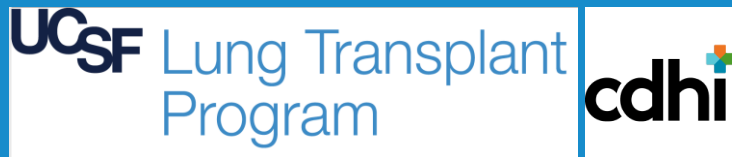# Lung Transplant Digital Care

Detecting graft dysfunction in lung transplant recipients using home spirometry during the COVID-19 Pandemic

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Detecting graft dysfunction in lung transplant recipients

- Early Detection of both Acute Allograft Dysfunction and Chronic Lung Allograft Dysfunction is important as delays in detection / treatment may lead to worse outcomes.

- **Spirometry remains the principal method for detecting graft dysfunction in outpatient lung transplant recipients**
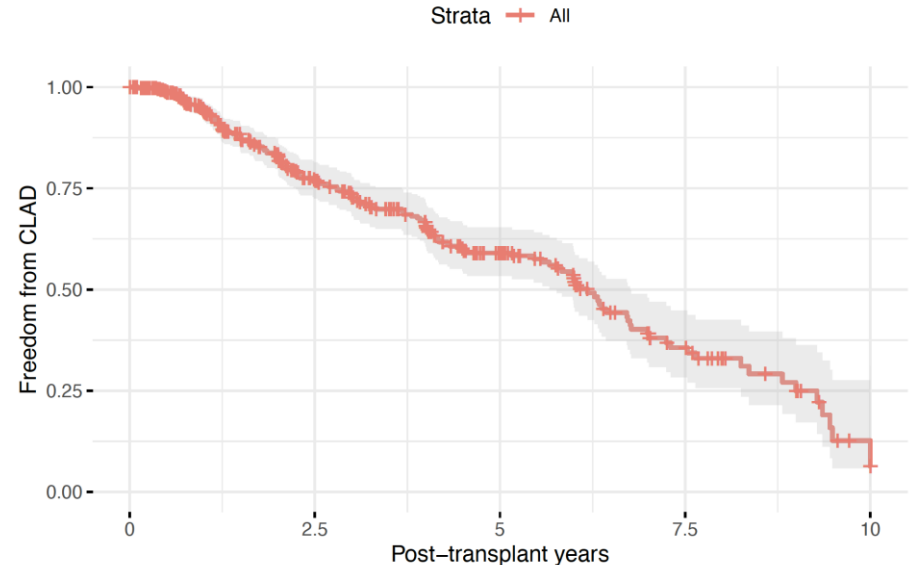
COVID-19 Impact on Spirometry

- **Aerosol Generating Procedures pose a significant risk of COVID-19 transmission**

- Nationwide most PFT labs either closed

- Barriers to In-Lab Spirometry:

  - **COVID-19**

  - Requires travel

  - Variability between labs

  - Frequency of measurement limited

  - Getting outside spiro data intercalated with our data

  - Review of outside spiro is challenging/requires fax/personnel
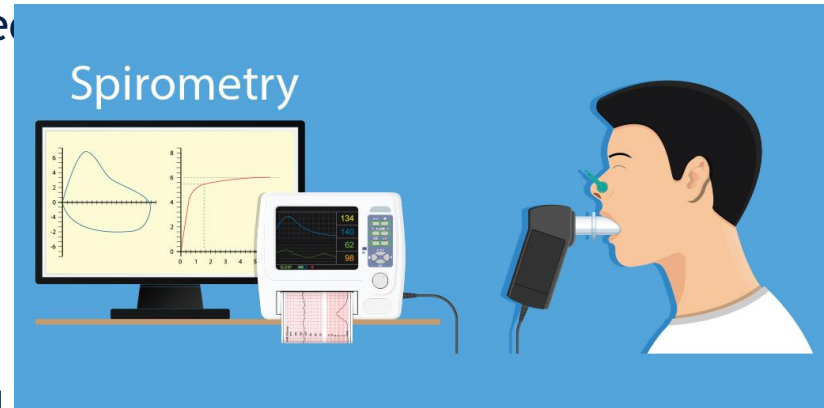
Detecting graft dysfunction in lung transplant recipients using home spirometry

