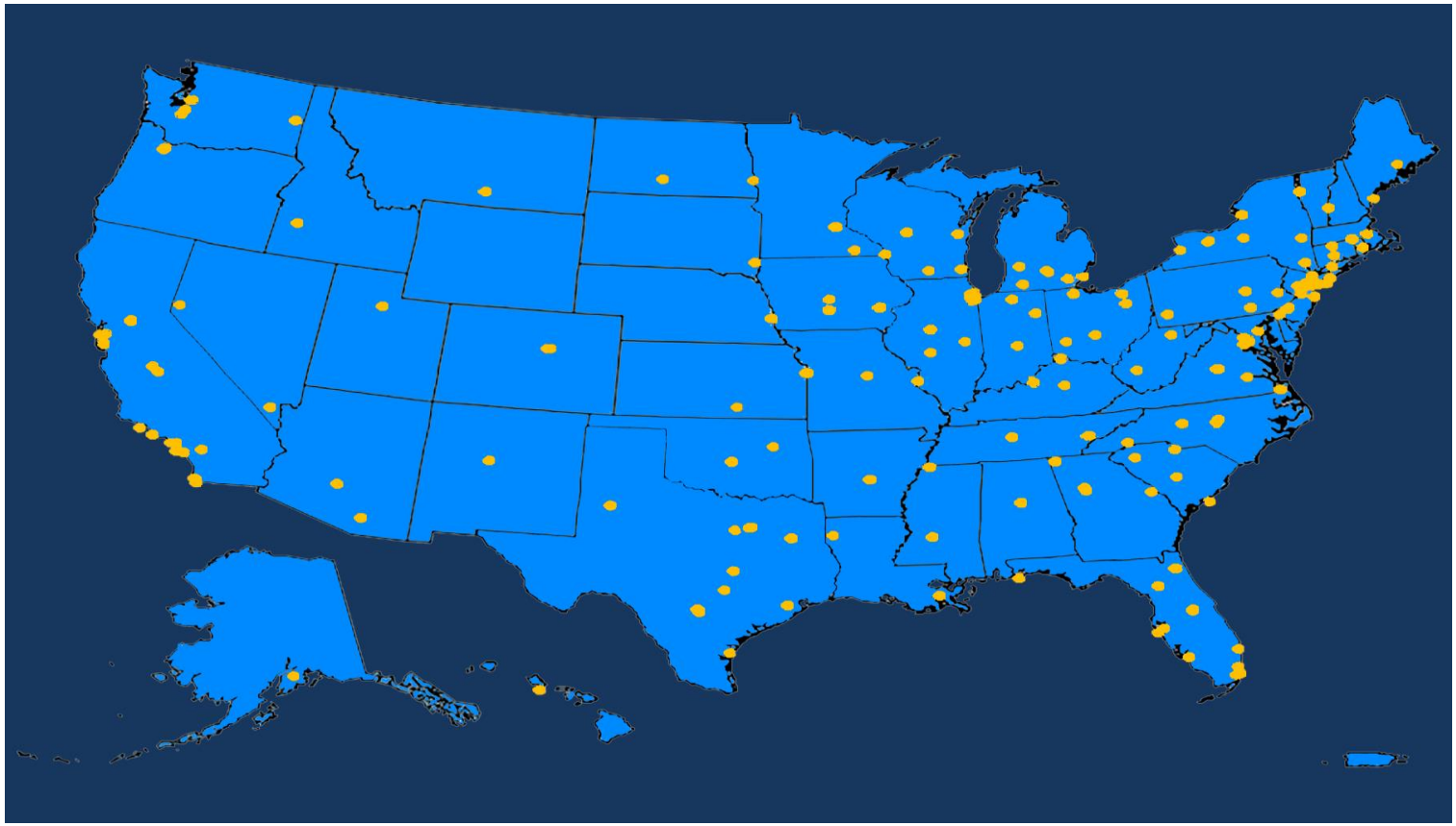
Overview of CFF and Challenges ~~They~~ We Face

Alexander Elbert
Senior Director, Patient Registry, CFF, USA

CYSTIC FIBROSIS FOUNDATION
ADDING TOMORROWS

CF Care Center Network



The CF Foundation sustains a network of 121 accredited CF care centers (comprised of 121 pediatric care programs, 105 adult care programs and 51 affiliate programs) across the United States.

Minimum Requirement

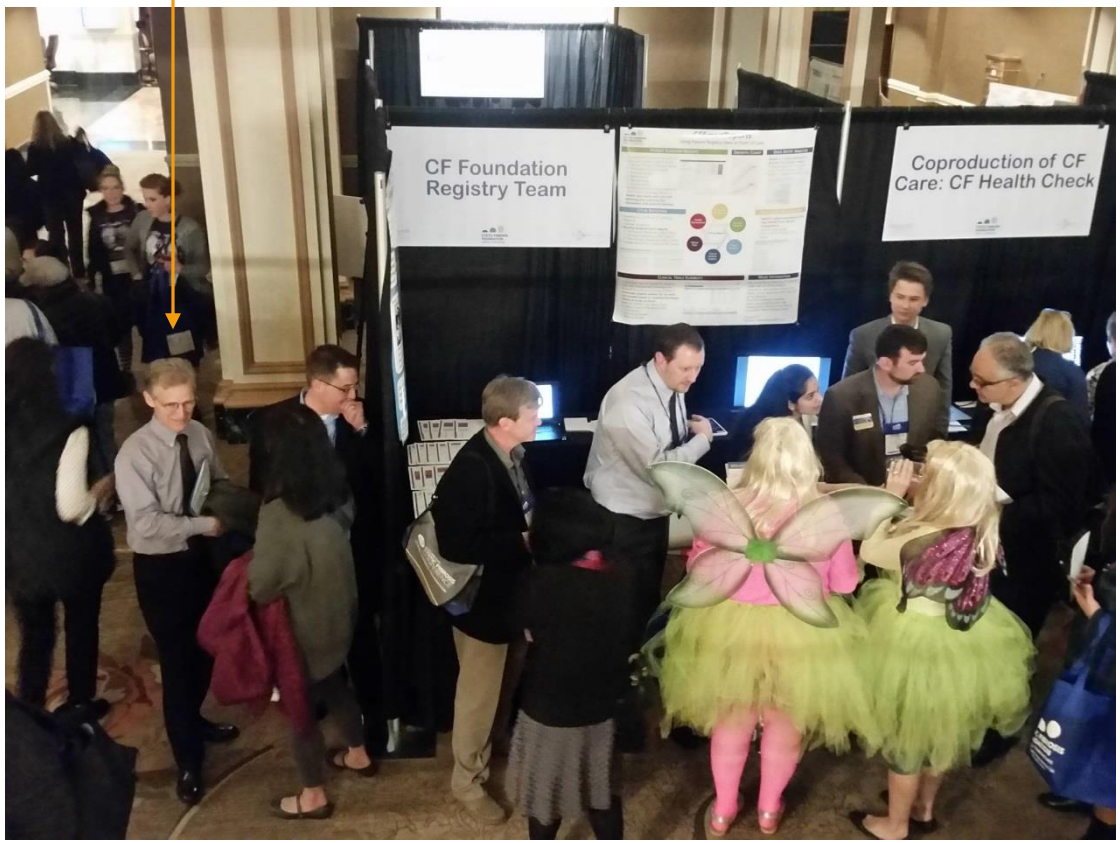
- CF Center Director
- CF Center Associate Director
- CF Center Coordinator
- SW, Nurse, Dietician, RT, PT, administrator
- Recommended: psychologist, pharmacist
- Involvement of: Endocrinologist, GI, ID (infectious disease)

Important: Accredited CF center must participate in CF Patient Registry

Meet the Registry Team

Freshly published 2015 report!

Clinical Affairs department is headed by
Dr. Bruce Marshall, SVP of CFF



QI Fair at NACFC 2017

US CF Registry Timeline of Events

YEAR	1985	1990	1995	2000	2005	2010	2015	2016
# Patients	15,200	17,600	20,100	22,200	23,200	26,400	29,100	29,600
FEV1 %, median	60.7	65.7	70.8	73.5	76.8	79.0	80.3	80.9
% Adults	29	32	35	39	43	47	52	53

CFF begins to maintain Registry under leadership of Dr. Bob Beall

Annual Reports Produced

Genotypes

Centers started using registry data via CFSmartReports in pre-visit planning

Metrics on center outcomes made public

1960s — CF Registry started by Dr. Warwick

1980s — Paper questionnaire

Annual
- Demographics
- Treatments
- Exacerbations

1994 — Data transfer on floppy disks

Quarterly
- Height
- Weight
- Pulmonary Functions
- Microbiology

1999 — Center Specific Reports

2002 — Separate reports created for clinical and general CF community

2003 — Web-based platform

Encounter based
- Height
- Weight
- Pulmonary Functions
- Microbiology

2006

Detailed medication collection
- Mycolytics
- Inhaled antibiotics
- Bronchodilators
- Corticosteroids

2010 — 2.0 — Enhanced Web-based platform

Encounter based
- Ability to embed studies
- CRMS and CFTR –related diagnoses added disorders
- Expanded data collection in microbiology, genotypes and infants under 2 years

2017

International Comparisons

Pediatrics. 2012 Feb;129(2):e348-55. doi: 10.1542/peds.2011-0567. Epub 2012 Jan 16.

Comparison of the US and Australian cystic fibrosis registries: the impact of newborn screening.

Thorax. 2015 Mar;70(3):229-36. doi: 10.1136/thoraxjnl-2014-205718. Epub 2014 Sep 25.

Children and young adults with CF in the USA have better lung function compared with the UK.

Ann Intern Med. 2017 Apr 18;166(8):537-546. doi: 10.7326/M16-0858. Epub 2017 Mar 14.

Survival Comparison of Patients With Cystic Fibrosis in Canada and the United States: A Population-Based Cohort Study.

