Improving
Test to Treatment,
Improving Patient Care

Chris Jackson

Assignment

You are the product manager at a small software company, and you've just left a meeting with the CEO and the VP of Sales. They want you to start work on putting together requirements for a brand-new piece of software that will be web-based and will allow our clients to send and receive protected health information to and from clinical laboratories. The clinical laboratory we're integrating with has an established, well-documented API that sends and accepts messages in the HL7 format.

Each clinic must be able to:

1. Collect a sample of blood from a patient, label it with a unique ID, send that ID, the type of sample collected (blood), and the test panels requested (Chem7, CBC, Tox Screen,…) to the laboratory.
2. Schedule a pickup of the physical samples.
3. Receive the results of the test panels back, flag any positive drug results for individual patients, and display them in the Smart UI.

In order to successfully complete this exercise, you will need to provide Smart with the business logic surrounding the interactions for at least two of the features described above, identify the classes of users and write a brief persona for at least two of them, and provide a set of user stories and/or epics that you think will allow engineering to start the grooming process.

No Smart resources are available to you for this exercise. Only publicly available information can be used to complete this task. The goal of this exercise is NOT to have a set of requirements that Smart can actually use to build a product, but is instead a chance for you to demonstrate your research, analysis, and communication abilities, along with your understanding of the software design process.

Problems

- Worldwide, an estimated 69,000 people die from opioid overdoses each year.
- There are an estimated 15 million people who suffer from opioid dependence (i.e., an addiction to opioids). The majority of people dependent on opioids use illicitly cultivated and manufactured heroin, but an increasing proportion use prescription opioids.
- There are effective treatments for opioid dependence yet only 10% of people who need such treatment are receiving it.

—WHO

The resulting massive swell of fragmented data is difficult to integrate meaningfully with subjective manifestations of human behavior and into a unified framework of continuity management. The result: information overload, combined with poor usability, overwhelms patients and providers.

—Ezra Schwartz, UX Director

As opposed to looking at the patient, thinking about what's important with this patient, asking the relevant questions, then proceeding to take care of this patient, there's this huge fountain of collection of data, then you've got to go wading through it hoping you can find the relevant piece of information. It's a totally backwards approach.

