into WA Health Active Directory with two-factor authentication
- Only requires internet access – users do not need to download software
- Project owner control of user permissions
- Easy to send surveys/forms and track responses
- Full Audit trails of data access, entry and revision

- Advanced features such as calculated fields, branching logic, file uploading and data piping
- API (Application Programming Interface) – automated integration into applications such as PowerBI
- Export data into analysis packages e.g. Microsoft Excel, R, SAS, STATA and SPSS
- Ad hoc reporting tools
- Download forms and surveys as PDFs
- Free and established online training resources

Survey Monkey or any other platform is not recommended, as users do not own the data and therefore this is not appropriate for sensitive and confidential WA Health data.

Deployment of REDCap across WA Health therefore will directly improve outcomes for patients and the whole system.

1.3 Project Objectives

The key project objectives were to:

- 1) Build a digital research database using REDCap for the administration, collection and management of clinical data at Touchstone
- 2) Migrate archived Touchstone research data to REDCap for long-term storage and management

2.0 Project Schedule

This section provides a brief timeline of the process undertaken to complete this project.

Project Milestones	Description	Time
Background Research	Preliminary research was undertaken to investigate and understand REDCap and whether it would be feasible for Touchstone to use REDCap for data collection, management and storage	June – July 2021
Consultation with stakeholders	This included consultation with CAHS REDCap administrator and REDCap Department of Health administrator	October 2021
Project planning and strategy	Development of the Project Initiation Document and a brief plan for how the project would be executed including a timeline	August 2021 – Oct 2021
Audit Copyrighted Measures and create parameters around their use	All instruments to be created on REDCap audited to ensure appropriate copyright was granted to administer them electronically	October 2021
Create online data collection tools	Using the online designer feature and the data dictionary on excel all instruments/measures were built online and enabled as a survey	October 2021
Create auto-calculations for scores	Development of calculation fields for automatic summation, mean etc. of certain measures	November 2021
Test/check/data validation, including import and export data tool, survey distribution	Complete testing of the project: <ul style="list-style-type: none"> • Checking surveys for errors • Inputting test data • Testing export and import function • Survey distribution, using QR codes and emails • Reports and stats • Validating online calculations 	November 2021 – December 2021
Pilot data collection	Once thorough testing was complete with two researchers, the project was put into “production” and ready for data	Jan 2022

	collection. Online instruments were piloted for data collection with new participants (6 participants)	
“Go-live”	Project went live and all new client data was collected using REDCap	Feb 2022
Import archive data	Using the import function – all historic Touchstone data was imported for archival storage on REDCap	March 2022
Project completion	Project report and evaluation completed	April 2022

3.0 Method

3.1 Pre-Development Considerations

- Understand your data and what you want to put onto REDCap. Consider if it is a longitudinal study (will you re-administer these questionnaires at any point eg. pre/post? or will it be a once off measure?).
- Ensure you have an up to date Data Dictionary to work off. This will ensure you understand the meaning behind every code that you are trying to recreate, and you are able to update as you go.
- Consider how you will connect a client’s identifiable name with their REDCap response. We created a unique identifier for each client, and the master key for this is stored outside of REDCap.
- Consider if you have questionnaires that can be completed off site to decrease measures to be completed during appointment time. This can create efficiency with appointments and reduce time spent completing assessments during a visit. *Be mindful that if a measure has triggering questions or content they may have to be completed on site.*
- Be sure you have permission to electronically re-distribute a questionnaire. Some are copyrighted and need to be purchased before you can do this.

3.2 Development Steps

- Create new project on REDCap. More information on how to do this can be found here: [REDCap Mini Vids - 2 Creating a Project - YouTube](#)

- Go through project set-up and settings; REDCap is good for this as it sets everything out as a checklist to go through in the project set-up tab.
- Add instruments/measures collecting to the data collection instruments list and enable as a survey.