US CF Registry

"The best registry in America, in my opinion, is the cystic fibrosis registry"

Martin Adel Makary, M.D., M.P.H.
Surgical Director, Johns Hopkins Multidisciplinary Pancreas Clinic
Professor of Surgery, Interview to National Public Radio, 2015

Uses of CF Registry

DISEASE SURVEILLANCE	FRAMEWORK FOR CLINICAL TRIALS	POST-MARKETING SURVEILLANCE STUDIES	QUALITY IMPROVEMENT	COMPARATIVE EFFECTIVENESS RESEARCH	INTERNATIONAL COMPARISONS
					
Track progress in curing CF and the impact of treatments	Test promising new therapies	Ensure safety and effectiveness of approved products	Provide all people with CF with high quality care	Promote evidence-based clinical decision making	Compare impact of different health systems

- Pre-visit planning
- Predictive analytics
- Recruiting patients for clinical trials

CF Patient Registry Today

Inclusion criteria

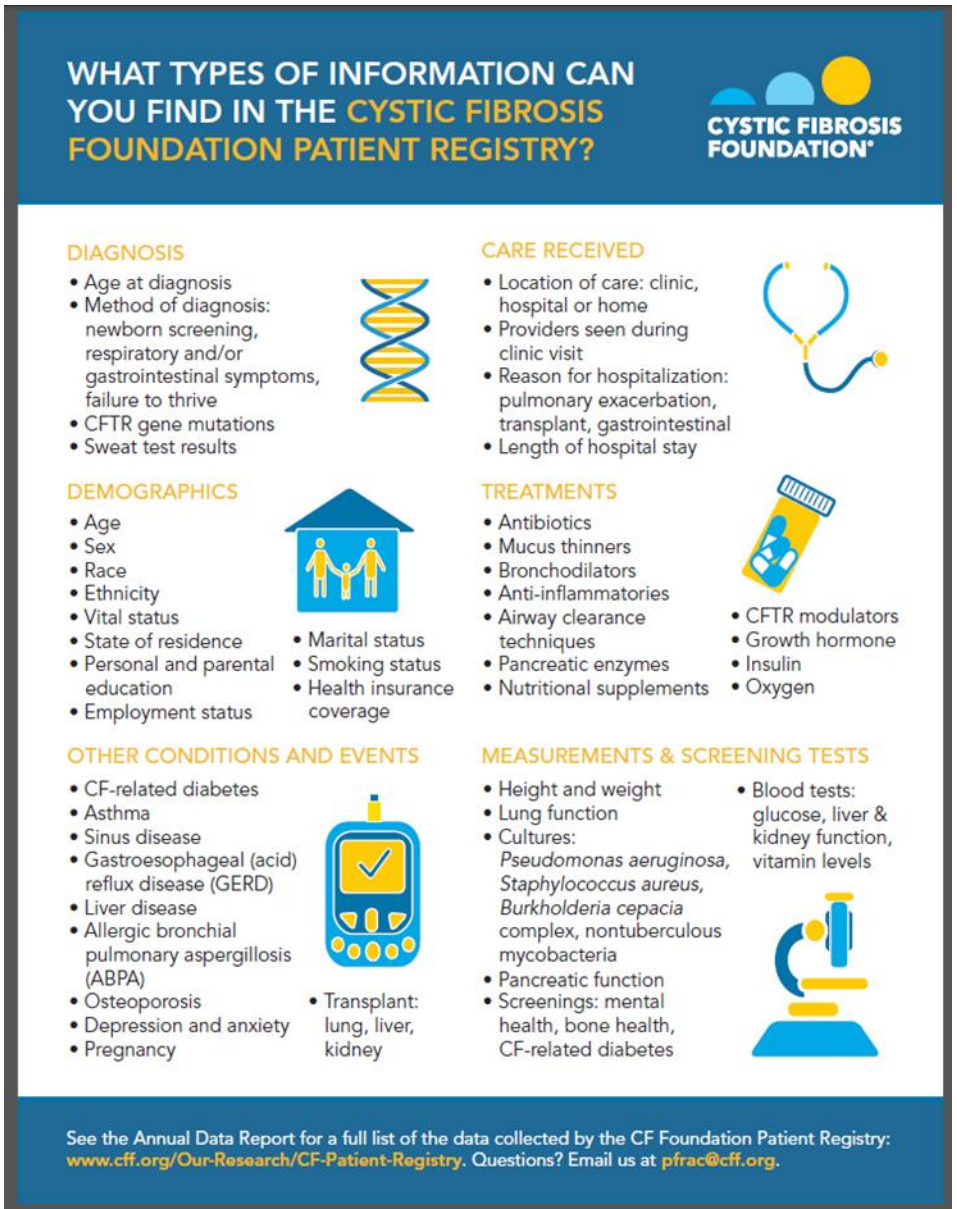
- Seen at CF Care Center
- Consent to participate

Data collected at

- Diagnosis
- Clinic Visits and Annually
- Hospitalizations and Home IV treatments

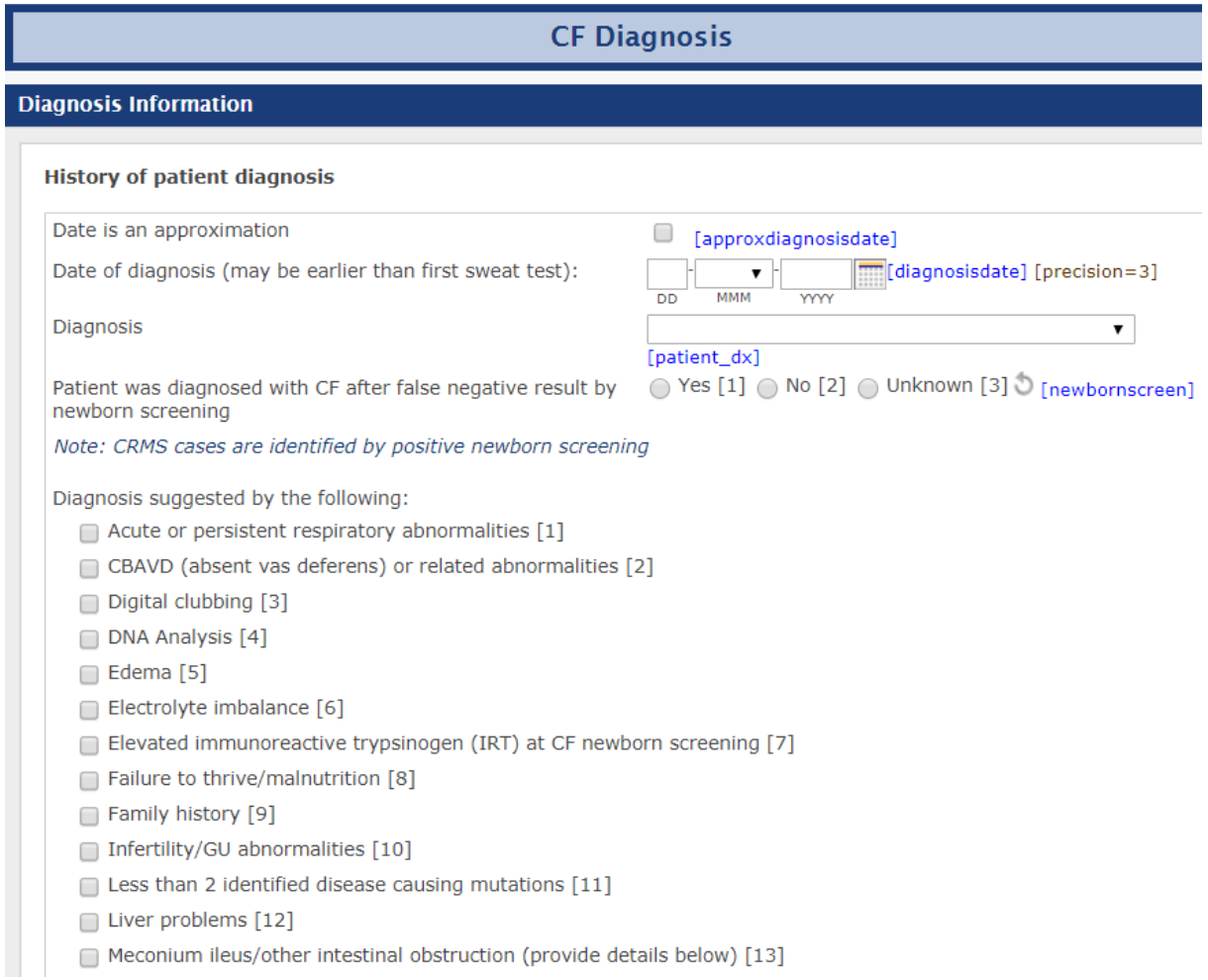
Download a copy at

CFF.org/InsightCF



CF Patient Registry Data Collection Forms

- CF Diagnosis
- Demographics
- Annual Review
- Care Episode
- Encounter
- Note
- File Upload



CF Diagnosis

Diagnosis Information

History of patient diagnosis

Date is an approximation [approxdiagnosisdate]

Date of diagnosis (may be earlier than first sweat test): DD MMM YYYY [diagnosisdate] [precision=3]

Diagnosis [patient_dx]

Patient was diagnosed with CF after false negative result by newborn screening Yes [1] No [2] Unknown [3] [newbornscreen]

Note: CRMS cases are identified by positive newborn screening

Diagnosis suggested by the following:

- Acute or persistent respiratory abnormalities [1]
- CBAVD (absent vas deferens) or related abnormalities [2]
- Digital clubbing [3]
- DNA Analysis [4]
- Edema [5]
- Electrolyte imbalance [6]
- Elevated immunoreactive trypsinogen (IRT) at CF newborn screening [7]
- Failure to thrive/malnutrition [8]
- Family history [9]
- Infertility/GU abnormalities [10]
- Less than 2 identified disease causing mutations [11]
- Liver problems [12]
- Meconium ileus/other intestinal obstruction (provide details below) [13]

The Cystic Fibrosis Foundation Patient Registry

Design and Methods of a National Observational Disease Registry

Emily A. Knapp[1], Aliza K. Fink[1], Christopher H. Goss[2], Ase Sewall[3], Josh Ostrenga[1], Christopher Dowd[1], Alexander Elbert[1], Kristofer M. Petren[1], and Bruce C. Marshall[1]

[1]Cystic Fibrosis Foundation, Bethesda, Maryland; [2]Department of Medicine, University of Washington, Seattle, Washington; and [3]Sewall, Inc., Bethesda, Maryland

From 1986 through the end of 2014:

- **48,463 unique patients**
- **632,022 person-years of data,**
- **2,497,178 clinic visits, and**
- **241,984 hospitalizations and/or home IV episodes**

Ann Am Thorac Soc Vol 13, No 7, pp 1173–1179, Jul 2016

CF Registry at a glance in 2017

Data on 30,000 patients was entered by more than 700 people from 124 sites;

It included:

- **197,000 + Encounters (including annual);**
- **24,000 + Home or Hospital IV treatments;**
- **890 + New CF Diagnoses;**
- **570+ Newborns with CF;**
- **1,500 + Lung Transplant patients.**

Each CF patient had, on average, 4.4 encounter records in the registry. Each patient's record could have up to ~850 raw data elements available to describe health and socio-economic status

Registry has data on more than 50,000 patients since 1982!

