



Enhancing the Visual Display of a Provider Dashboard for Patient-Reported Outcomes in Surgical Spine Patients

Project Team

- **Cynthia LeRouge, PhD - Presenting**
 - **Mary Beth Hasselquist, MD**
 - **Elizabeth Austin, MPH**
 - **Brett Fey**
 - **Liz Kellogg, MPH**
 - **Andrea Hartzler, PhD**
 - **David R. Flum, MD, MPH**
- **Danielle C. Lavalley, PharmD, PhD**

This project was supported by grant number R01HS023785 from the Agency for Healthcare Research and Quality. The content is solely the responsibility of the authors and does not necessarily represent the official views of the Agency for Healthcare Research and Quality.





This study assesses use of heuristic evaluation using general design principles in the context of a prototype for Patient-Reported Outcome (PRO) data presented in a dashboard for use by clinicians.

Electronic Patient-Reported Outcomes: ePRO

Patient Outcomes



Trends/Comparisons



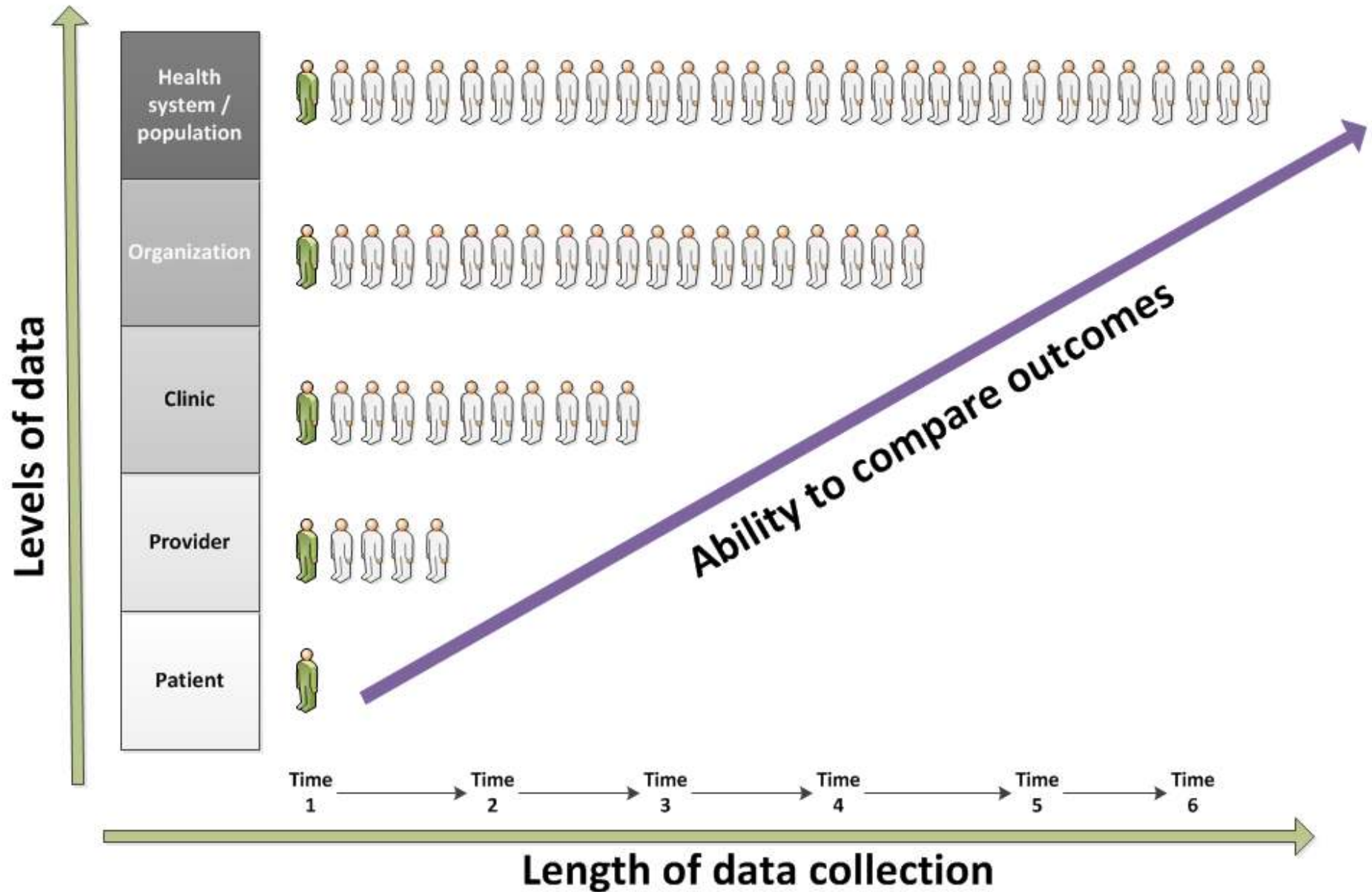
Assess Performance



Shared Decision Making



Longitudinal & Comparative Information



ePRO Design Goals



Useful Content

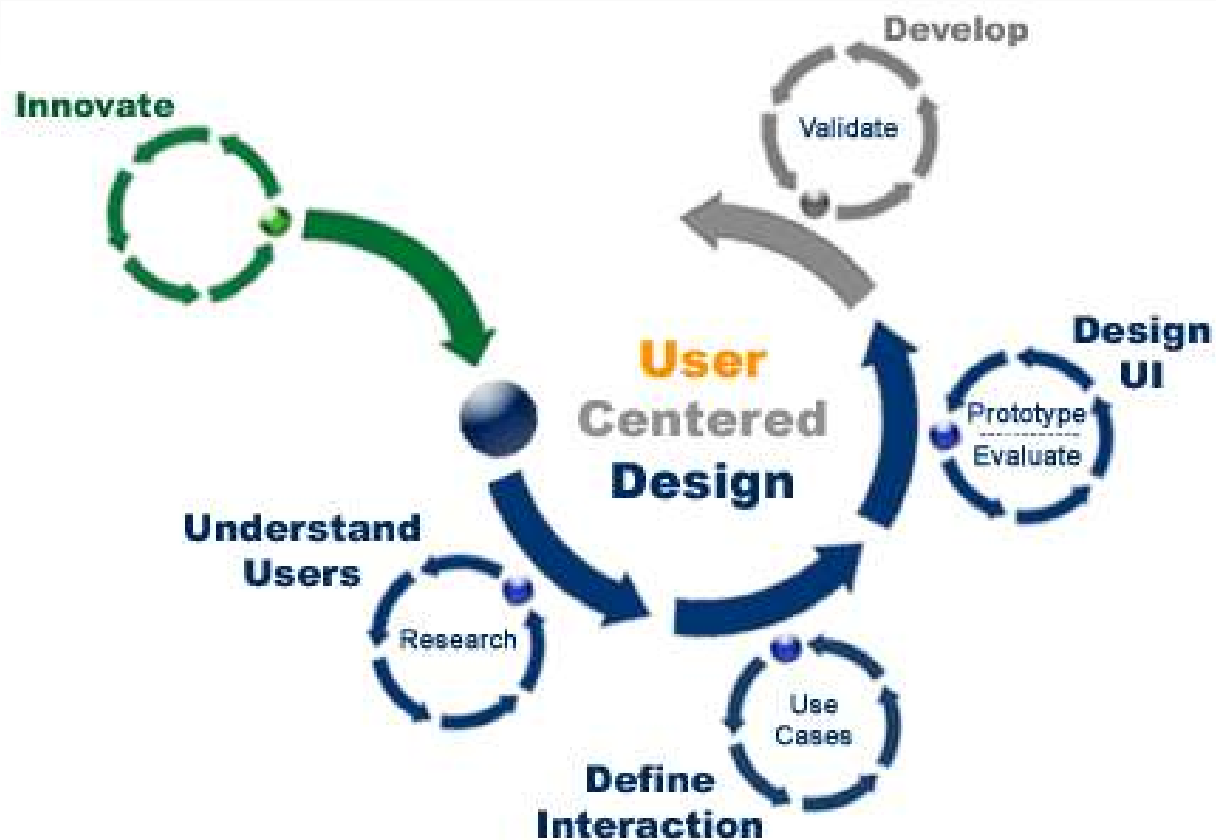


Usability



Fit with workflow

Human-Centered Design: Enhancing HCI



Step 1: Start with Words

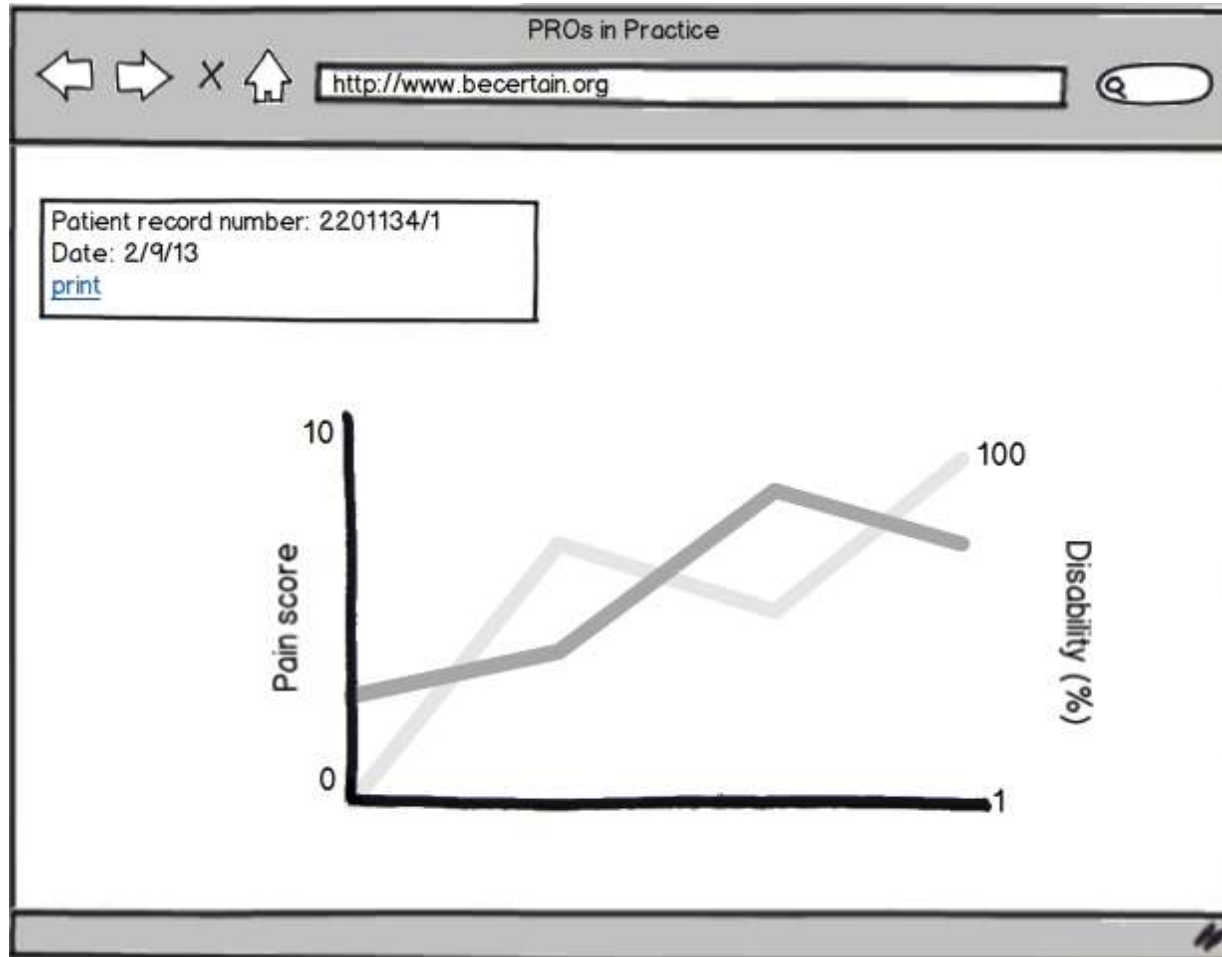
Case Study: Dr. Jones' patient returns for a 12-month visit following a lumbar surgery. The patient reported pain and disability outcomes through SCOAP surveys at 30 days, 6 months and 1 year. Dr. Jones wants to share this data with the patient to show changes in reported pain and disability over time.