- **Home Spirometry potential benefits**
  - **Less risk – Keeps AGPs at home**
  - Less Travel
  - Increased Frequency
  - Portable Data
  - Home management
- **Barriers**
  - Compare to Lab Measure?
  - How to interpret?
  - How to trouble shoot?
 - Education / Coaching?
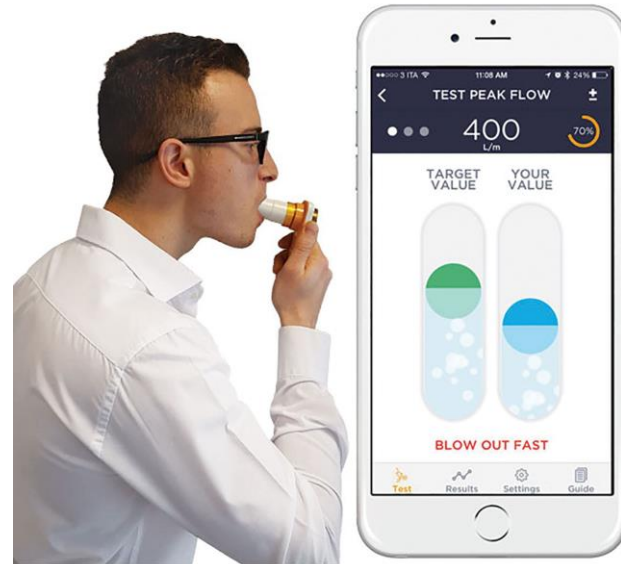
Prior experience with home spirometry in Lung Transplantation

- Adherence to home spirometry generally decreases over time due to multiple factors

  - Lack of understanding

  - Lack of feedback

  - Lack of engagement

- Non-adherence to home spirometry is related to a decreased freedom from BOS

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Goals of home spirometry

- Obtain spirometry on a weekly basis for the first year and monthly basis after one year to detect graft dysfunction

- Obtain spirometry in real time to assess remote symptoms

- Identify changes in lung function earlier

  - Diagnose acute graft dysfunction

  - Diagnose CLAD earlier

- Provide education to patients

- Collect feedback
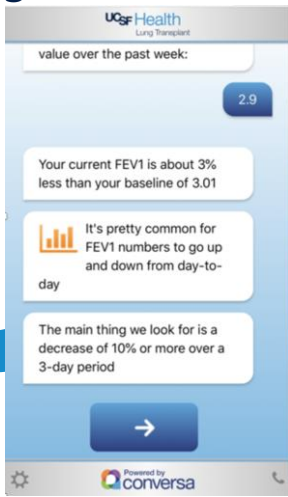
- Iterate based on experience and feedback

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Engagement Platform
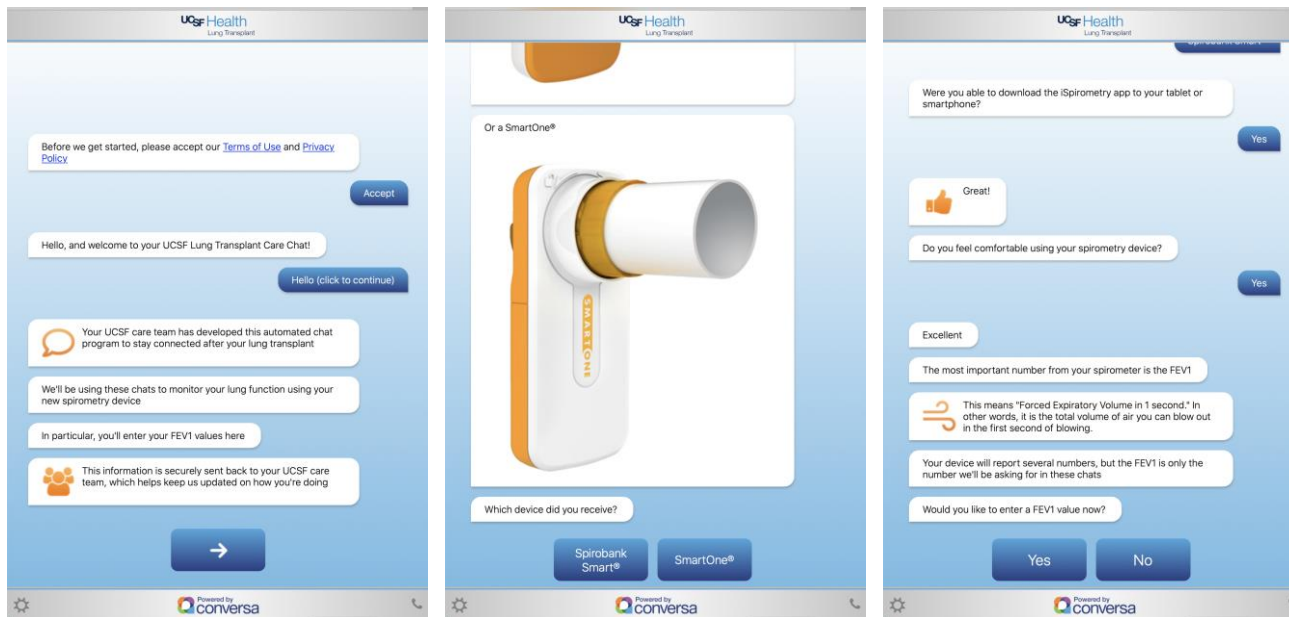
Engage, Collect, Feedback