CF Patient Registry Web Platform (PortCF) strengths

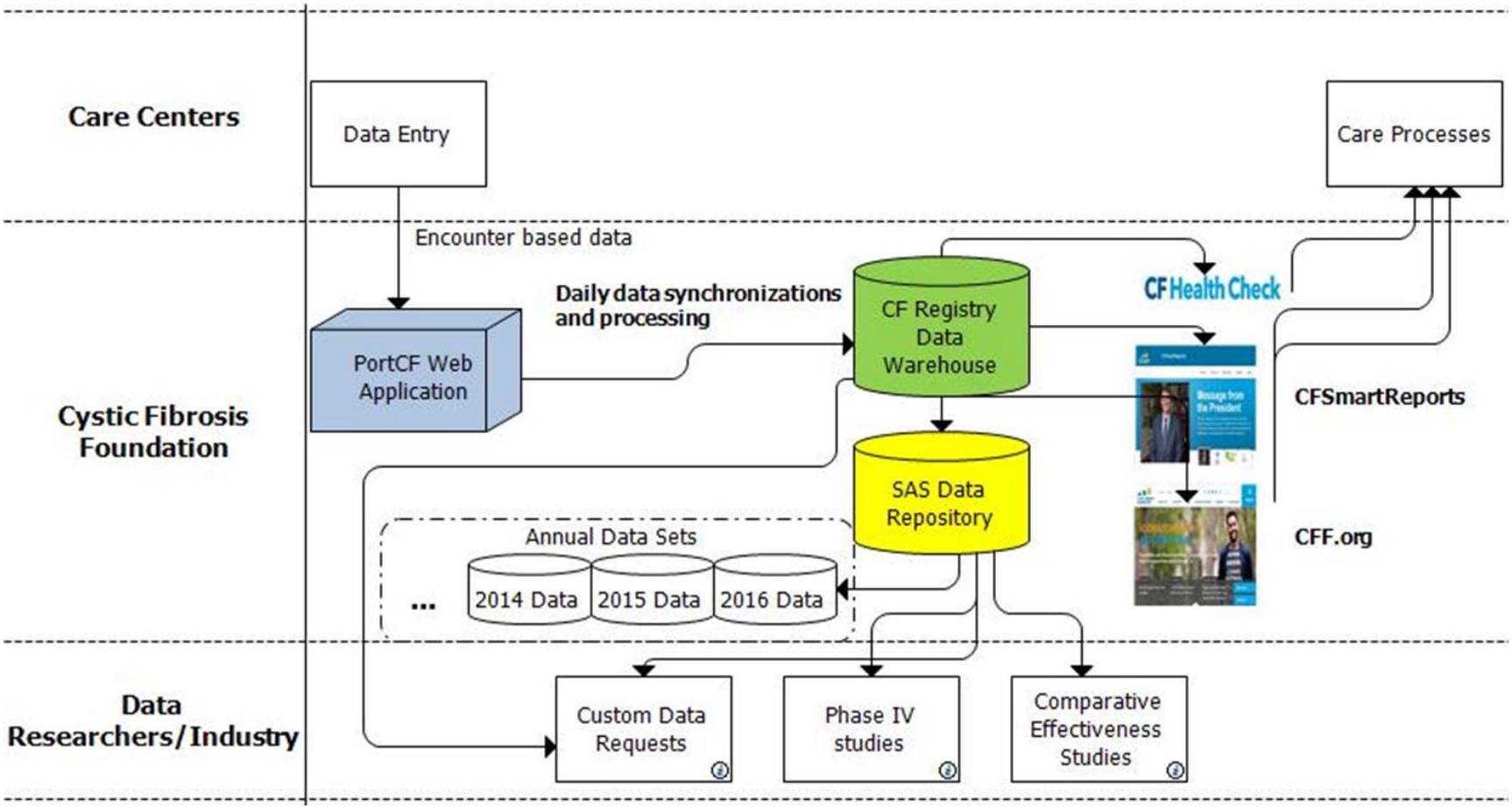
Strengths

1. Stable and well learned application
2. Mature processes
3. Well thought out registry platform
4. Built-in features to improve data quality

Weaknesses

1. Code and application is not owned by CFF
2. Maintenance and changes are expensive
3. Reporting tools need improvement, … and we don't want to improve them .
4. Obsolete underlying technology
5. Manual data entry

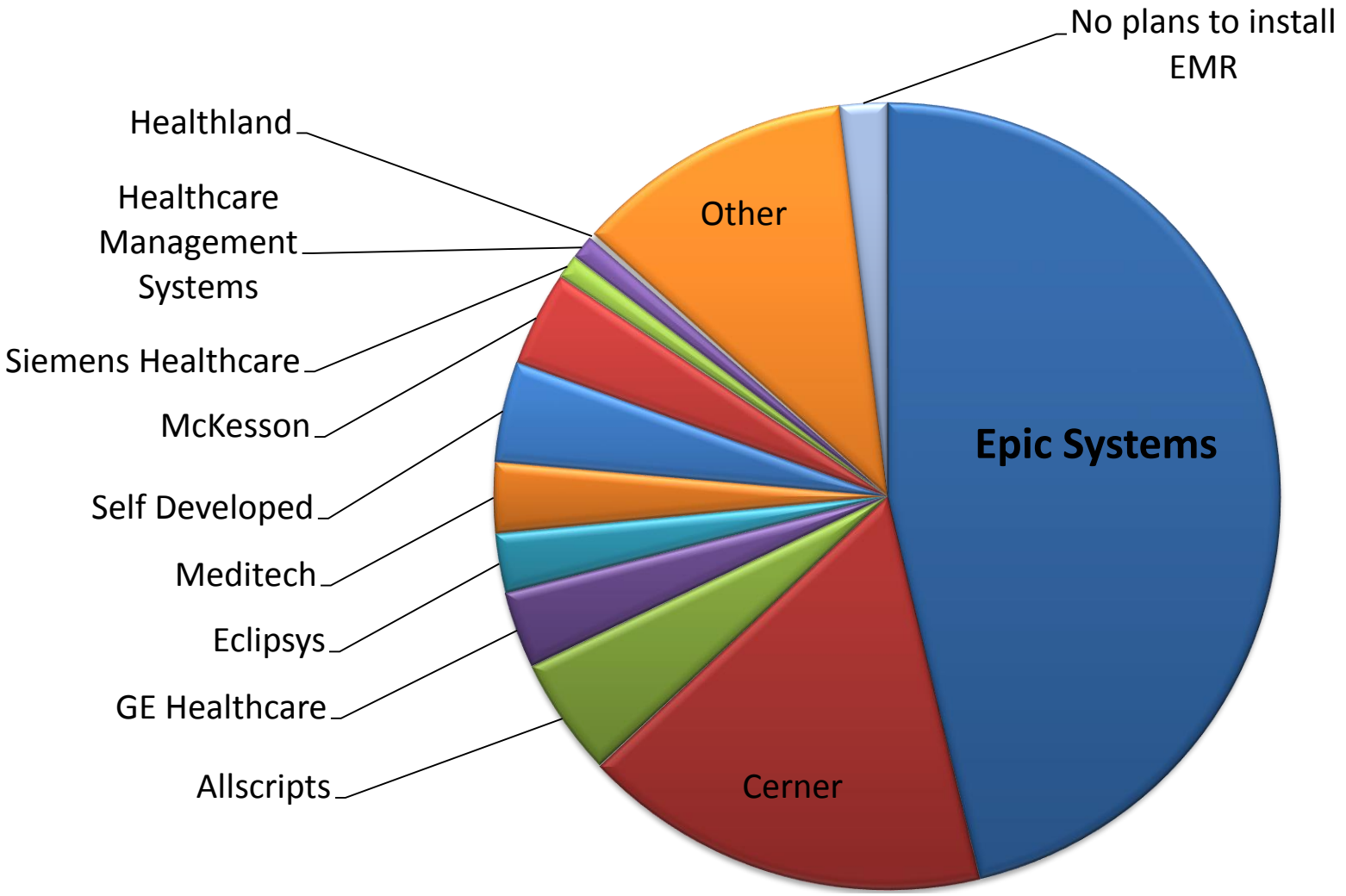
Registry Data Flow



Why we still don't use EMR – registry data exchanges

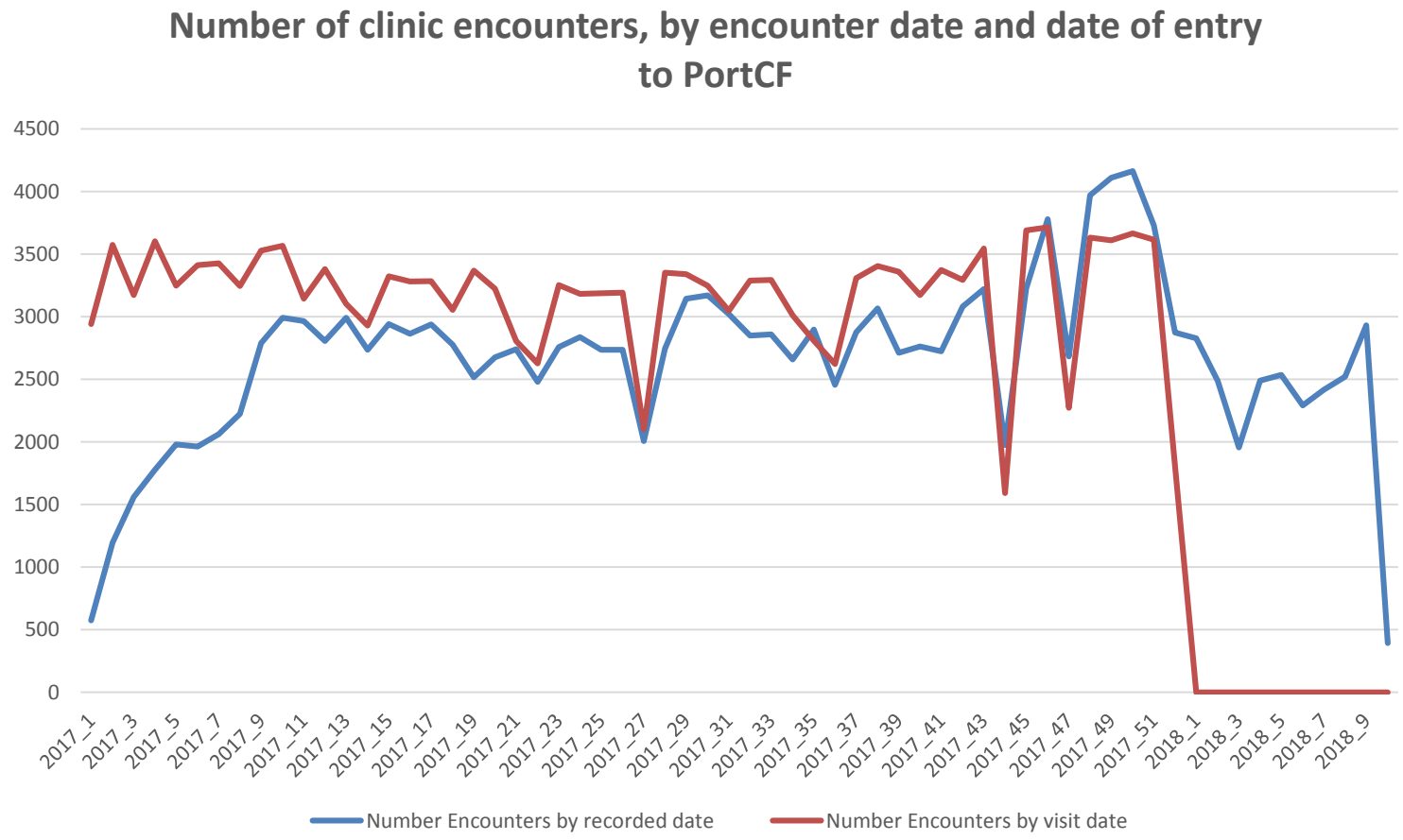
1. Not all data elements that we collect exist in EMR. Examples: classes of antibiotics; participation in observational and interventional studies, assistance from a Patient Assistance Program, mother/father education, etc.
2. In-patient and out-patient data could be stored in different EMRs
3. Different levels of local IT support to CF care teams
4. Necessity to maintain PortCF and EMR- Registry interfaces simultaneously;
5. Established data flows for Phase IV studies