Questions for End Users:

- How well does this case fit actual practice – what other ways can you use PROs?
- How would *you* examine and interact with PROs?
- How often would you use this data?
- What other questions might you answer with PRO data?



Step 2: Level 1 Prototype





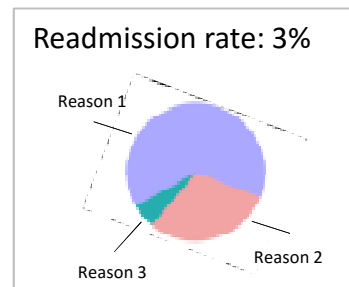
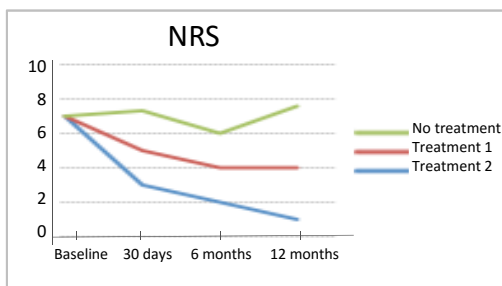
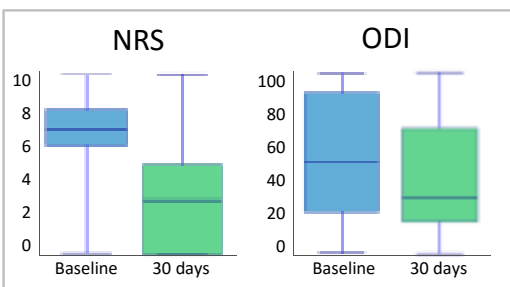
https://www.QIDashboard/StandardReports

Lumbar

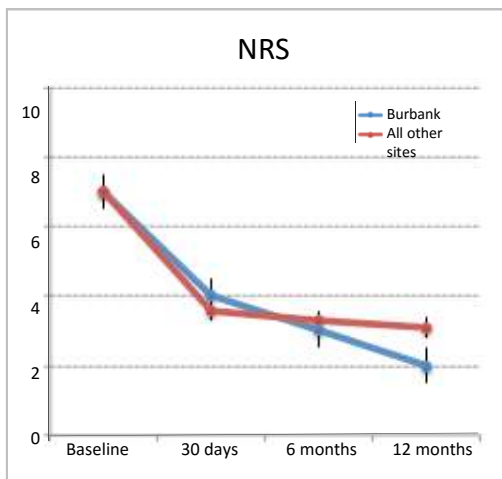
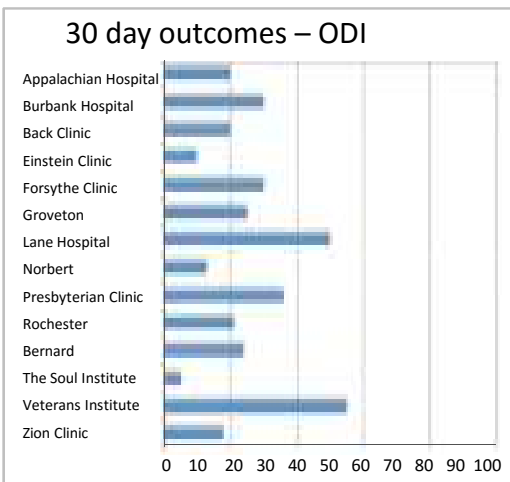
Cervical

QI Dashboards for as of

Burbank Hospital



All sites



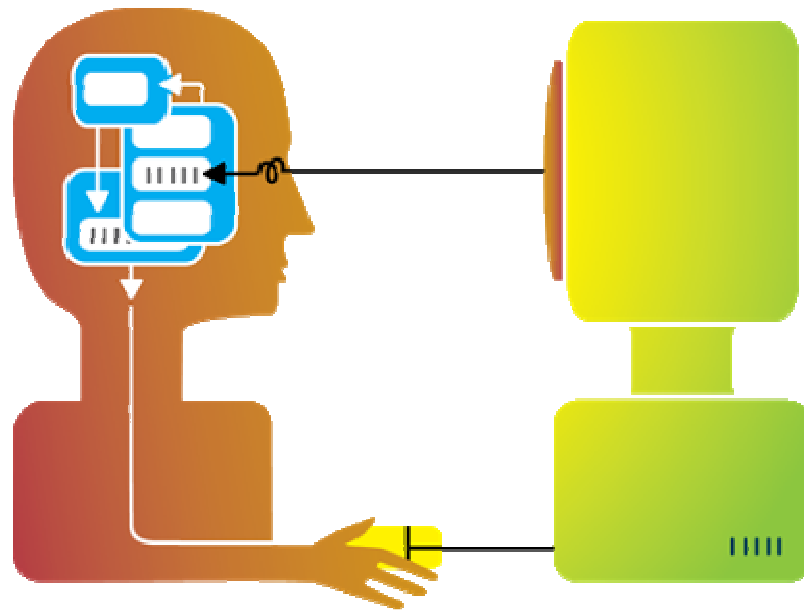
Readmission rates

Appalachian Hospital	1%
Burbank Hospital	3%
Back Clinic	0.3%
Einstein Clinic	1%
Forsythe Clinic	0.2%
Groveton	0.9%
Lane Hospital	13%
Norbert	3%
Presbyterian Clinic	3.7%
Rochester	2%
Bernard	6%
The Soul Institute	1%
Veterans Institute	0.2%
Zion Clinic	4%
All sites (mean +/- se)	2.6% +/- 0.9%