Data Deposit, Assimilation
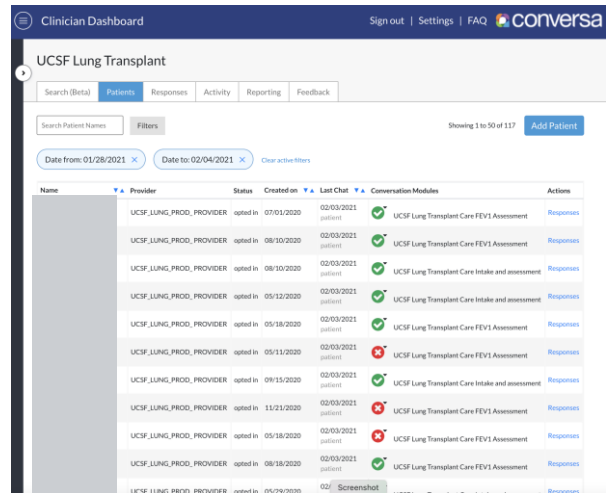
Create Spiro Data

Feedback, Disposition

Physician Dashboard

Patient Name	Date of Birth ↓	Values Reported	Median (IQR)	Baseline	Most Recent	FEV1 Trend
		128	0.46 (0.42 - 0.5)	1.27	0.39	
		73	2.91 (2.88 - 3)	5.4	2.78	
		67	1.89 (1.85 - 1.92)	2.26	1.87	
		58	0.67 (0.58 - 0.69)	0.75	0.72	
		56	2.36 (2.17 - 2.57)	3.21	1.88	
		54	1.25 (1.23 - 1.26)	1.43	1.25	
		52	1.54 (1.49 - 1.69)	1.88	1.52	
		48	1.88 (1.8 - 2)	2.21	2.13	
		46	2 (1.97 - 2.04)	2.16	2.07	
		45	2.4 (2.35 - 2.44)	2.51	2.37	
		45	2.19 (2.08 - 2.24)	2.52	2.31	

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Home spirometry highly correlates with Lab spirometry

Home vs Lab FEV1 Scatterplot

$R^2 = 0.938$
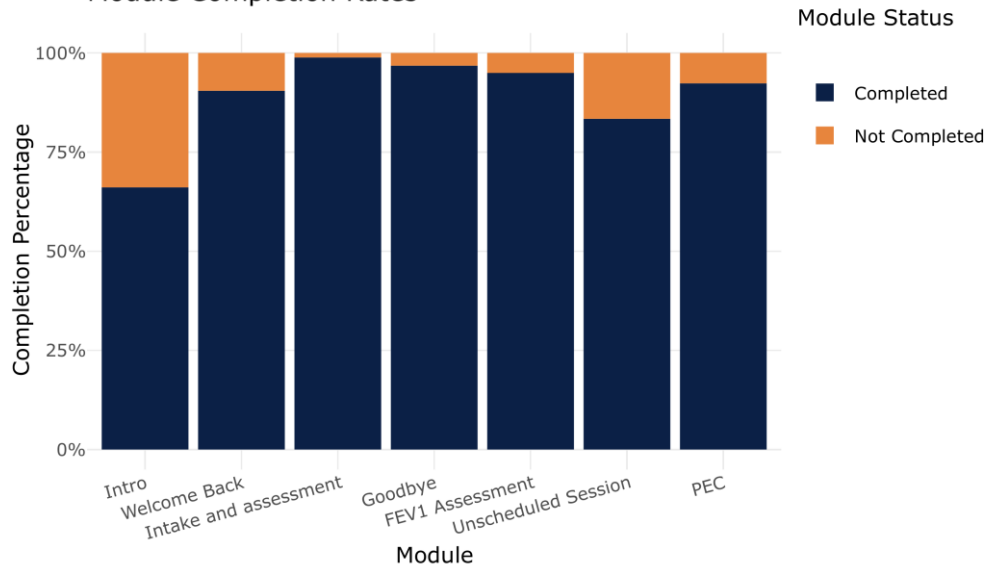
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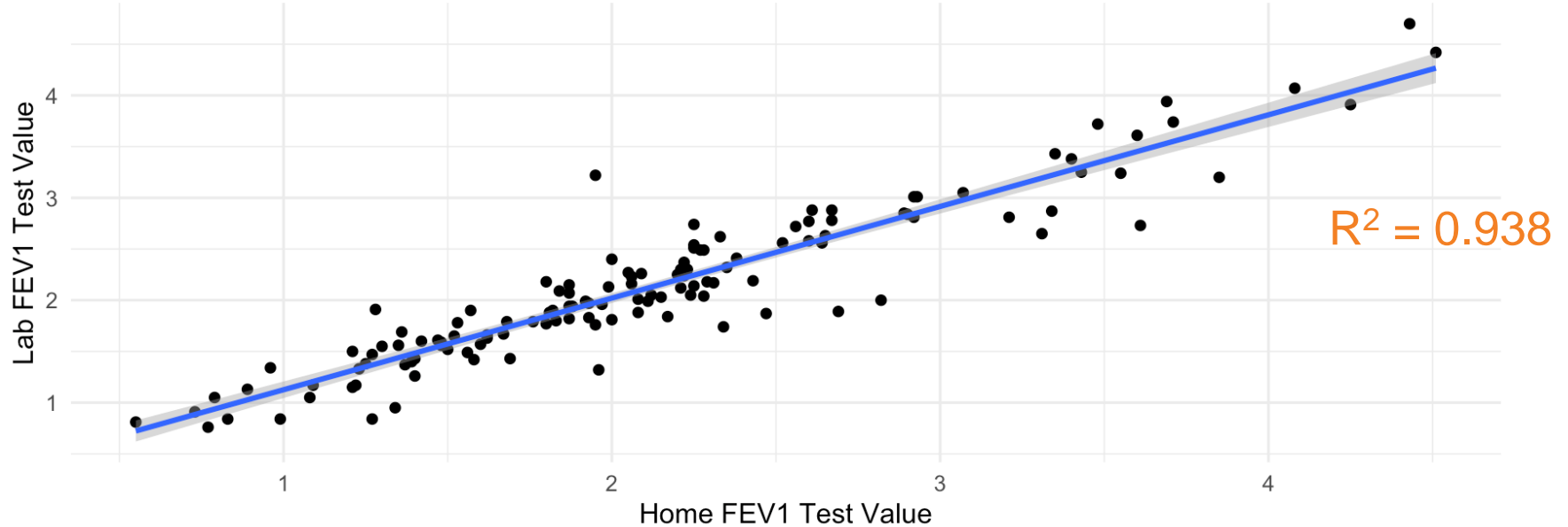
Enrollment and Engagement

