

Database Theory and Applications for Biomedical
Research and Practice

BMIN 502 / EPID 635
Week 3: Introduction to REDCap and
Data Collection Forms Design

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Today's Agenda

- Review of the ABIC E-R model
- Review of the ABIC relational schema
- Introduction to REDCap
 - System check- does everyone have an account?
 - General overview video
 - Project field types video
- Assignment 3
 - Data collection and representation principles
 - Review of conceptual model
 - Design and implementation of a REDCap project

Objectives for today

- You will learn:
 - All about the basics of REDCap
 - How to design a simple data collection instrument
 - How to implement a data collection instrument in REDCap

Clinical Data Collection and Representation

Data Collection Methodologies

- Paper-based
 - Patient listings
 - Abstract forms
 - Questionnaires
- Computer-based
 - Database dumps
 - Electronic abstracts
 - Computer-assisted interviews
 - Real-time data acquisition

Open-ended Data Collection Items

1. List the drugs you have taken in the past two months...
2. What do you think about the quality of care you received in our emergency department?

Closed-end Data Collection Items

1. Do you smoke cigarettes?
(circle your answer) Yes No

2. How many times have you gone to the
Emergency Department this year?

Data Representation: Coding

- Reduces need for cumbersome data representation
- Eliminates ambiguity
- Facilitates statistical analysis

Functions of Coding

- Identification
- Classification
- Concealing information
- Decision indicators

Functions of Coding: Identification

- Used to distinguish instances of entities
- Numeric and/or alphabetic sequences
- *Examples*
 - Study ID
 - Social Security Number (ugh!)
 - Medical Record Number (ugh!)

Functions of Coding: Classification

- Characterizes group membership
- Codes assigned to values of a variable
- *Examples*
 - Case/Control status
 - Race
 - Sex

Functions of Coding: Concealing information

- Usually used for identification
- Scrambled identifiers
- *Example*
 - “Hashed” Social Security Numbers

Functions of Coding: Decision indicators

- May be used in decision tables or trees to represent complex functions or outcomes
- Often used in programming for process control

- *Example*

Do you smoke? Yes No

If Yes:

How many years have you smoked? _____

How many packs per year have you smoked? _____

Coding Guidelines

- Be *atomic*
- Be *concise*
- Be *consistent*
- Be *clear*

Coding Guidelines, continued

- Avoid alphabetic codes
- Reflect ordinality on coding
 - Use **0** to reflect the absence of an attribute
 - Use **1** to reflect the presence of an attribute
- Assign specific, consistent codes to missing values

The Special Case of Missing Data Codes

- True missing data
 - Data not available on chart
 - Question not asked in an interview
- Refusals
 - Subjects refuses to answer an item
- Don't knows
 - Subjects truly "don't know" answer to an item
- Not applicables
 - If a subject never smoked, number of pack-years is irrelevant

Data Collection Instruments: Design Issues

- Do not clutter the workspace with text
- Observe the "7±2 rule"
- Use typefaces and fonts discretely and uniformly
- Number items logically and sequentially

Data Collection Instruments: Design Issues

- Keep responses unambiguous
- Provide clear instructions to the user
- Always consider the objectives of the instrument and the objectives of the study
- Place controversial items carefully

A bad design...

INSTRUCTIONS: As you know, we asked you to be a part of this research project to help us study the best way to educate people in some of the issues about heart disease. It will be quite helpful to us if you answer all the questions that have been asked to the best of your ability. Please read each question and its possible answers carefully. If you have any questions, please ask the project staff who is helping you today.

1. What is your age? _____
2. Please circle your sex: Male Female
3. Please circle your racial/ethnic group:
African-American White Asian Other
4. Please circle whether you consider yourself to be of Hispanic heritage? Yes No
5. Do you own a computer? Yes No
6. How often do you use computers at home or at work? (Please circle one answer.)
Never 1-4 times/year 1-2 times/month 1-2 times/week Daily
7. How often do you play computer gamess or videogames? (Please circle one answer.)
Never 1-4 times/year 1-2 times/month 1-2 times/week Daily
8. What computer games do you play? (Please list a few types or names.)
9. Has anyone close to you had a heart attack? Yes No
10. Have you had a heart attack? Yes No

This is better...

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1. What is your date of birth? (enter as MM/DD/YYYY) ____/____/____
2. Are you (please check): ☐ Male ☐ Female
3. Please check your racial/ethnic group:
☐ African-American ☐ White ☐ Asian ☐ Other
4. Are you of Hispanic heritage? ☐ Yes ☐ No
5. Do you own a computer? ☐ Yes ☐ No
6. How often do you use computers at home or at work? (Please check one answer.)
☐ Never ☐ 1-4 times/year ☐ 1-2 times/month ☐ 1-2 times/week ☐ Daily

And now with coding...

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1. What is your date of birth? (enter as MM/DD/YYYY) ____/____/____ (missing=1/1/2040)
2. Are you (please check): ☐ Female (2) ☐ Male (1)
3. Please check your racial/ethnic group:
☐ African-American (1) ☐ White (2) ☐ Asian (3) ☐ Other (4)
4. Are you of Hispanic heritage? ☐ No (0) ☐ Yes (1)
5. Do you own a computer? ☐ No (0) ☐ Yes (1)
6. How often do you use computers at home or at work? (Please check one answer.)
☐ Never (0) ☐ 1-4 times/year (1) ☐ 1-2 times/month (2) ☐ 1-2 times/week (3) ☐ Daily (4)

Assignment 3:
**Design and implement a data
collection form in REDCap**

- Follow the instructions in “REDCap Pointers”
- Note that there is nothing to submit in Canvas!
- Be sure to complete the assignment by 9am Tuesday, 2/12