Step 4

- Watch use and get feedback



At-A-Glance Tab: Based on User Input



HUB

AT-A-GLANCE

ANALYSIS

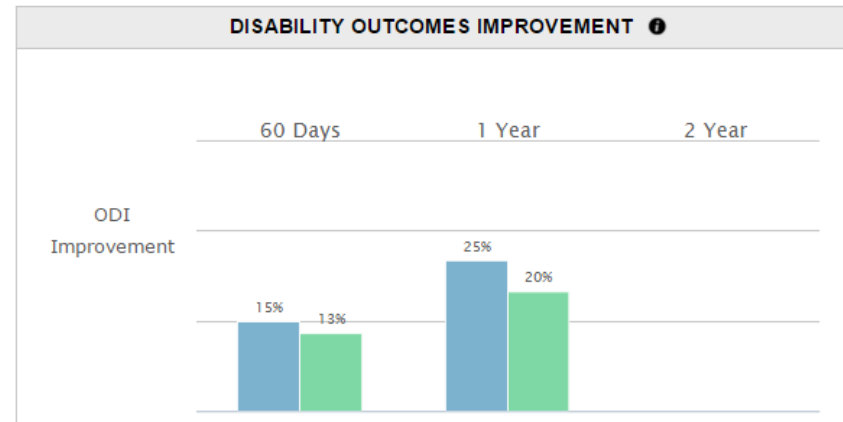
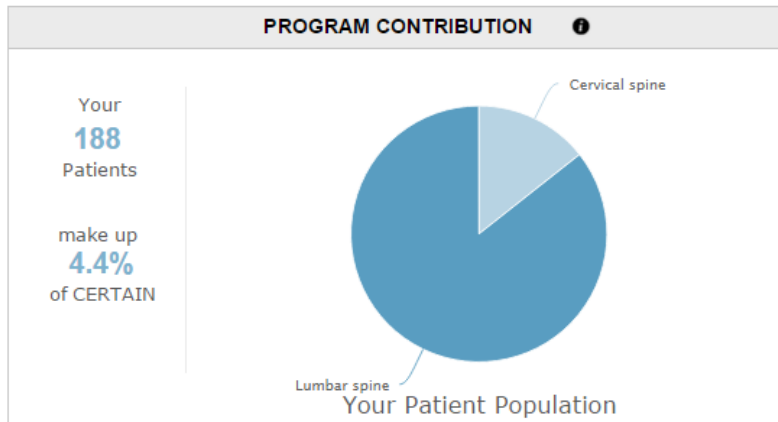
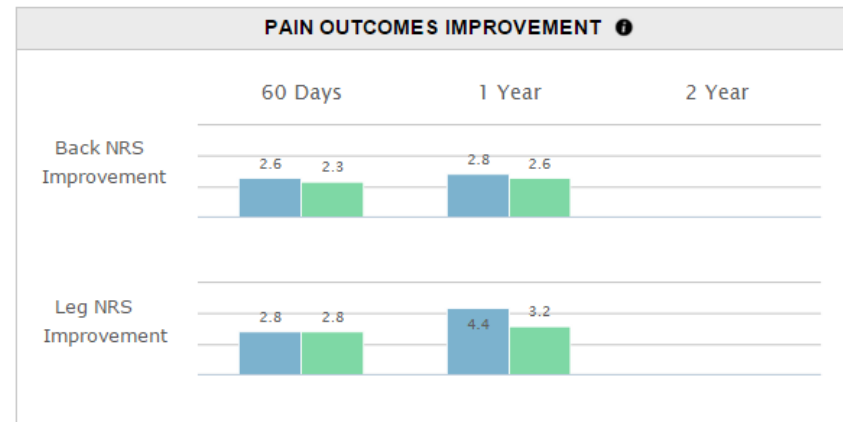
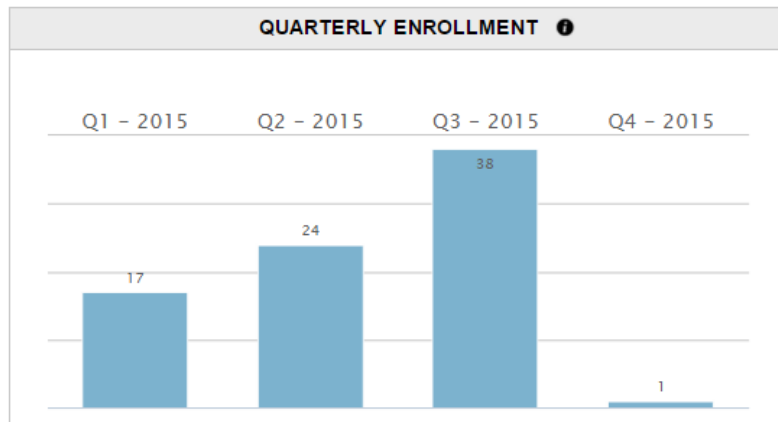
DATA QUALITY