3.3 Post Development Considerations

- Update your data dictionary with any changes that you made to codes or references during the migration process. This will ensure that anyone who comes onto your project can understand your project.
- Update any paperwork or documents for your service outlining procedures/policies/processes that identify a paper-based research questionnaire process with an online REDCap process. (Examples – Orientation processes for new staff, Service Model of Care, Admin Manuals).
- If your project is a Research (RGS) or Quality Improvement project (GEKO) ensure you update the relevant accompanying documentation where needed. This may include the Participant Information Sheet, Project Protocol or Consent Forms. Follow the appropriate channels to do this and be aware that your project may need to be re-authorised.
- Work closely with your admin team to refine the process of replacing the paper-based questionnaires with electronic questionnaires. For us, we developed a 'Questionnaire Access Sheet' for each client and each questionnaire (See Appendix).
- As Touchstone has a staggered entry process (new clients every 6/8 weeks for a period of 6 months) we began using electronic questionnaires for all new clients and kept using paper-based for existing clients. This also gave us an opportunity to see out discharging clients using the same system (paper) with which they started, to avoid confusion.

4.0 Lessons Learnt & Recommendations

4.1 Testing

- Have a clear strategy in place before commencing, in terms of the overall objective and what you want to achieve, for example is it to create a database to store archival data? Or will you be collecting new data using REDCap?
- A significant amount of time was spent in auditing the instruments/measures before building them on REDCap. It is important to make sure all measures are correct and data collection tools have been audited prior to commencing the project.
- Testing for errors is also important prior to enabling “production” mode, as it is easier to make changes within the REDCap draft mode. If using surveys, it is recommended to use multiple devices to test as additional errors were found when using a phone/iPad versus on the computer.
- Also test the import data function prior to moving into “production” mode as when importing data from excel onto REDCap additional errors were identified that had not previously been identified.
- Once in “production” mode any critical changes to your REDCap project requires REDCap administrator’s approval, this can add additional time to process and may delay your project and data collection. Therefore, reiterating the importance of adequate project testing.

4.2 Negatively coding items on an instrument

To the best of our knowledge there is no way to automatically negatively score an item on REDCap.

- The first approach undertaken was to individually add each question as a new field with its subsequent scores, rather than using a field matrix
eg. 1, disagree | 2, neutral | 3, agree and for negatively keyed items the reverse scoring 3, disagree | 2, neutral | 1, agree
However, this method appears disorganised and interferes with automatic calculations (did not correctly calculate sums and means).

- The next approach trialled was to create a new calculation field for each negatively coded item (see formula section for detailed formula). This allows you to have a matrix group and enables automatic calculations. On exporting the data to excel there was an issue with this method as it did not export any of the data for the negatively keyed items. All scores appeared blank on excel. This is because REDCap does not allow you to embed multiple calculations within a calculation field.
- Therefore, to use negatively scored items in a calculation it is necessary to use one formula as per below:

Sum((([3-pid_item30]),([3-pid_item33]))...

Where [3-x] negatively codes the item

4.3 Surveys

REDCap provides multiple survey distribution tools for sending survey links to participants. The simplest method is to send out a general public survey link for participants to access and complete anonymously. Another method is to have a “Participant List” which uses the participants email address to send out the link and track responses. This enables multiple surveys to be sent out to the same participant and track who responds to the survey by providing a unique participant identifier. This is useful for longitudinal studies to track participants responses over time. For Touchstone, as it has a longitudinal research program, it is essential to be able to identify participant responses. The Participant Link function is not appropriate as many of our participants do not have an email address and some of the surveys need to be completed onsite. Instead each participant is given a unique access code or QR code to complete their survey. To obtain this code follow these steps:

1. Go to participants record ID
2. Select survey you would like to administer at the specified timepoint
3. On the top right-hand corner “survey options” click down menu select “Survey Access Code and QR Code”

Touchstone Research Register PID 5661

Actions: [Download PDF of instrument\(s\)](#) [Share instrument in the Library](#) [VIDEO: Basic data entry](#)