EMR Landscape in CF Care Centers, 2013

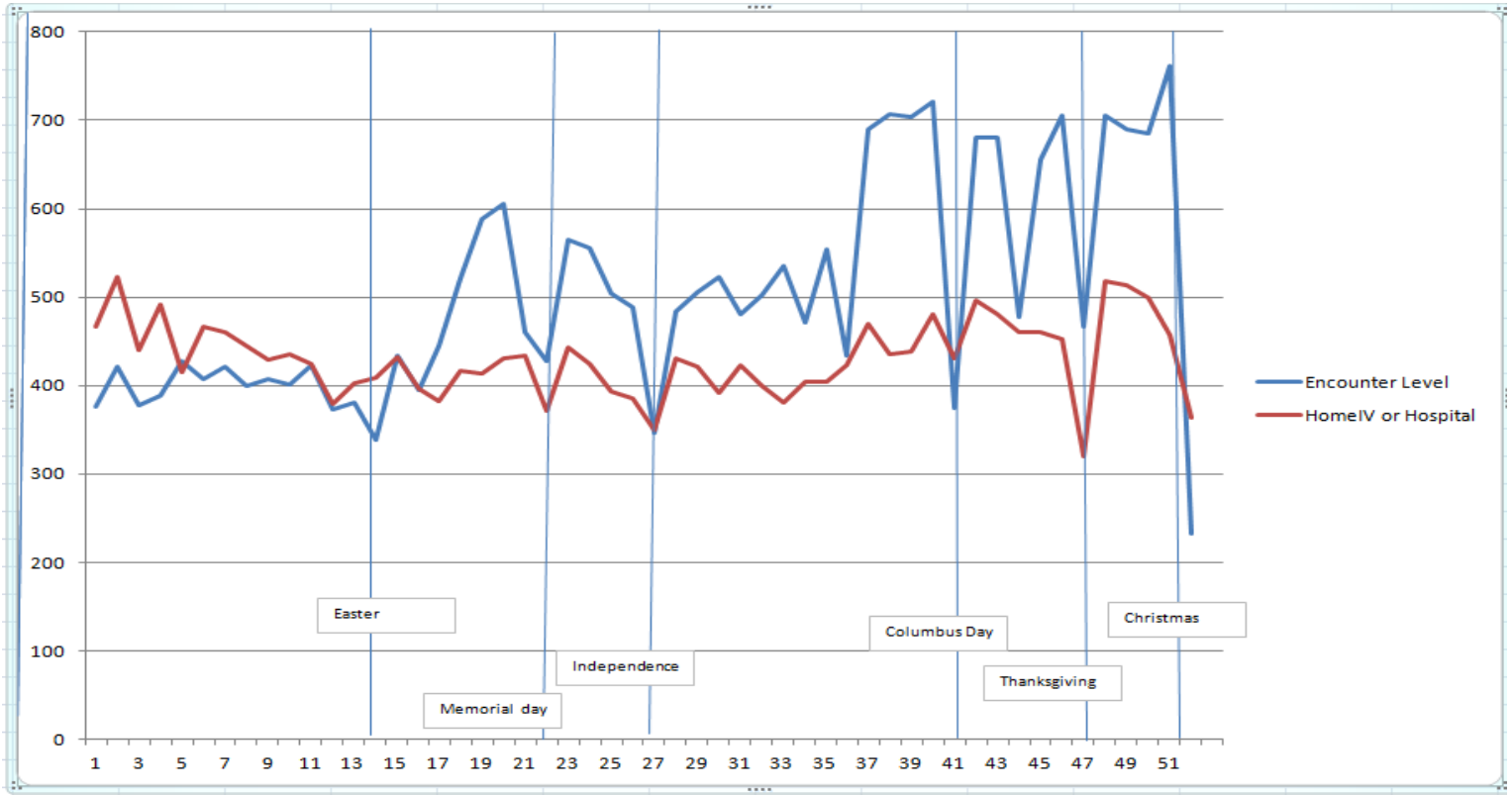


Timeliness of Data Collection

Data entry is not evenly distributed across the year



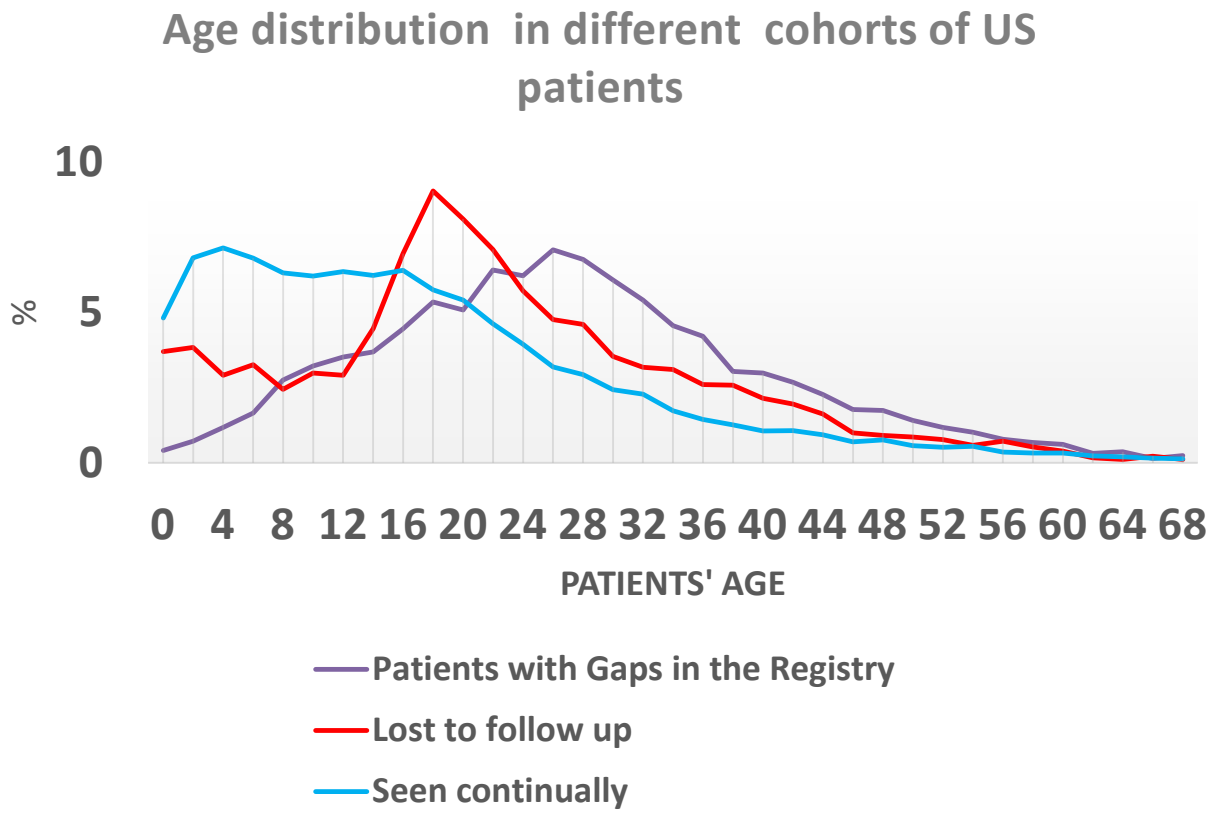
Seasonality of clinic visits and exacerbations



Week of a year

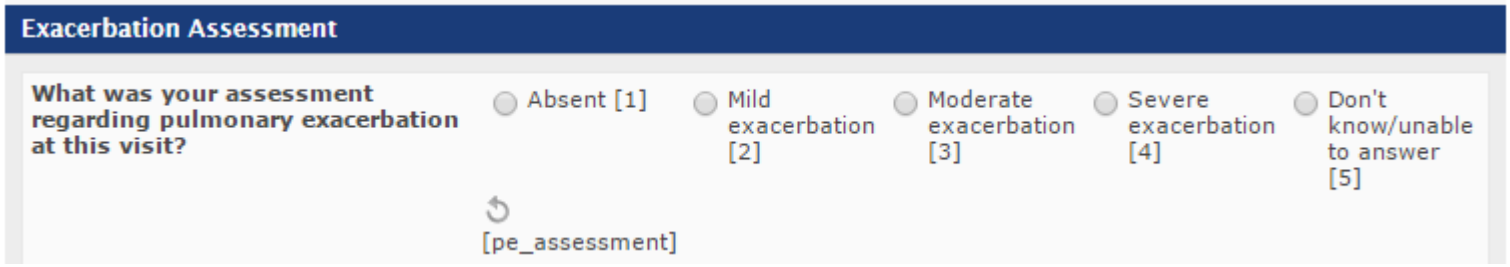
Other Known Issues

- **Patients lost to follow up;**
- **Medications: prescribed vs taken;**
- **Height and weight errors;**
- **Adherence and social issues**