Questions? Contact CERTAIN

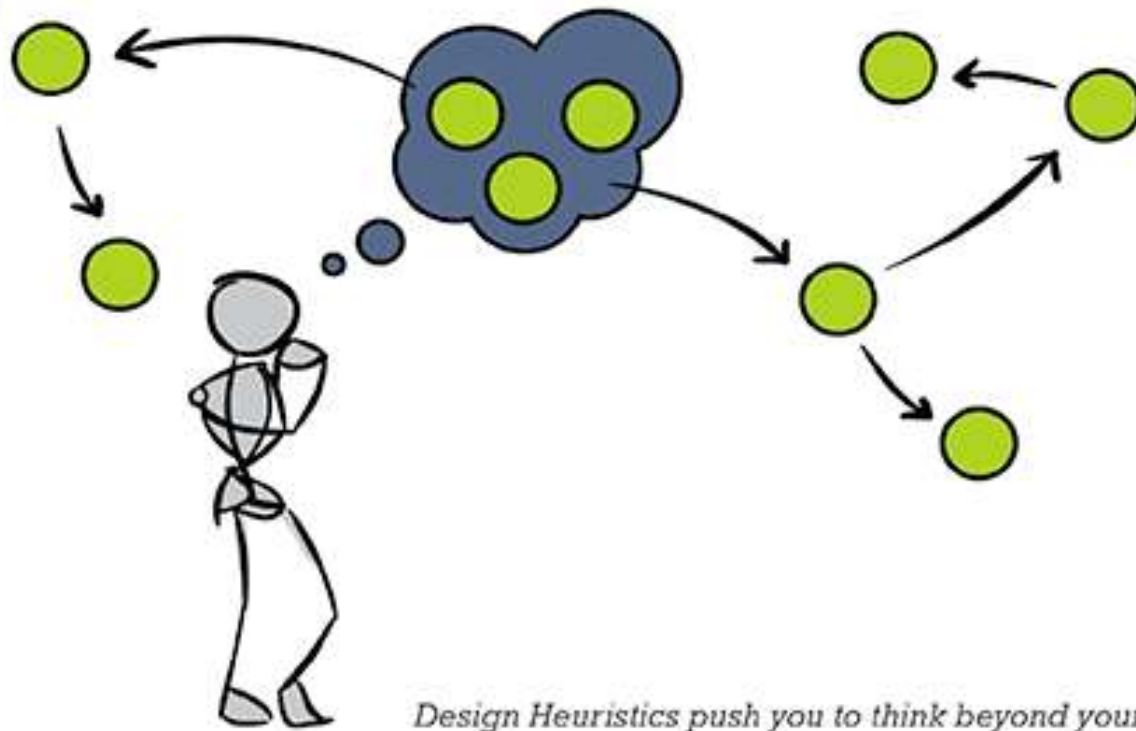
■ You

■ CERTAIN

Cervical
 Lumbar



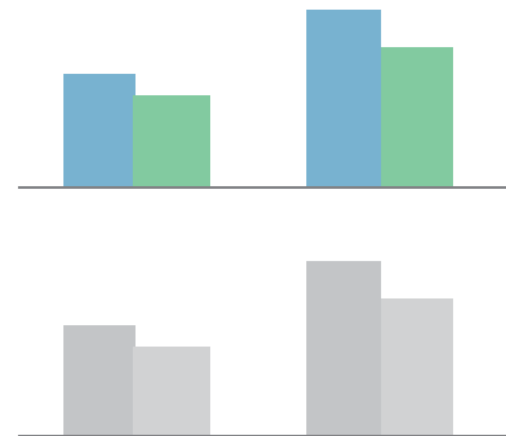
Heuristic Evaluation



Design Heuristics push you to think beyond your initial ideas

Color Heuristics

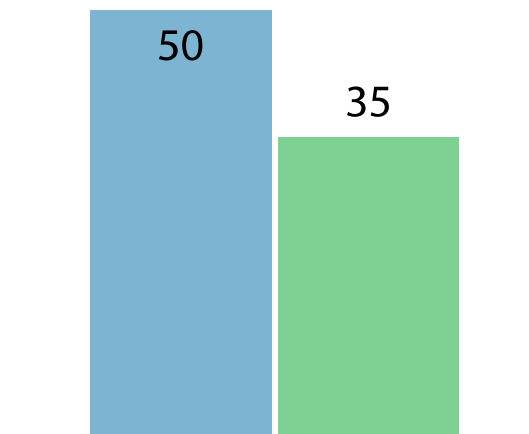
- Hue – color – used to encode and group categorical items
- Value – grayscale for printing
- Color deficiency – 8% men



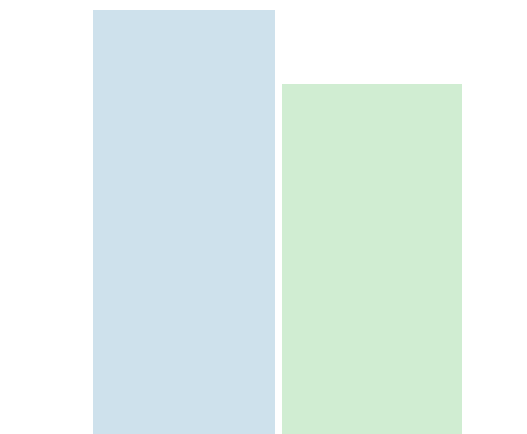
Heuristics: Placement of Text

- Numerals at top of columns distort column representations

as presented



as visualized

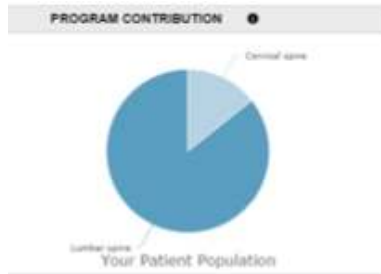


In this illustration, the value (35) encoded by the green column is 70% of the value (50) encoded by the blue column.

As visualized, the green column is about 85% as tall as the blue column.