Touchstone Program Questionnaires

Invitation status: **Survey options**

- Open survey
- Log out + Open survey
- Compose survey invitation
- Survey Access Code and QR Code

Editing existing Record ID 1

Event Name: **T1**

Record ID 1

Client Measures

Measure	Score
Negative Moods and Feelings	<input type="text"/> <small>View equation</small>
Borderline Personality Disorder Features	<input type="text"/> <small>View equation</small>

This access sheet (shown below) can then be printed for the respondent or emailed separately. Touchstone has created its own version, a “Research Access Sheet” which can be found in Appendix 5.3.

Survey title: **"Touchstone Program Questionnaires"** [Print page](#)

Please follow the instructions below to navigate to the survey page. To start the survey, you may use either of the two choices (the Survey Access Code or the QR code), whichever you find easiest or quickest to use.

Enter the Survey Access Code

Start the survey by following the steps below.

1.) **Go to this web address:**

2.) **Then enter this code:**

Scan the QR Code

Alternatively, if you have a device that has an app capable of reading QR codes, you may scan the QR code below, which should take you directly to the survey in a web browser.



[Close window](#)

4.4 Creating new Records with unique identifier

When creating a new record on REDCap, the new record is automatically named '1'. To rename this record to coincide with your research unique identifier you can use the following steps:

1. Go to Record Status Dashboard on the left hand-side menu
2. select the record that needs to be renamed and, from the dropdown "choose action for record" select rename

Record Home Page

The grid below displays the form-by-form progress of data entered for the currently selected record. You may click on the colored status icons to access that form/event. If you wish, you may modify the events below by navigating to the [Define My Events](#) page.

Legend for status icons:

- Incomplete
- Unverified
- Complete
- ? Incomplete (no data saved)
- Partial Survey Response
- Completed Survey Response

Choose action for record ▾

- 📄 Download PDF of record data for all instruments/events
- 📄 Download PDF of record data for all instruments/events (compact)
- 🔒 Lock entire record
- 🔄 Rename record
- ✖ Delete record (all forms/events)

	T3 Discharge	T4 Follow-up
Parent Questionnaire - Parent 1 (survey)		
Parent Questionnaire - Parent 2 (survey)		
Pid5sf (survey)		
Masc (survey)		
AQoL-6D (survey)		
Delete all data on event:	✖	

4.5 Making changes in "Production" Mode

Changes to your project can still be made in "production" mode, the process is just not as seamless and requires a REDCap administrator to approve some of the changes. To make changes you firstly need to enter "draft" mode. Once the changes have been made, reviewed and submitted you may need to await approval, which can take up to a couple of days to go through depending on the changes. It is important to note that once the changes have been approved, any calculations will not be changed until you individually enter each record. This can be done by either manually going through each record and questionnaire to ensure calculated fields are updated or by

downloading the data through the export function and then reupload the data via the import function; this is more efficient.

4.6 Other

4.6.1 Capitals

REDCap is capital sensitive. A lot of calculation errors uncovered were because capitals were used in the formula. Note that action tags should be capitalised.

4.6.2 Action Tags

Action tags are particularly useful if you want to see the data quickly without having to export it and do not want the client to be able to see a score when completing a survey. To hide a field from participants completing the survey but make it visible to the administrator the HIDDEN-SURVEY action tag can be used.

Client Measures	
Measure	Score
Negative Moods and Feelings	<input type="text"/> View equation
Borderline Personality Disorder Features	<input type="text"/> View equation
Resilient Coping	<input type="text"/> View equation
Emotional Dysregulation	<input type="text"/> View equation
NSSI - Thoughts	<input type="text"/> View equation
NSSI - Acts	<input type="text"/> View equation
Attachment	
Mum - Avoidant	
Mum - Anxious	
Mum - Attachment Style	
Dad - Avoidant	
Dad - Anxious	
Dad - Attachment Style	
Best Friend - Avoidant	

4.5.3 Field Embedding

Field embedding allows you to present information in an easier to read and user-friendly format. Field embedding was used in this project to display scores in a table at the top of the screen for quick reference. It was also used to present demographic and other information in a succinct way, as shown below.