—Gary Botstein, MD

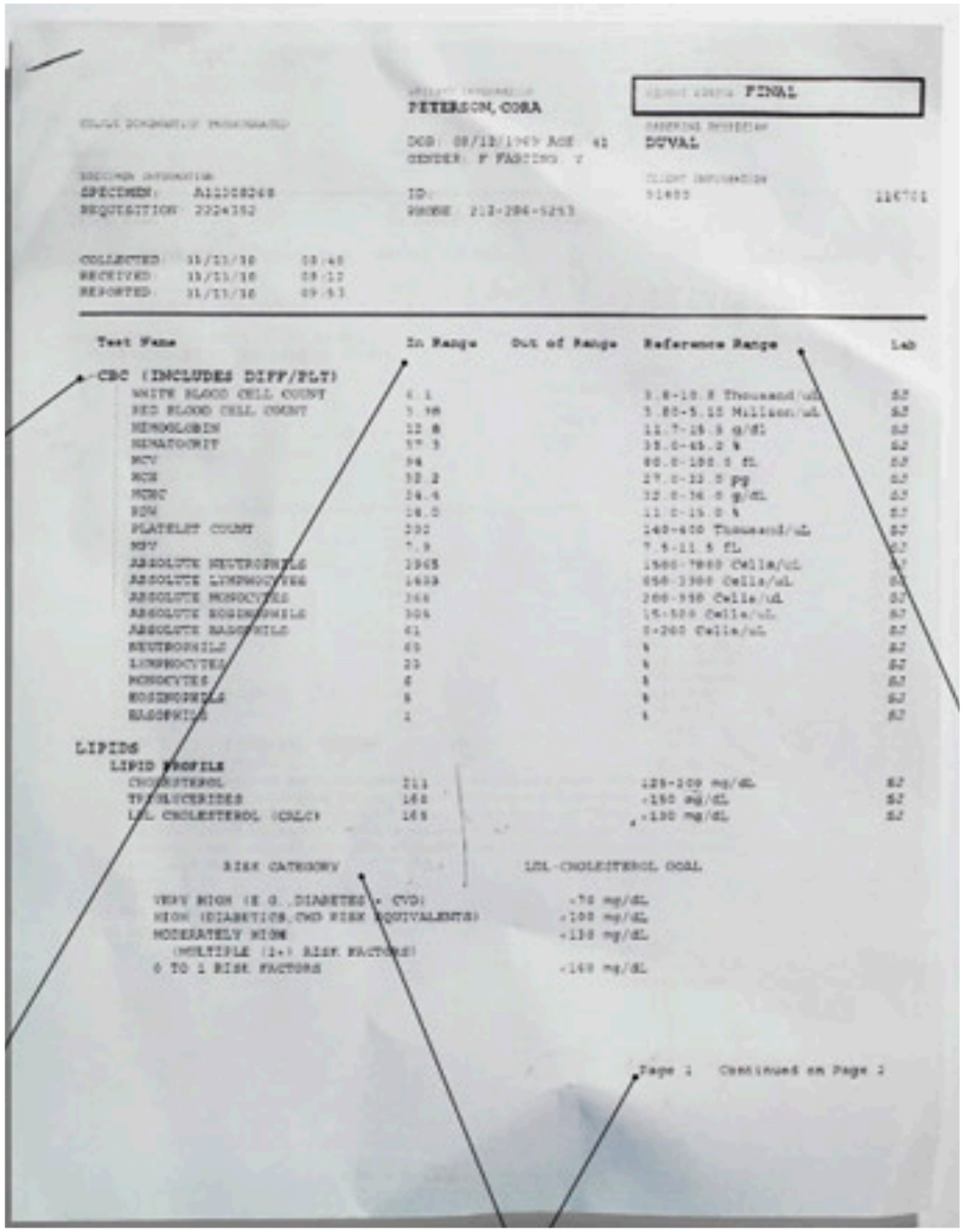
What we've had to do is [use] some workarounds by employing other providers, scribes, mid-levels, and that comes at a cost. But what we really want from our investment is free flow of information, because that will allow us to improve the care that we can provide.

—John Rogers, MD

Most EHRs suck because they're designed to collect data and not to help the patient.