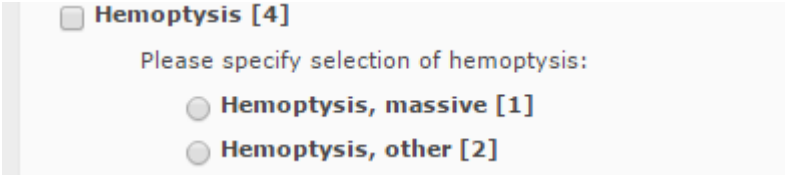


Impact of data collection forms on PortCF data

Making exacerbation question mandatory, increased number of PEX by 25%

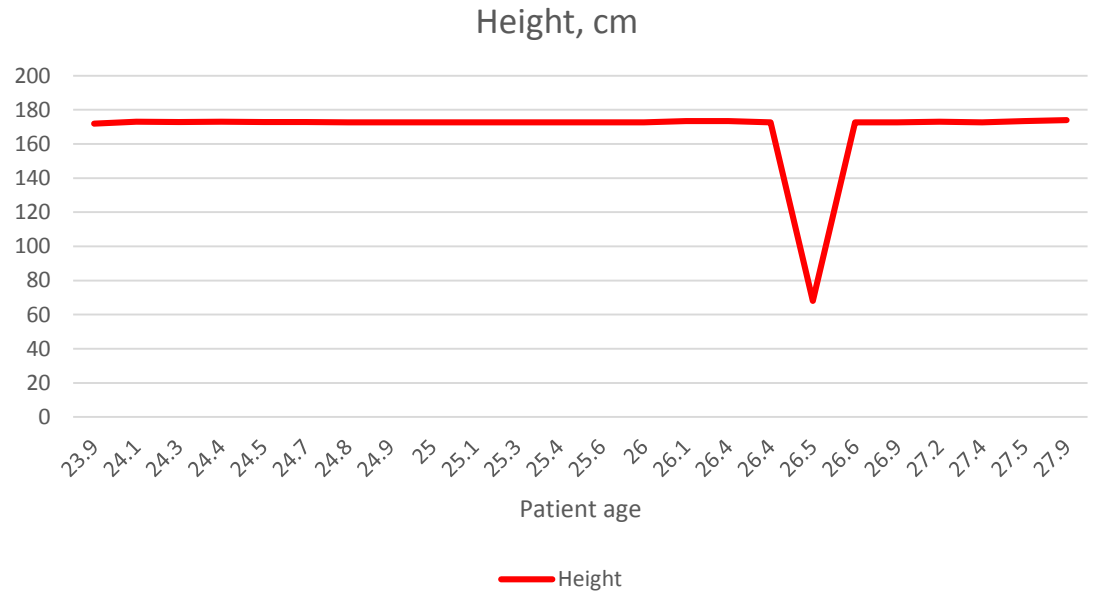


Removing carry forward functionality decreased number of reported hemoptysis cases by almost 100%
In 2015



Methods to improve/monitor quality of registry data

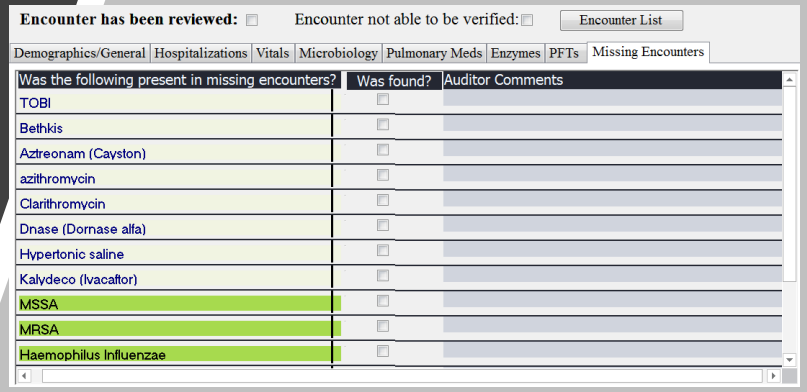
- Data verifications with CF Centers, e.g. death dates, transplant dates, hemoptysis;
- Analytical methods to identify wrong values, e.g. wrong height, weight, date of birth, gender, etc;
- User reported errors identified due to QI projects;
- De-duplication of records;
- Programs like MAP (genotyping)
- Recoding of user text entries



Example of height error

Data Audits

- Compares data between EMRs and PortCF;
- Sites are selected randomly and “For-cause”;
- Auditors compare medications, hospitalizations, microbiology
- Excellent matching between EMRs and CF registry for all variables;
- “For-cause” and non TDN sties make slightly more errors
-



	Data Completeness			Data Accuracy - Exclude Height/Weight variables			Data Accuracy - Sites Collecting H/W		
		Mean	P-value	N	Mean	P-value	N	Mean	P-value
	67	0.45	N|A	67	1.51	N|A	54	1.68	N|A
TDN Site			0.025			0.011			0.034
Yes	44	0.26		44	1.32		33	1.49	
No	23	0.56		23	1.86		21	1.96	
For-Cause			0.923			0.031			0.001
Yes	20	0.39		20	1.84		20	2.11	
No	47	0.35		47	1.36		34	1.42	

Data comparisons

International comparisons of health and other measures of people with CF may highlight differences in health care and health outcomes between different countries

Thorax. Author manuscript; available in PMC 2016 Apr 20.
Published in final edited form as:
Thorax. 2015 Mar; 70(3): 229–236.
Published online 2014 Sep 25. doi: 10.1136/thoraxjnl-2014-205718

PMCID: PMC4838510
NIHMSID: NIHMS771905

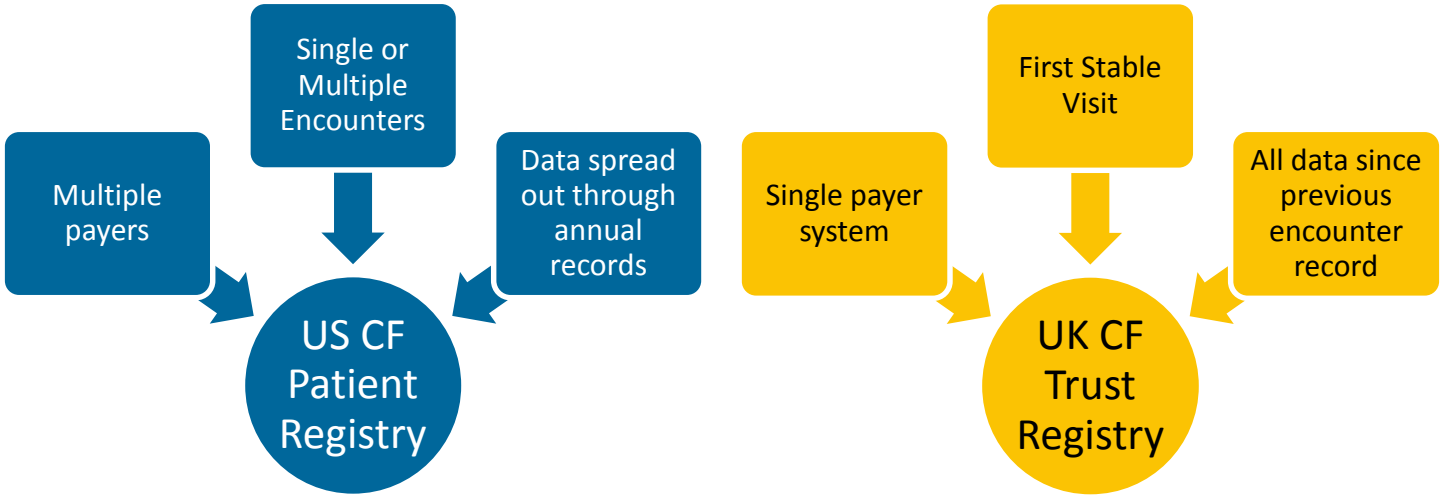
Children and young adults with CF in the US have better lung function as compared to the UK

Christopher H Goss,[1] Stephanie J MacNeill,[2] Hebe B Quinton,[3] Bruce C Marshall,[4] Alexander Elbert,[4] Emily A Knapp,[4] Kristofer Petren,[4] Elaine Gunn,[5] Joanne Osmond,[5] and Diana Bilton[6]

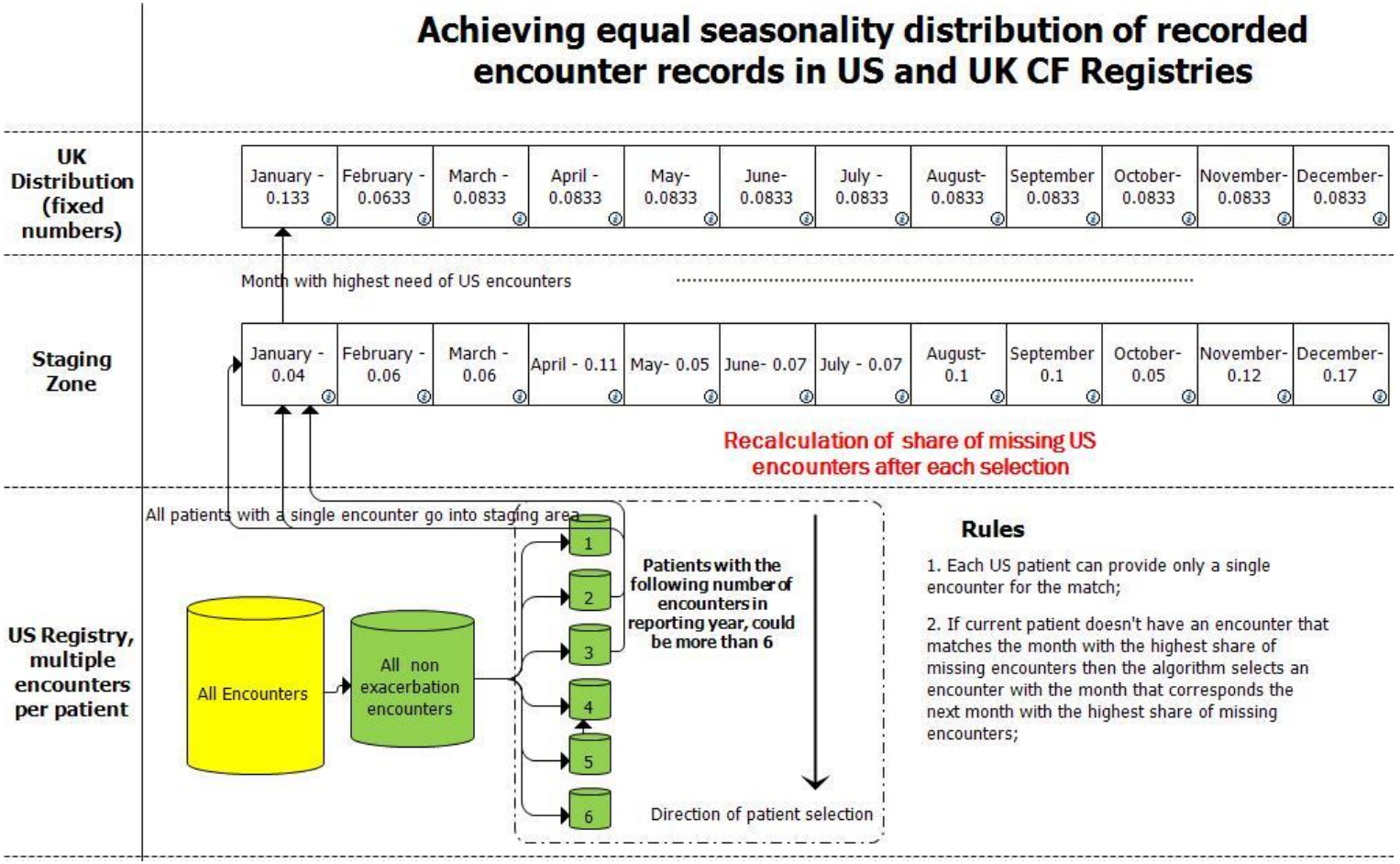
Author information ▶ Copyright and License information ▶