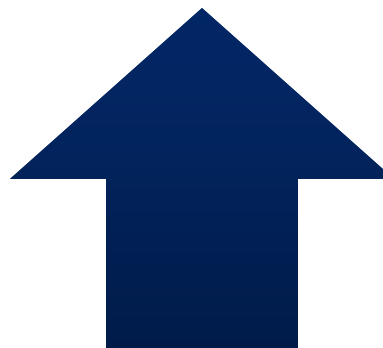
Heuristics: Consider Space



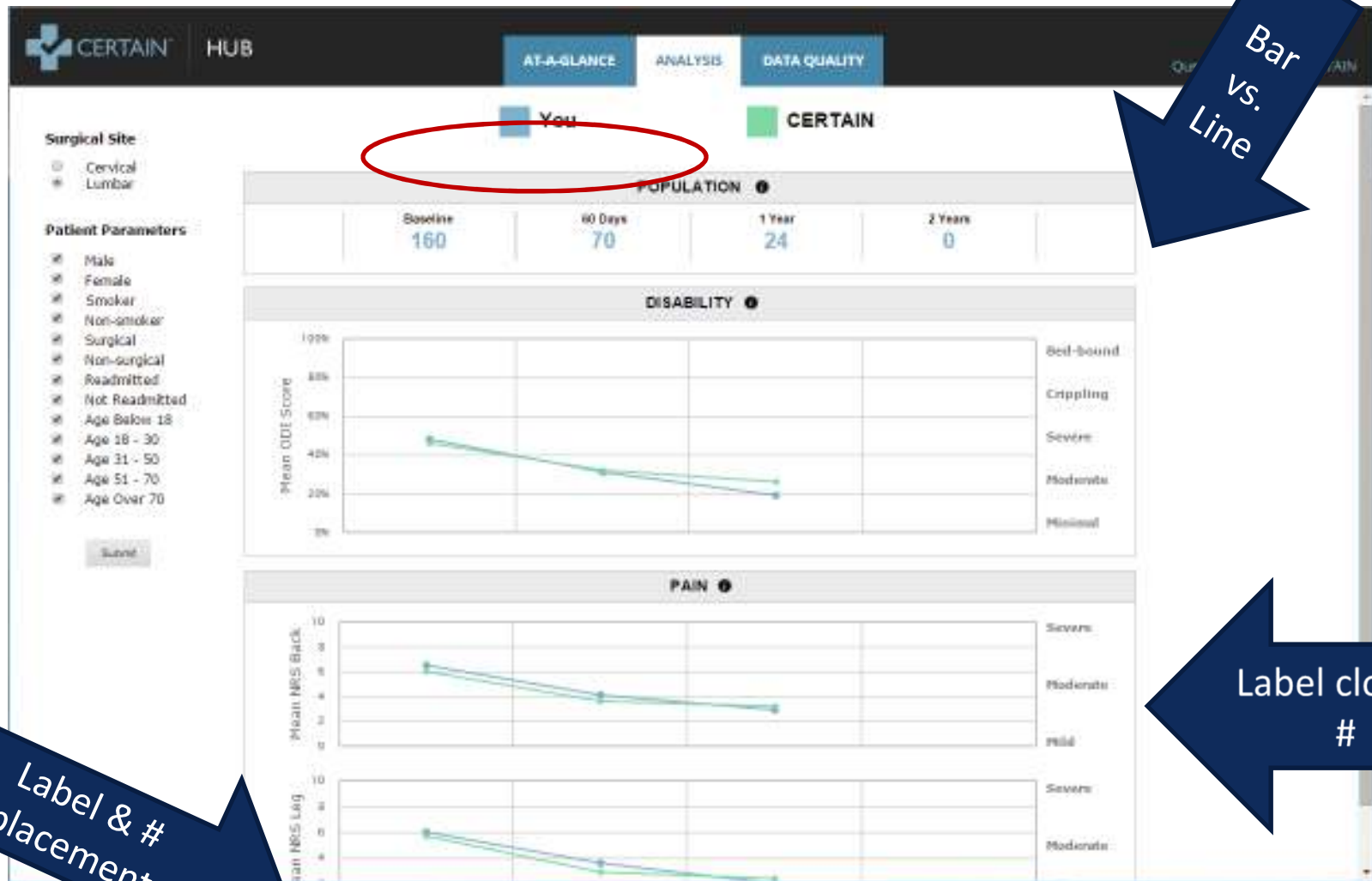
Some graphics
take up room
w/ limited
added value



Fill up
graphic area



Heuristics: User Expectations/Conventions (Before)



Label & #
placement

Bar
vs.
Line

Label close to
#



Heuristics: User Expectations/ Conventions (After)

DISABILITY ⓘ

Bar vs. Line

Mean ODI* Score

% Interpretation

Bed-bound
Crippling
Severe
Moderate
Minimal



Label close to #

Label & # placement

N= ⓘ

155

60

21

0

*Oswestry Disability Index



A Few Final Heuristic Considerations

- Adding benchmark lines (e.g., means to graphs)
- Remember user and context rule
- Remove distracting lines
- Dashboard - Upper left most meaningful

Putting it together...