—Sarah Rose Jackson, NP

Inspiration



PETERSON, CORA

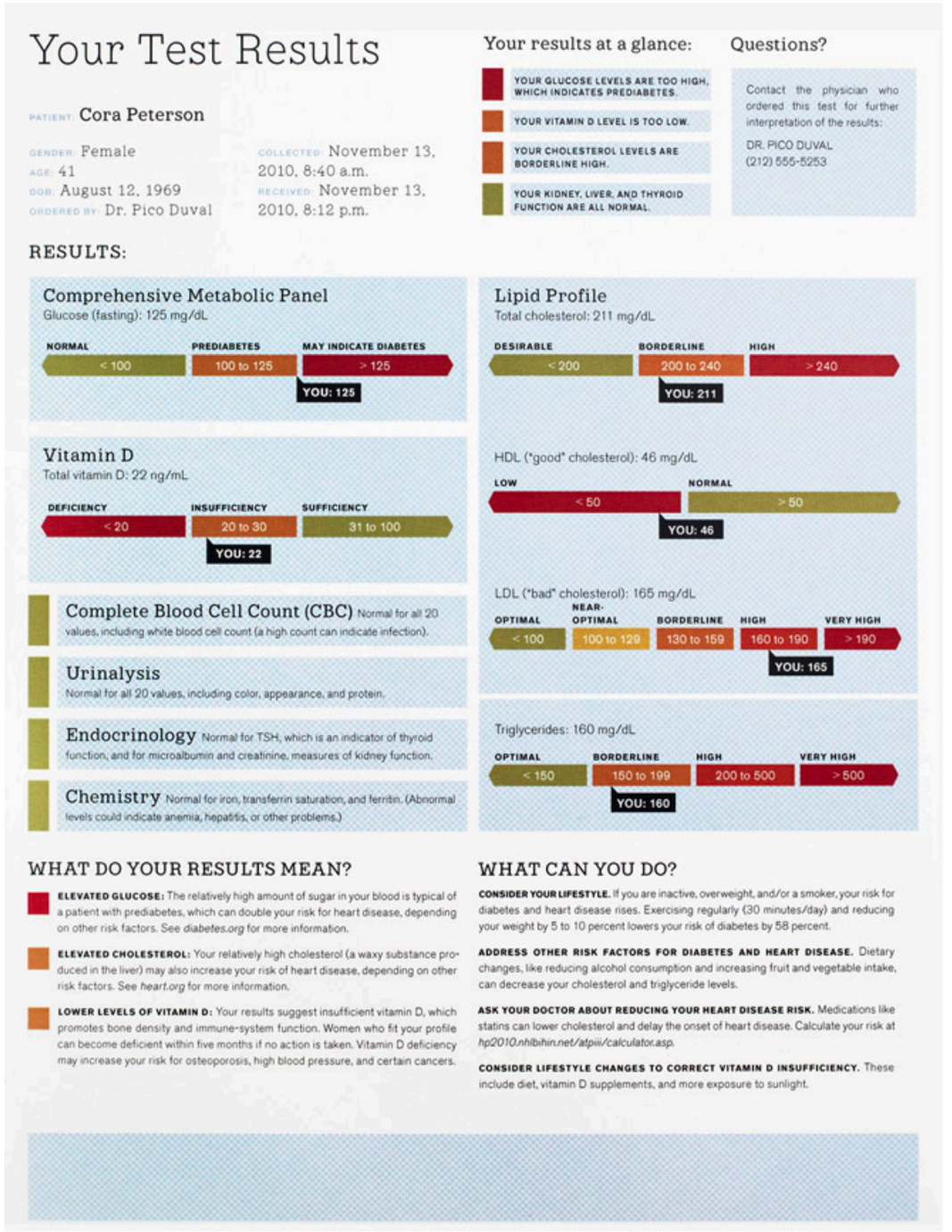
FINAL

DUVAL

Test Name	In Range	Out of Range	Reference Range	Lab
CBC (INCLUDES DIFF/PLT)				
WHITE BLOOD CELL COUNT	6.1		3.8-10.8 Thousand/uL	87
RED BLOOD CELL COUNT	5.48		3.80-5.10 Million/uL	87
HEMOGLOBIN	12.8		11.7-15.5 g/dL	87
HEMATOCRIT	37.3		35.0-45.0 %	87
MCV	94		80.0-100.0 fL	87
MCH	32.2		27.0-33.0 pg	87
MCHC	34.4		32.0-36.0 g/dL	87
RDW	14.0		11.0-15.0 %	87
PLATELET COUNT	232		140-400 Thousand/uL	87
MPV	7.9		7.5-11.5 fL	87
ABSOLUTE NEUTROPHILS	1965		1500-7800 Cells/uL	87
ABSOLUTE LYMPHOCYTES	1633		850-3900 Cells/uL	87
ABSOLUTE MONOCYTES	366		200-950 Cells/uL	87
ABSOLUTE EOSINOPHILS	304		15-500 Cells/uL	87
ABSOLUTE BASOPHILS	61		0-200 Cells/uL	87
NEUTROPHILS	65		%	87
LYMPHOCYTES	23		%	87
MONOCYTES	6		%	87
EOSINOPHILS	5		%	87
BASOPHILS	1		%	87
LIPIDS				
LIPID PROFILE				
CHOLESTEROL	211		125-200 mg/dL	87
TRIGLYCERIDES	160		<150 mg/dL	87
LDL CHOLESTEROL (CALC)	165		<130 mg/dL	87