CYSTIC FIBROSIS FOUNDATION
ADDING TOMORROWS

US UK Registry Data Comparison



Algorithm for matching seasonality



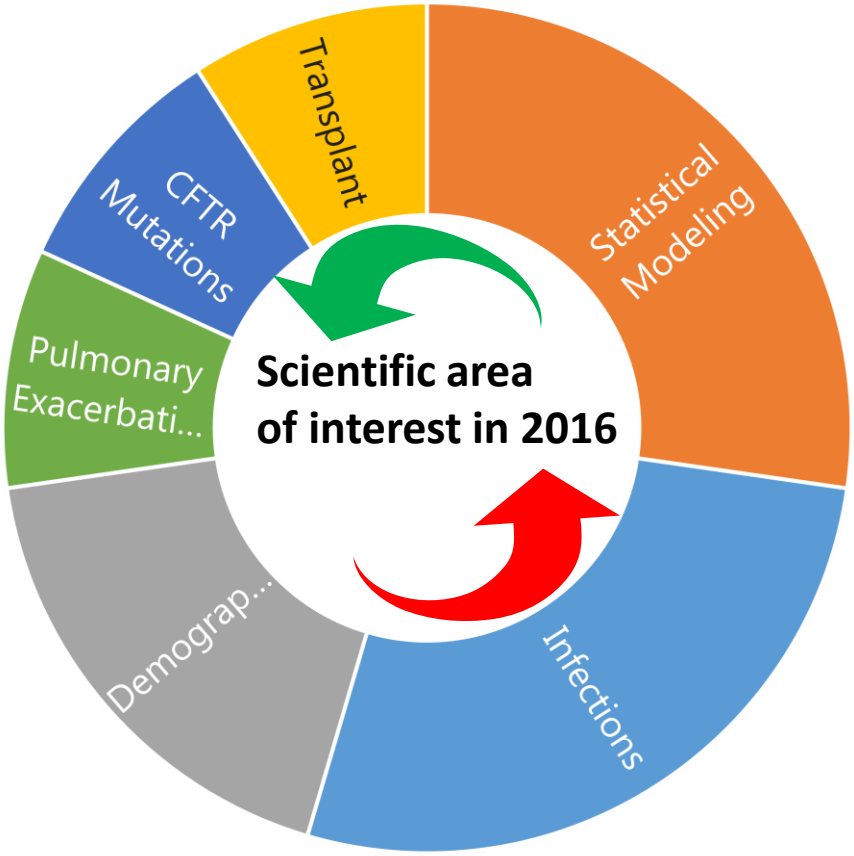
CF Patient Registry: Data research and publications

Data requests since 2010: **133**

Publications since 2010: **81**

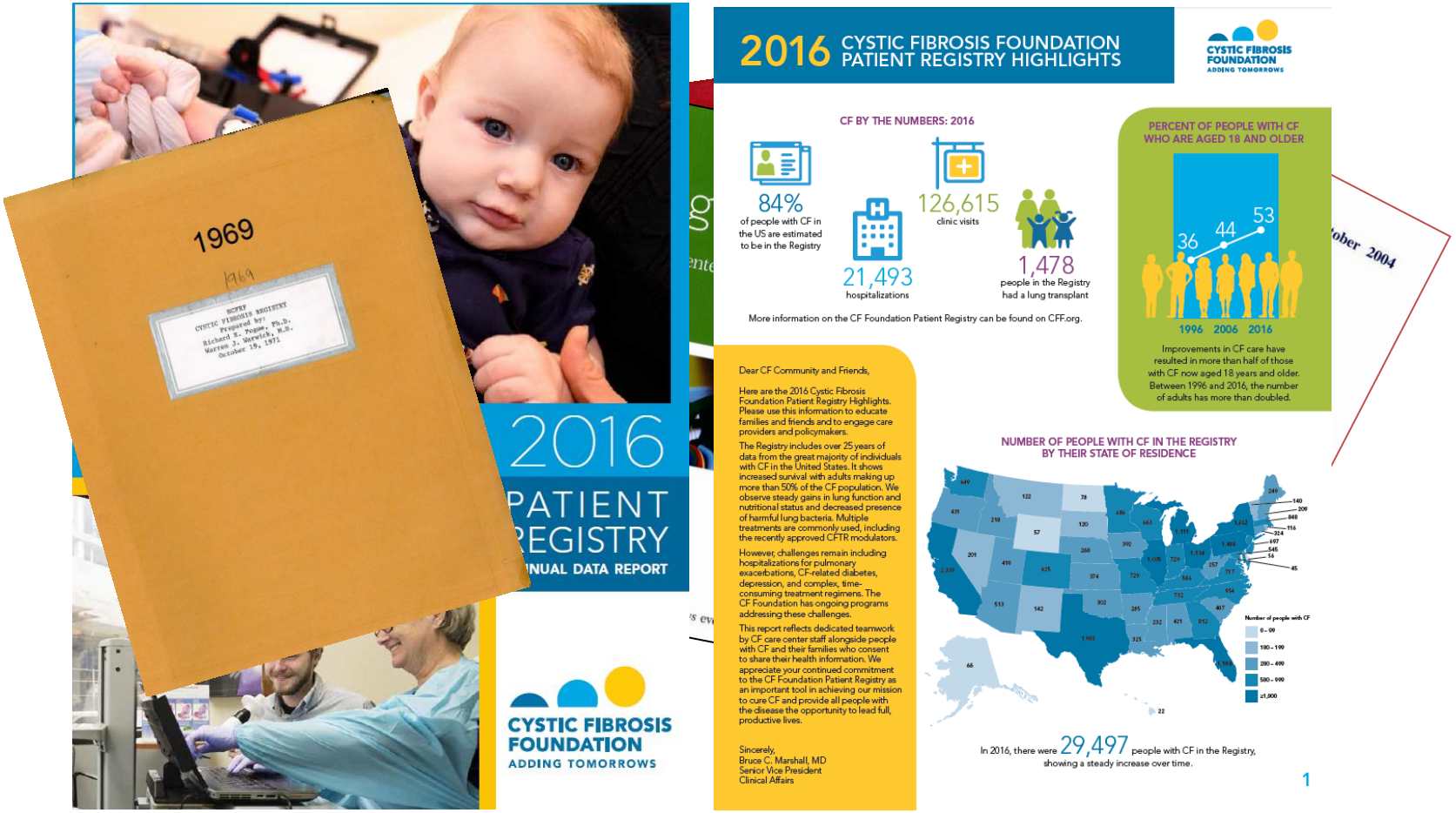
Data requests in 2017: **16***

Publications in 2017: **21***



* Data for incomplete year

History of Registry Data Reporting

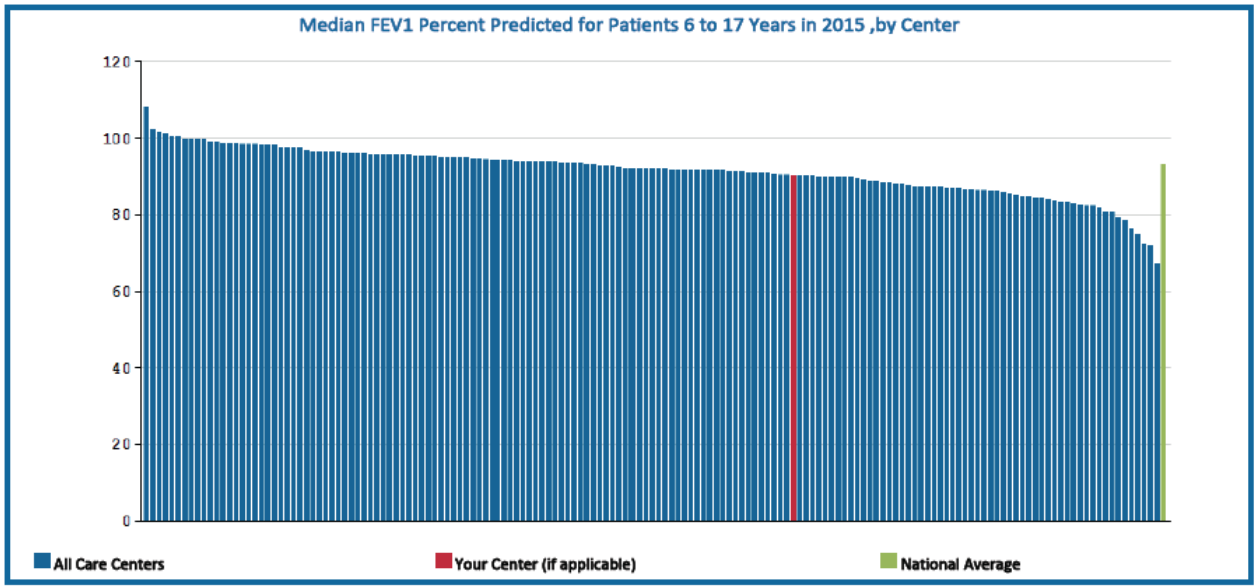


Before 2003, all CF registry reports were only available as a printed copy

Center Level Reports

Median FEV1 Percent Predicted for Patients 6 to 17 Years

Anonymous Center, 2015	90.1
Care Center Network - Median of All Center Values, 2015	92.0
Care Center Network - Average of Top 10 Center Values, 2015	99.9
National Average of All Patients, 2015	92.9



Reports provided to each CF Center at the end of Reporting year;

Reports cover almost every important outcome measure ;