At-A-Glance Tab: Based on User Input



HUB

AT-A-GLANCE

ANALYSIS

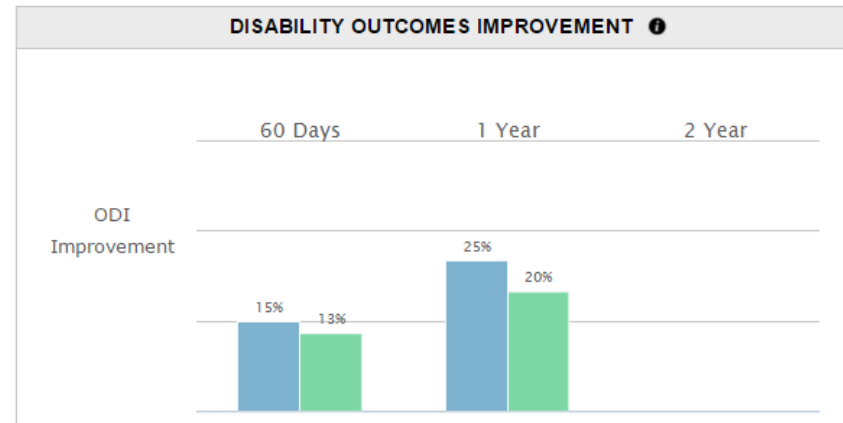
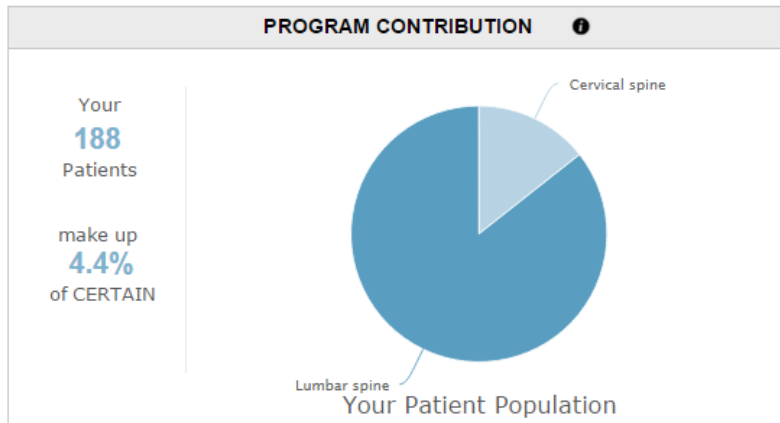
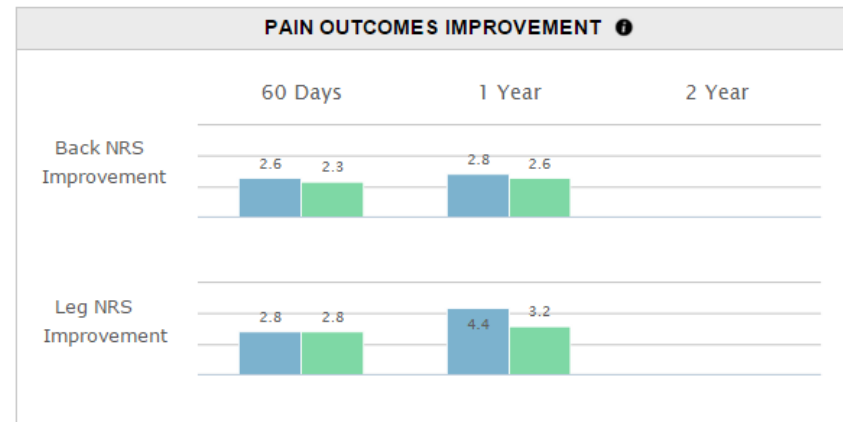
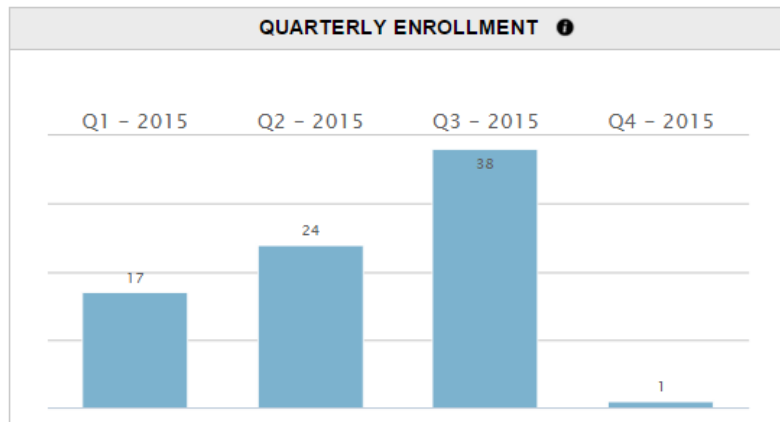
DATA QUALITY

Questions? Contact CERTAIN

■ You

■ CERTAIN

Cervical
 Lumbar



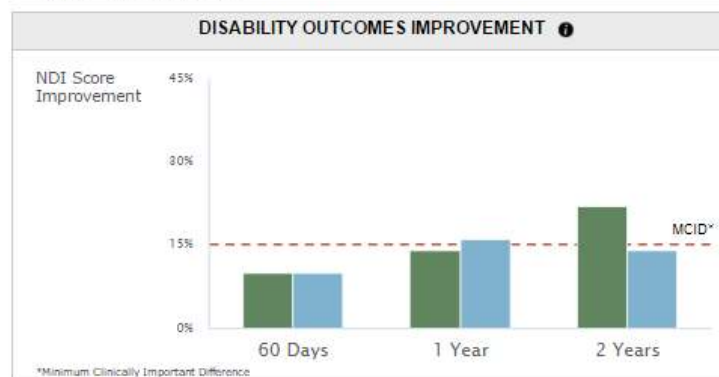
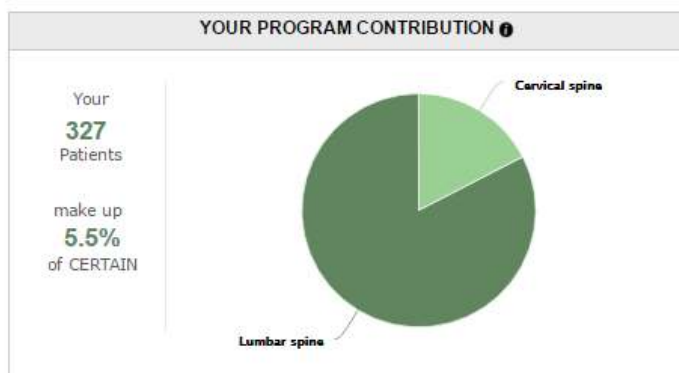
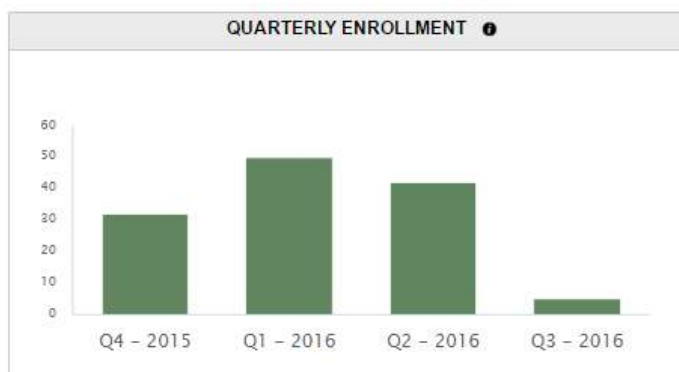
At-A-Glance Tab: w/ Heuristic Review