RISK CATEGORY	LDL-CHOLESTEROL GOAL
VERY HIGH (E.G., DIABETES + CVD)	<70 mg/dL
HIGH (DIABETES, CHD RISK EQUIVALENTS)	<100 mg/dL
MODERATELY HIGH	<130 mg/dL
(MULTIPLE (2+) RISK FACTORS)	
0 TO 1 RISK FACTORS	<160 mg/dL

Page 1 Continued on Page 2



Your Test Results

PATIENT Cora Peterson

GENDER: Female
AGE: 41
DOB: August 12, 1969
ORDERED BY: Dr. Pico Duval

COLLECTED: November 13, 2010, 8:40 a.m.
RECEIVED: November 13, 2010, 8:12 p.m.

Your results at a glance:

- YOUR GLUCOSE LEVELS ARE TOO HIGH, WHICH INDICATES PREDIABETES.
- YOUR VITAMIN D LEVEL IS TOO LOW.
- YOUR CHOLESTEROL LEVELS ARE BORDERLINE HIGH.
- YOUR KIDNEY, LIVER, AND THYROID FUNCTION ARE ALL NORMAL.

Questions?

Contact the physician who ordered this test for further interpretation of the results:

DR. PICO DUVAL
(212) 555-5253

RESULTS:

Comprehensive Metabolic Panel
Glucose (fasting): 125 mg/dL

NORMAL	PREDIABETES	MAY INDICATE DIABETES
< 100	100 to 125	> 125
		YOU: 125

Vitamin D
Total vitamin D: 22 ng/mL

DEFICIENCY	INSUFFICIENCY	SUFFICIENCY
< 20	20 to 30	31 to 100
	YOU: 22	

Complete Blood Cell Count (CBC) Normal for all 20 values, including white blood cell count (a high count can indicate infection).

Urinalysis Normal for all 20 values, including color, appearance, and protein.

Endocrinology Normal for TSH, which is an indicator of thyroid function, and for microalbumin and creatinine, measures of kidney function.

Chemistry Normal for iron, transferrin saturation, and ferritin. (Abnormal levels could indicate anemia, hepatitis, or other problems.)

Lipid Profile
Total cholesterol: 211 mg/dL

DESIRABLE	BORDERLINE	HIGH
< 200	200 to 240	> 240
	YOU: 211	

HDL ("good" cholesterol): 46 mg/dL

LOW	NORMAL
< 50	> 50
YOU: 46	

LDL ("bad" cholesterol): 165 mg/dL

OPTIMAL	NEAR-OPTIMAL	BORDERLINE	HIGH	VERY HIGH
< 100	100 to 129	130 to 159	160 to 190	> 190
			YOU: 165	

Triglycerides: 160 mg/dL

OPTIMAL	BORDERLINE	HIGH	VERY HIGH
< 150	150 to 199	200 to 500	> 500
	YOU: 160		

WHAT DO YOUR RESULTS MEAN?

ELEVATED GLUCOSE: The relatively high amount of sugar in your blood is typical of a patient with prediabetes, which can double your risk for heart disease, depending on other risk factors. See *diabetes.org* for more information.

ELEVATED CHOLESTEROL: Your relatively high cholesterol (a waxy substance produced in the liver) may also increase your risk of heart disease, depending on other risk factors. See *heart.org* for more information.

LOWER LEVELS OF VITAMIN D: Your results suggest insufficient vitamin D, which promotes bone density and immune-system function. Women who fit your profile can become deficient within five months if no action is taken. Vitamin D deficiency may increase your risk for osteoporosis, high blood pressure, and certain cancers.

WHAT CAN YOU DO?