Event Name: T1			
Record ID	1		
Your first name:	<input type="text"/>	Your family name:	<input type="text"/>
Your child's name:	<input type="text"/>	Your relationship to your child:	<input type="text" value="v"/>
Today's date:	<input type="text" value="2022-04-28"/>	If other, please specify:	

4.5.4 Videos

To embed videos into a survey, so that the participant can view the video live, you need to firstly upload the video onto Youtube and embed this link onto REDCap. This is the only way that REDCap will allow you to view a video within a survey. We also made it so that only one video plays per page by adding new section fields to stop participants from going ahead and reading the question prior to viewing the video.

4.5.5 Branching Logic

Branching logic is another useful tool that allows you to show and hide questions/fields based on participants selection of a response. For example, in one of the questionnaires it asks “do you have a mother figure”, if the respondent answers “yes” then the associated questions are displayed, whilst if they answer “no” then it does not show these questions and displays the next question. This minimises the amount of questions displayed to the participant making it faster and more user friendly. It also allows you to select required field for the branching logic questions so that they are only required to answer the questions if they answer yes to the first question but are not required to answer the questions if they select no to the first question, this reduces participant errors.

5.0 Resources

5.1 CAHS Database Development Officer

Able to assist with all REDCap database enquiries. You can book a consult using this link: <https://datalibrary-rc.health.wa.gov.au/surveys/?s=F4MJNJXCL>

5.2 CAHS Research Education Program

The Research Education Program provides many REDCap resources including a [REDCap workshop series](#) and other useful guides.

5.3 REDCap website

On the official REDCap website, several information videos are provided to assist you with starting a new project. [Videos – REDCap \(projectredcap.org\)](#)

5.4 Department of Health REDCap Administrator

For more specific queries you can directly email the DOH Data Library REDCap Administrator for assistance. DataLibrary@health.wa.gov.au

5.0 Appendix

5.1 ACTION TAGS

ACTION TAGS used in this project:

@HIDDEN – this action tag was used in the context of having to create an additional field for a calculation for example negatively keyed items, where neither the researcher nor the participant needs to see this information

@HIDDEN SURVEY – this action tag was really useful within the context of this project as it allows the researcher to quickly review scores on instruments without having to export the data, whilst being hidden from participants.

@today – this was used to automatically fill the date for participants when they enter the data

5.2 Useful Formulae

To count frequency of a score

(REDCap syntax)

if([baseline_masc_q1]=1,1,0)+if([baseline_masc_q2]=1,1,0)+if([baseline_masc_q3]=1,1,0)+if([baseline_masc_q4]=1,1,0)...

Negatively keying items as part of a total calculation:

mean((8-[tsq_f_c1]),(8-[tsq_f_c2]),(8-[tsq_f_c3]),(8-[tsq_f_c4]))

Negatively Keying items not part of a total calculation:

if([pq_1_q11]=1,7,"") or if([pq_1_q11]=7,1,"") or if([pq_1_q11]=2,6,"") or if([pq_1_q11]=6,2,"") or if([pq_1_q11]=3,5,"") or if([pq_1_q11]=5,3,"") or if([pq_1_q11]=4,4,"")

5.3 Questionnaire Access Sheet

GROUP #

TSRID

(Measure) Questionnaire Access Sheet (Client Name)

To complete your survey, you can either:

1. Go to this address on your device

OR

2. Open the camera on your device, scan the below QR code. Open the link and fill in the survey.

<https://datalibrary-rc.health.wa.gov.au/surveys/>

Fill in this code to access survey

XXX



If you would like to use a Touchstone device, please let a staff member know.
Thank you!