Your Patients **CERTAIN**

Surgical Site

- Cervical
- Lumbar

Submit



Feedback on Changes



Ongoing Work: Patient-Friendly Shared Visuals

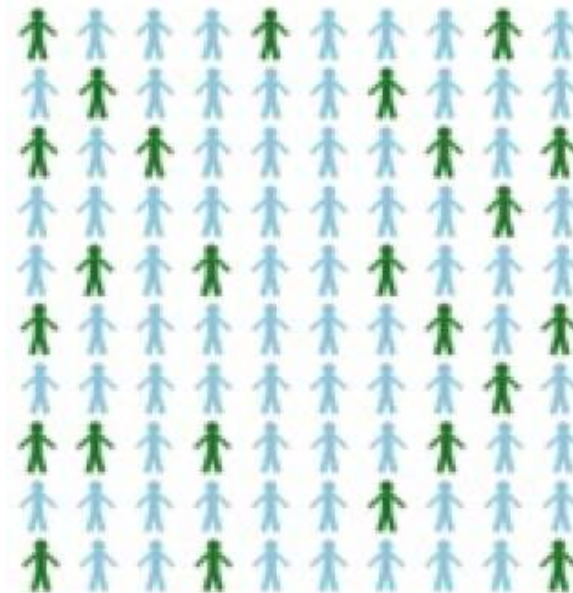
Will you be helped by surgery?

- | Patient parameters | Pre-operative level of disability |
|---|--|
| <input checked="" type="checkbox"/> Male | <input type="checkbox"/> 0-20 (minimal) |
| <input type="checkbox"/> Female | <input checked="" type="checkbox"/> 21-40 (moderate) |
| <input type="checkbox"/> Smoker | <input type="checkbox"/> 41-60 (severe) |
| <input checked="" type="checkbox"/> Non-smoker | <input type="checkbox"/> 61-80 (combined) |
| <input type="checkbox"/> Less than 18 years old | <input type="checkbox"/> 81-100 (end-stage) |
| <input type="checkbox"/> 18-30 years old | |
| <input type="checkbox"/> 31-50 years old | |
| <input checked="" type="checkbox"/> 51-70 years old | |
| <input type="checkbox"/> Over 70 years old | |

It is impossible to tell exactly what result you will get from surgery. However, doctors do know what happened to other people just like you.

People like you have a **25%** chance of having their symptoms helped by surgery.

A 25% chance means in the past, when doctors operated on 100 people like you, about 25 of them were helped by surgery.



Ongoing Work: Personal Patient Data Display

Data included: Scoring of individual patient data (e.g. ODI, NRS)

Intended audience: Patient, provider

Sample use case: A patient completes their CERTAIN baseline measures online which waiting for their doctor; the doctor and patient review the results of their report online at the beginning of their appointment, using the results to discuss the patient's goals for surgery and behavior changes needed to support a successful surgery (e.g. quitting smoking)

Your Survey Results

This report measures the intensity of the pain you are experiencing at this time and will help you understand the degree to which your pain is affecting your ability to perform every day activities.

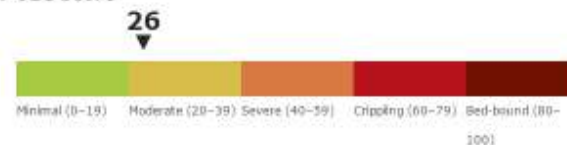
Your Back Pain Score



Your Leg Pain Score



Your ODI Score



Additional Items to Discuss with Your Doctor

Thank you for the information you provided for your upcoming appointment. Based on your responses, we recommend you ask your doctor about the following:

- ✓ Your answers indicate you may be at nutritional risk. Your doctor may want you to see a Registered Dietitian.
- ✓ If you have been previously told that you have diabetes, or if you have certain risk factors for pre-diabetes, you and your doctor should review your blood sugar levels and decide on an appropriate care plan.
- ✓ You said you are a current smoker. Quitting smoking now will help improve your health, especially if you undergo surgery. These resources can help you quit:
 - Plan My Quit (www.planmyquit.com/strongforsurgery); a free, online smoking cessation program.
 - The Washington State Quitline (1-800-Quit Now); a telephone based counseling service. Your ability to use the Quitline is based on your insurance, the Quitline website can help you determine what services are available to you: <http://www.doh.wa.gov/YouandYourFamily/Tobacco/HowtoQuit.aspx>
- ✓ You said you are or may be taking herbal medications. Some of these medications could cause increased risks during surgery. If you are scheduled for surgery, you should discuss all the medications you are taking, including herbal medications, with your doctor.

Conclusion

Usability enhanced by:

- Engaging users (core needs & interaction) AND
- Heuristic expert - **subtle elements of design and cognition that users would not be expected to know, articulate, and demonstrate, yet do have impact on usability.**
 - Improvements included:
 - Color palette compliant for color vision deficiency
 - Color optimized for black & white printing
 - Chart types changed to better communicate data
 - Chart formatting improved for rapid cognition