Reports show data longitudinally and cross-sectionally;

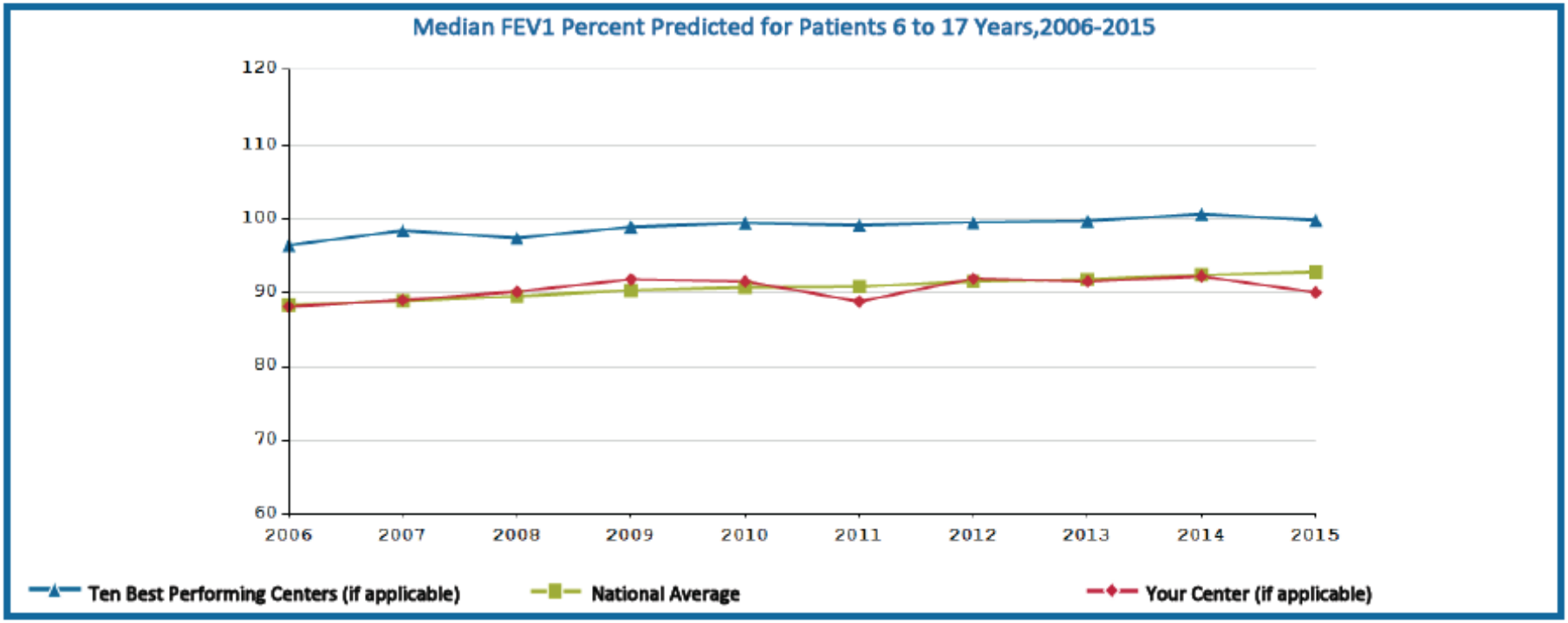
Reports allow to compare network-wide results with center-level data;

Reports have over 250 pages of charts and tables.

CYSTIC FIBROSIS FOUNDATION
ADDING TOMORROWS

Center Level Reports

Median FEV1 Percent Predicted for Patients 6 to 17 Years



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Your Center	88.2	89.1	90.2	91.9	91.6	88.9	92.0	91.6	92.3	90.1
National Average	88.4	89.0	89.6	90.4	90.8	90.9	91.6	91.9	92.5	92.9
Ten Best Performing Centers	96.5	98.5	97.5	99.0	99.5	99.2	99.6	99.8	100.7	99.9

Bringing Registry Data to Point of Care

~~ONE YEAR~~ → 24 hours or less

January, 2017

CF Clinic

Data Collection in PortCF

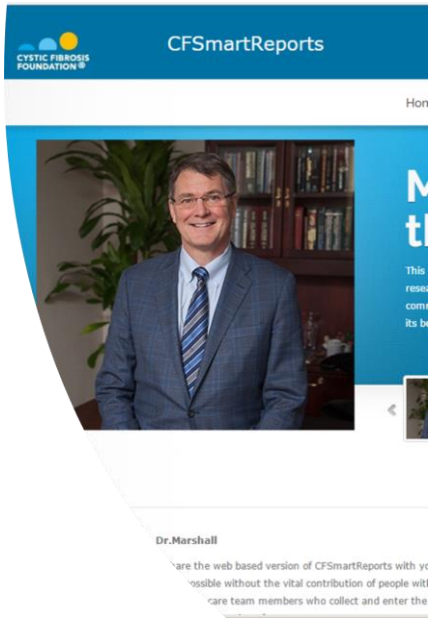
CF Registry

Data Transfer to CFF and Cleansing

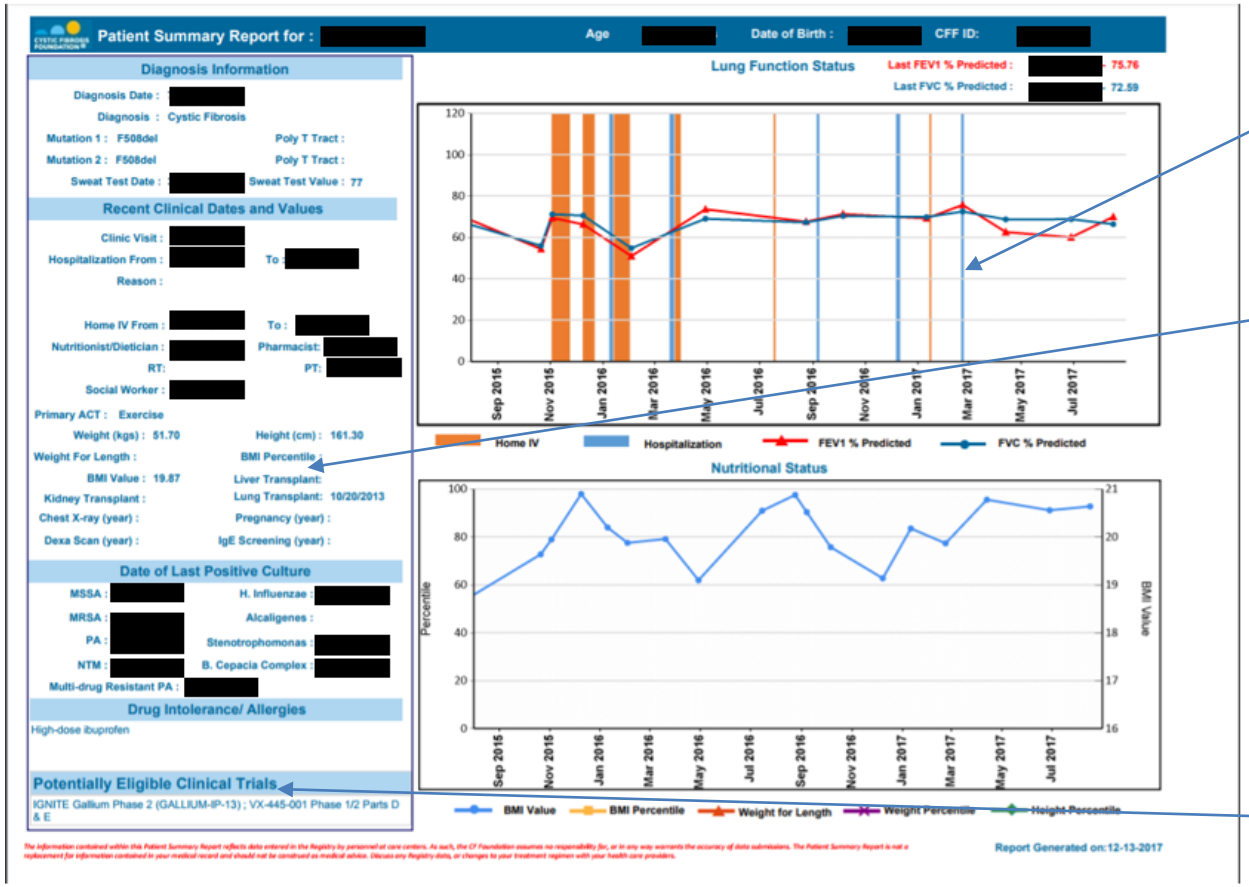
Data Processing

Data Reporting

CFSmartReports with patient–level data deployed!



Patient Summary Report



CFSmartReports shows Hospitalizations and Home IV events right on FEV1 chart

Microbiology and Vital signs on the same page

Each report may inform Care Team of a patient's clinical trial eligibility

… and much more on other three pages!

Shows patients eligible for clinical trials!

Study:	NTM-OB-17 Part A (PREDICT)				
Sponsor:	Nick, Jerry	**Study Phase:**	Other	**Status:**	Protocol Reviewed
Study Type:	Observational	**Intervention Type:**		**Date query deployed:**	8/14/2017