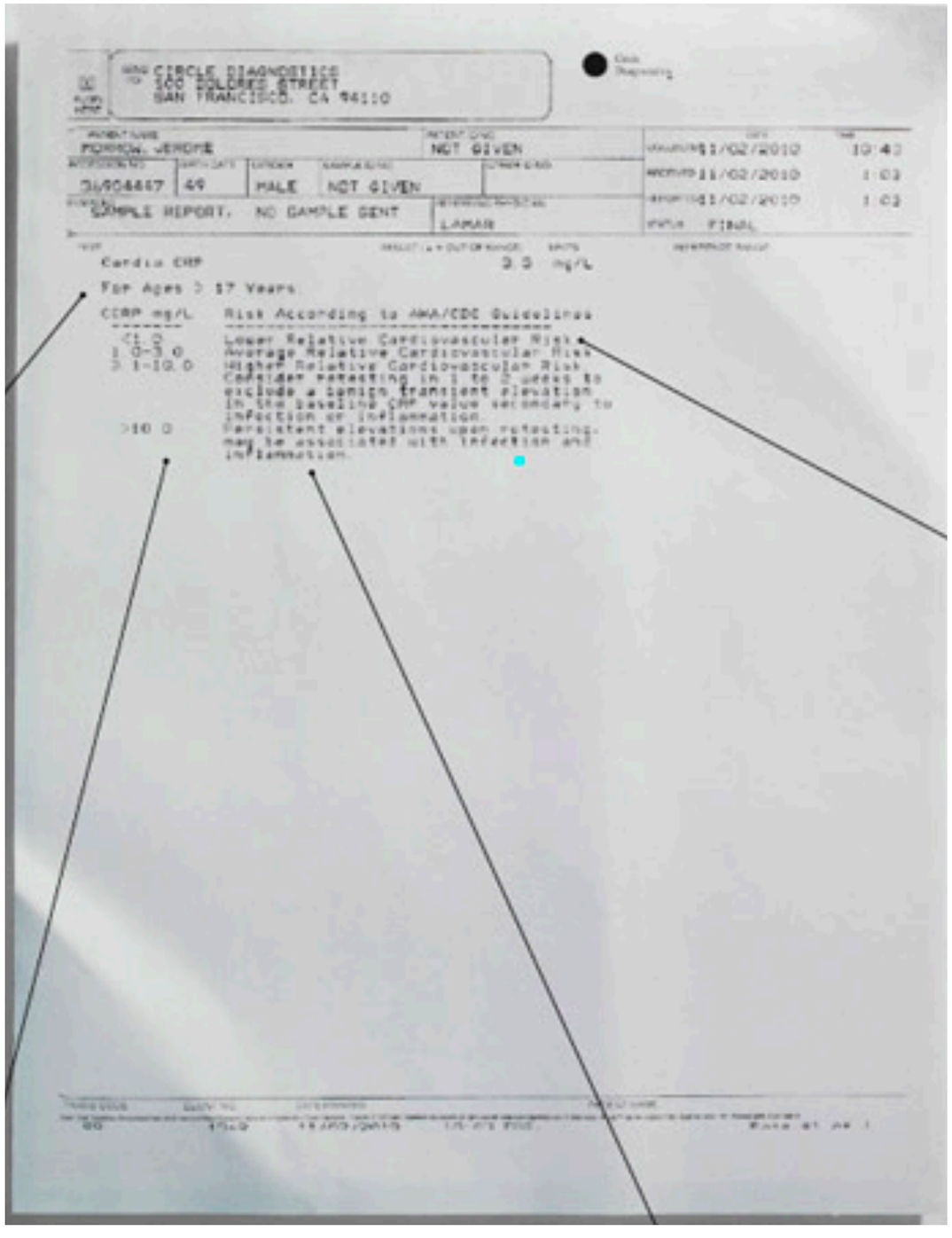
CONSIDER YOUR LIFESTYLE. If you are inactive, overweight, and/or a smoker, your risk for diabetes and heart disease rises. Exercising regularly (30 minutes/day) and reducing your weight by 5 to 10 percent lowers your risk of diabetes by 58 percent.