Number of Patients Enrolled Over Time
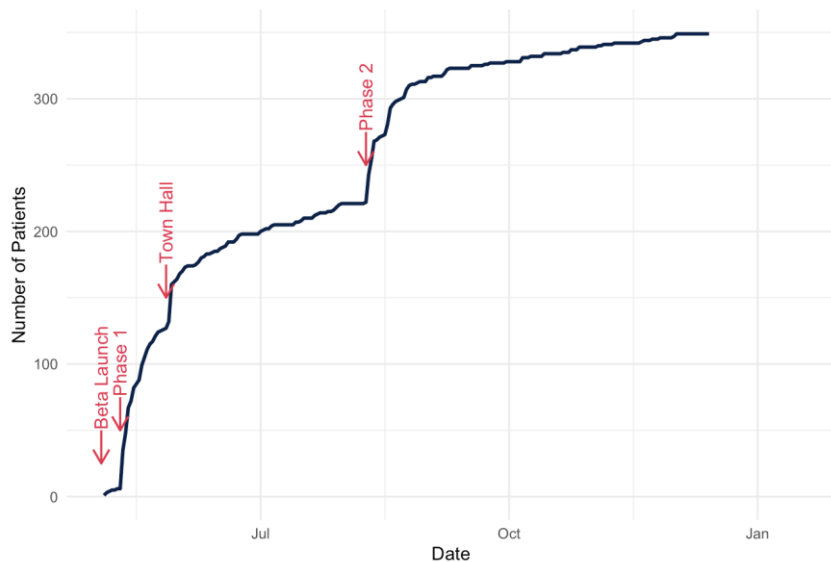
Module Completion Rates

Next steps

April: Development and First patient beta testers

May: Marketing release to patients that received first 200 spirometers

May-July: Print materials sent to latest cohort with next shipment of 200 spirometers
- Patients self enrolling
- Total enrollment at 220

August: Email Marketing and bulk enrollment
- Newsletter for existing patients August 6th
- Information re: bulk enrollment of remaining 200 patients August 10th

February: Integration of alerts into EMR
- Transfer FEV1 data into EMR
- Allows for easier dispo planning

Next: Disposition (Telehealth)
- Goal state allows for engagement platform to prompt patient to self schedule urgent follow up

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Summary

- We rapidly developed a home spirometry program to help manage lung transplant recipients during COVID-19

- The program provides for engagement, data collection and feedback

- The data generated has a high degree of fidelity

- We continue to iterate to improve user experience and engagement

- The future state will allow for more rapid clinical assessments utilizing both Telehealth self scheduling and onsite evaluations