Number of Potentially Eligible Patients: 5 **Program Number :1**

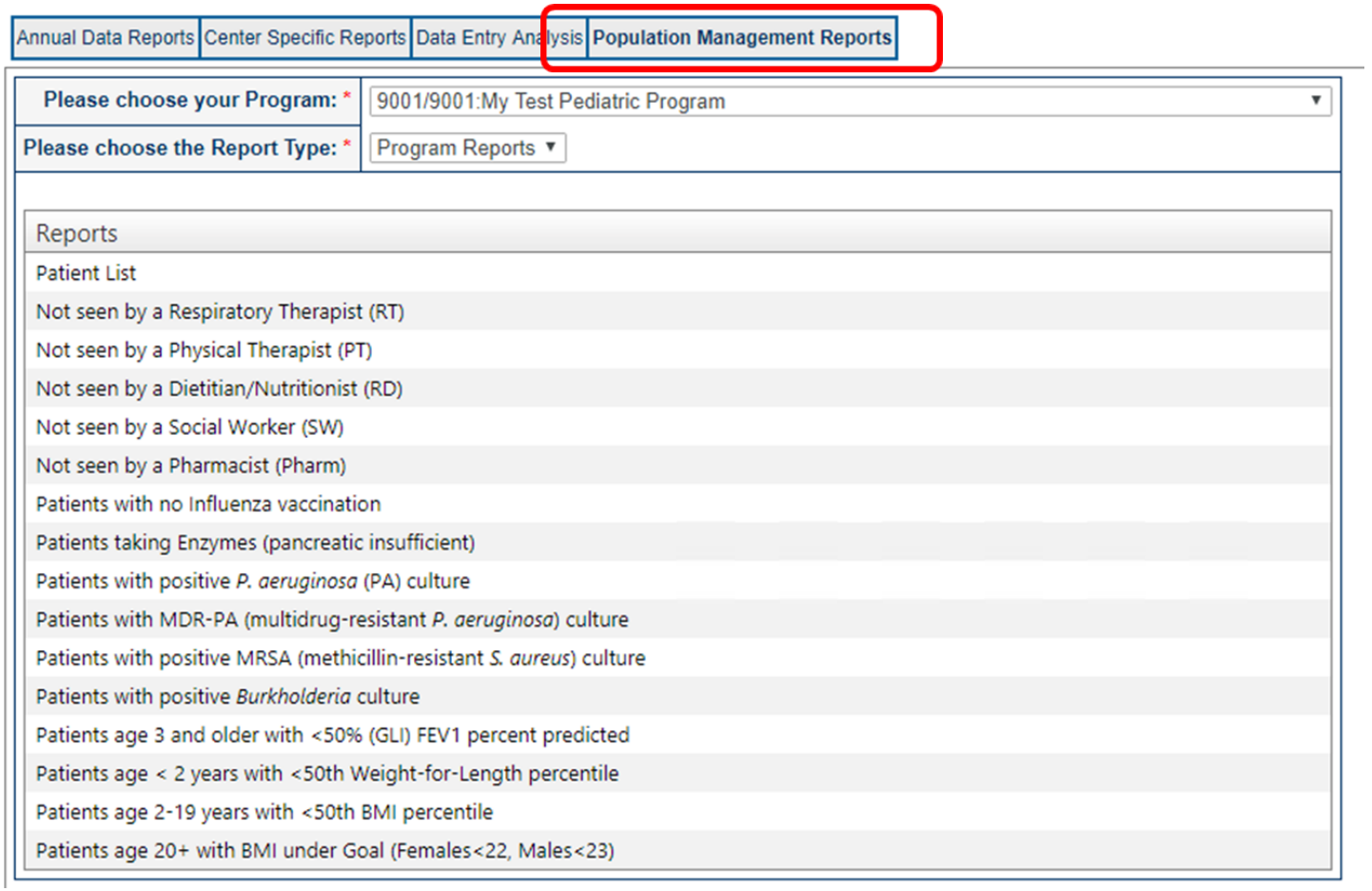
Solicitations | Recruiting Studies | Referral Studies

Trial Name	Sponsor	Study Phase	Status	Study Type	Intervention Type	
Proteostasis Phase 1 (PTI-808) PART 3		1	Protocol Reviewed	Interventional	Restore CFTR Function	Potentially eligible Patients
NTM-OB-17 Part A (PREDICT)		Other	Protocol Reviewed	Observational		Potentially eligible Patients
CHEC-SC		Other	Protocol Reviewed	Observational		Potentially eligible Patients
AbbVie Creon Phase 4 (M16-111)		4	Protocol Reviewed	Interventional	Nutritional-GI Therapies	Potentially eligible Patients
CURx Phase 2b (CX-FTI-204)		2	Protocol Reviewed	Interventional	Anti-Infective	Potentially eligible Patients
Laurent Phase 2 APPLAUD		2	Protocol Reviewed	Interventional	Anti-Inflammatory	Potentially eligible Patients
Novartis QBW276 Cohort 3		2	Protocol Reviewed	Interventional	Mucociliary Clearance	Potentially eligible Patients
Corbus JBT101-CF-002 Phase 2 PROPOSED		2	Not Reviewed	Interventional	Anti-Inflammatory	Potentially eligible Patients

Queries for 19 clinical trials as of Jan, 2018

Population Management Reports

List of queries is revisited regularly . New report is usually published in 1-2 weeks after decision to add it



Cystic Fibrosis Learning Network

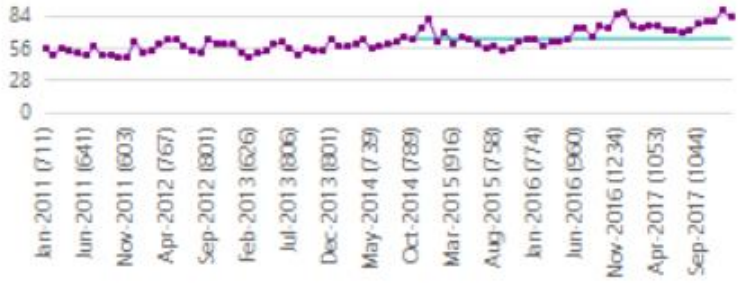
Data Quality Measures vs My Cohort

A report of all data quality measures for your program and the appropriate comparison cohort. The comparison cohort includes all programs that joined the CFLN as part of the same onboarding wave but it does not take into account the program type.

Percentage of Clinical Encounters Entered Within 30 days of Encounter Date

Program Name: **6/6 Ann and Robert H. Lurie Children's Hospital of Chicago (Pediatric)**

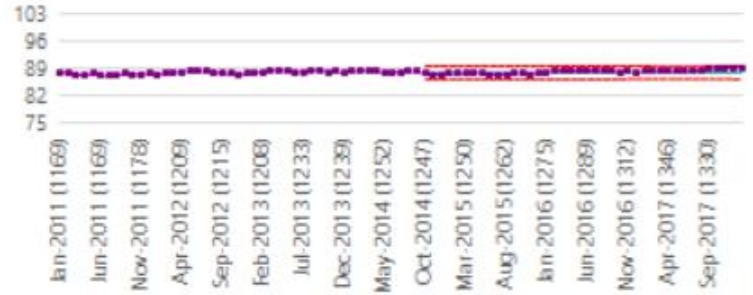
Program Name: **CFLN (Cohort 1) - All Programs**



Average FEV1 Percent Predicted for Patients 6 Years and Older

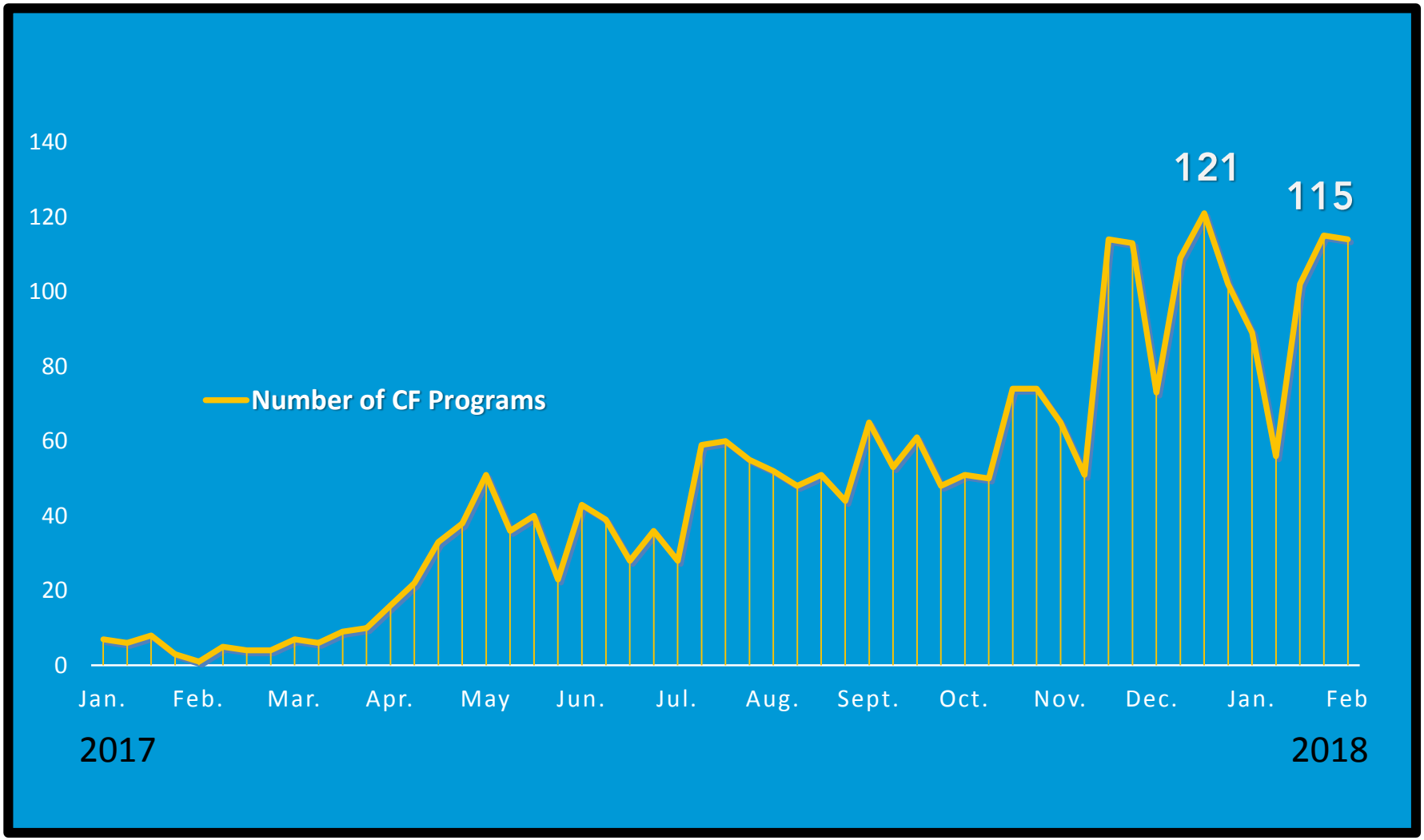
Program Name: **6/6 Ann and Robert H. Lurie Children's Hospital of Chicago (Pediatric)**

Program Name: **CFLN (Cohort 1) - Pediatric Programs**



CYSTIC FIBROSIS FOUNDATION
ADDING TOMORROWS

Uptake of CFSmartReports



Care Teams about CFSmartReports

1. Saves them an incredible amount of time to not have to dig through labs, charts, etc… joy in work!
2. Allows them to use their time more valuably to track down referrals and other important info
3. Provides great historical information about each patient, which has really aligned their team around supporting a patient/ family (they project the report on the screen during PVP meetings and have had some great team dialogue about care)
4. Serves as a great data quality check – they have found some missing data variables based on reviewing the reports together
5. Motivates their team to be more responsive to changes in data - e.g. respond to a small change in lung function that they may not have responded to before
6. Highlights which patients are not consented for PortCF and getting them on board so they can benefit from these reports

Questions? Ideas?

Thank you!

Contact: aelbert@cff.org