ADDRESS OTHER RISK FACTORS FOR DIABETES AND HEART DISEASE. Dietary changes, like reducing alcohol consumption and increasing fruit and vegetable intake, can decrease your cholesterol and triglyceride levels.

ASK YOUR DOCTOR ABOUT REDUCING YOUR HEART DISEASE RISK. Medications like statins can lower cholesterol and delay the onset of heart disease. Calculate your risk at *hp2010.nhlbihin.net/atpiii/calculator.asp*.

CONSIDER LIFESTYLE CHANGES TO CORRECT VITAMIN D INSUFFICIENCY. These include diet, vitamin D supplements, and more exposure to sunlight.

Inspiration



Blood Work Cardiology Result

BACTA MEDICAL CENTRE

ORDERED BY: Dr. Francis Pulaski
Bacta Medical Centre
pulaski.f@bactamed.edu
(603) 555-9564 x1523

COLLECTED: 11/02/2010, 10:40 a.m.
RECEIVED: 11/02/2010, 1:03 p.m.

Patient
NAME: **Jerome Morrow**
GENDER: **M** AGE: **49** DOB: **01/10/1961**

1 About this test
This report evaluates your potential risk of heart disease, heart attack, and stroke.

2 Your results

CRP level test
Your level of c-reactive protein in the blood. High levels are linked to inflammation of the blood vessels, which has been associated with an increased risk of heart disease.

3.3

mg/L
Low risk — 1 Average risk — 3 High risk of cardiovascular disease — 10+

Total cholesterol level

265

mg/DL
Desirable — 200 Borderline — 240 High — 280+

LDL ("bad" cholesterol)

233

mg/DL
Optimal — 100 Near optimal — 130 Borderline high — 160 High — 190 Very high — 260+

HDL ("good" cholesterol)

32

mg/DL
Low — 40 Borderline — 60 Optimal — 100+

3 Your risk You show an elevated risk of cardiovascular disease.

If you're a smoker with blood pressure of 130 mm/Hg but a family history of heart attack before age 60 (in one or both parents), your risk over the next 10 years is:

15%

Your risk would be lowered to:
12% if your blood pressure were 120 mm/Hg.
10% if you quit smoking.
6% if you reduced your cholesterol to 160 mg/DL.

Use your CRP results and cholesterol level to calculate your 10-year risk of a cardiovascular event at ***www.reynoldsriskscore.org***.

4 What now?

Diet and exercise can improve your cholesterol levels.

Avoid drinking alcohol, except in moderation: one to two drinks per day.

Ask your doctor about statins or other medications that can lower cholesterol.

Consider retesting in one to two weeks, in case your CRP level was caused by infection.

Product Brief

We have an opioid crisis in the U.S. Have for quite some time. One of the ways people can live better lives without opioids is through better patient care. Patient care can be improved in many ways, including

- reducing time from testing to treatment,
- turning data into actionable information, and
- helping technicians and providers focus more on patients than on software.

SMART Management is committed to helping providers and clinics deliver high-quality patient care. When we deliver on that commitment, each customer will tell two potential customers. Our business will grow, and even more patients will receive better care.

We recognize that there is an opportunity in our SMART Solution to improve the patient and provider experiences by allowing our clients to send and receive protected health information to and from clinical laboratories. The Lab Communications module will transact data securely with APIs in the HL7 FHIR format. Human-system interfaces will be easy-to-use and be designed not for data collection but for better patient care.

We will know that our Lab Communications module is successful when

- Test to Treatment time is reduced by 15%;
- 4 out of 5 providers report that
    - the module provides actionable information,
    - the module reduces effort and waste, and
    - the module allows them to focus more on patients; and
- our clients give the module an average NPS score of 25 or better.

Users

- Opioid-dependent Patient (Jack)
- Provider/Practitioner (Sarah)
- Administrative Assistant
- Medical Assistant
- Lab Tech
- Main Lab Tech
- Billing Specialist
- Clinic Supervisor
- System Administrator

Opioid-dependent Patient (Jack)

in list Users

Labels

patient +

Description Edit

Jack is a young-adult male who has been through several intense surgeries due to a serious motorcycle crash. Additional surgeries and non-opiate treatments failed to manage his chronic pain and he was started on OxyContin by his primary care provider.

Over several months, the PCP noticed behaviors indicating addiction and referred him to the opiate treatment center. The treatment center provider has ordered Suboxone to manage his opiate addiction, and referred him to a pain management center to address his chronic pain.

The provider has also ordered biweekly urine drug testing (UDT) in accordance with their policy. Jack has to pay hundreds of dollars each month for his UDT co-pays, which causes stress on his family.

Provider/Practitioner (Sarah)

in list Users

Labels

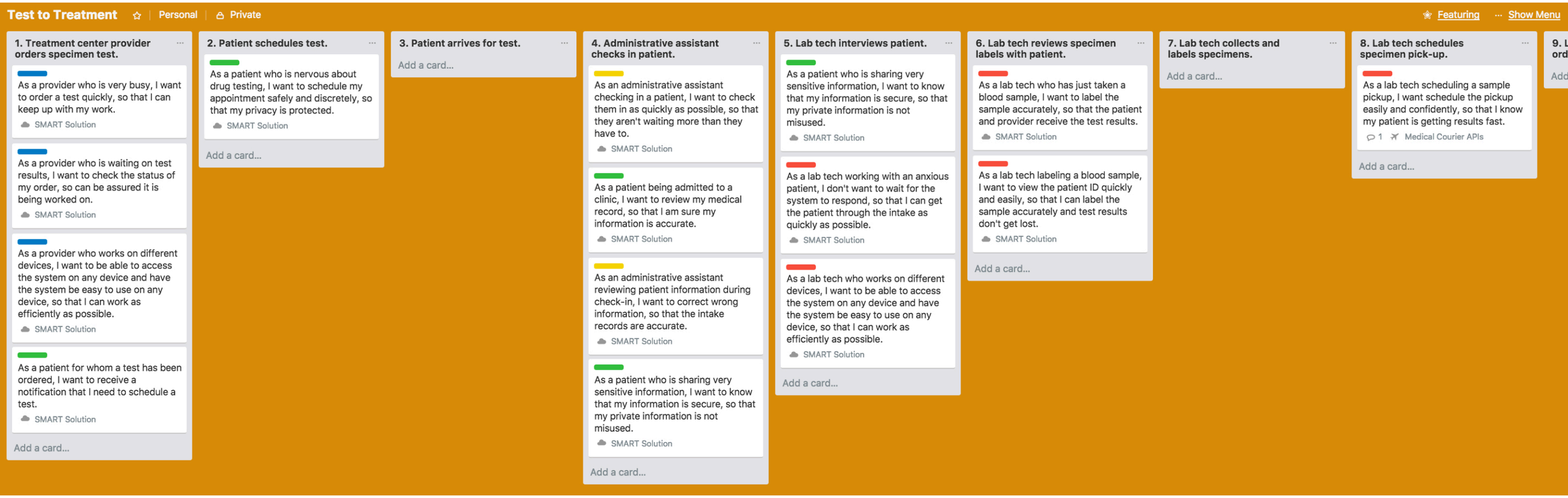
provider +

Description Edit

Sarah is a middle-aged nurse practitioner who has been working in an opioid treatment clinic for the past 5 years. She enjoys her work when she feels she is making a difference in patients' lives. She becomes frustrated with her work when she spends more time record-keeping than talking with patients.

She distrusts the large medical and insurance systems that seem to, day-by-day, reduce the time she spends listening to patients and their needs. To preserve some of her patient "face-time," she has begun doing paperwork on her weekend mornings. She worries about getting burned out.

User Stories



Feedback

How did I do?