

Advancing Research in Rare Disease Using VIYA[®] PL-081

Kelly Olano is a Data Science Manager for the Data Management and Analysis Collaborative at Cincinnati Children's Hospital Medical Center with over 20 years of experience in the pharmaceutical industry and academia. As a certified SAS programmer and manager, she enjoys supporting researchers by providing high quality analysis datasets, tables, reports, and graphics and her experience spans diverse projects, ranging from Phase I research to clinical trials.

Pierce Kuhnell, MS is a Lead Data Programmer for the Data Management and Analysis Collaborative who has been with Cincinnati Children's Hospital Medical Center for 10 years. He has worked with a wide variety of projects in both a programming and statistical analysis capacity using both SAS and R and enjoys working collaboratively with project teams to leverage expertise to meet the needs of projects.

Laurie Smith, MS is a certified base SAS Senior Data Programmer for the Data Management and Analysis Collaborative at Cincinnati Children's Hospital Medical Center with more than 18 years programming and database design experience. As a certified base SAS programmer, in addition to working on many complex research projects with multiple divisions, she has also presented original papers at various SAS conferences and has served as co-author for multiple research papers.



Advancing Research in Rare Disease Using VIYA[®] PL-081

Kelly Olano, Manager - Data Scientist
Pierce Kuhnell, Lead Data Programmer
Laurie Smith, Senior Data Programmer
Cincinnati Children's Hospital Medical Center



What are rare diseases?

- In the United States, the FDA defines a rare disease as any disease that affects fewer than 200,000 Americans.
- There are more than 10,000 known rare diseases which affect around 30 million people—roughly 10% of the U.S. population.
- Rare diseases are not rare: About 1 in 10 Americans have a rare disease.



**An estimated
350 million people
suffer from
rare diseases
worldwide**



Challenges of rare disease research



Limited Patient Populations

- Small number of patients makes recruitment for studies difficult.
- Challenges in statistical analysis and generalizability.

Lack of Awareness

- Rare diseases are often underdiagnosed or misdiagnosed.
- Delayed diagnosis impacts research and patient tracking.

Insufficient Funding

- Few patients = low demand for treatments.
- Limited financial support for research.

Regulatory and Approval Hurdles

- Difficulty in gathering sufficient data for regulatory agencies.
- Challenges in approving treatments with limited evidence.

Rare Disease Clinical Research Network

- **Mission:** Advance medical research on rare diseases by providing support for clinical studies and facilitating collaboration, study enrollment and data sharing.
- Established by Congress in 2002 under the Rare Diseases Act
- Funded by NIH
- Cincinnati Children's Hospital Medical Center was awarded the grant to be the DMCC in 2019.
 - Central hub that manages and coordinates data activities across the network.



A network of 20 research teams with over 125 active studies studying more than 200 rare diseases



Data Management Coordinating Center (DMCC)

Data Collection and Management

- Ensures standardized and compliant data collection across RDCRN studies.
- Manages and stores data securely.

Coordination and Support

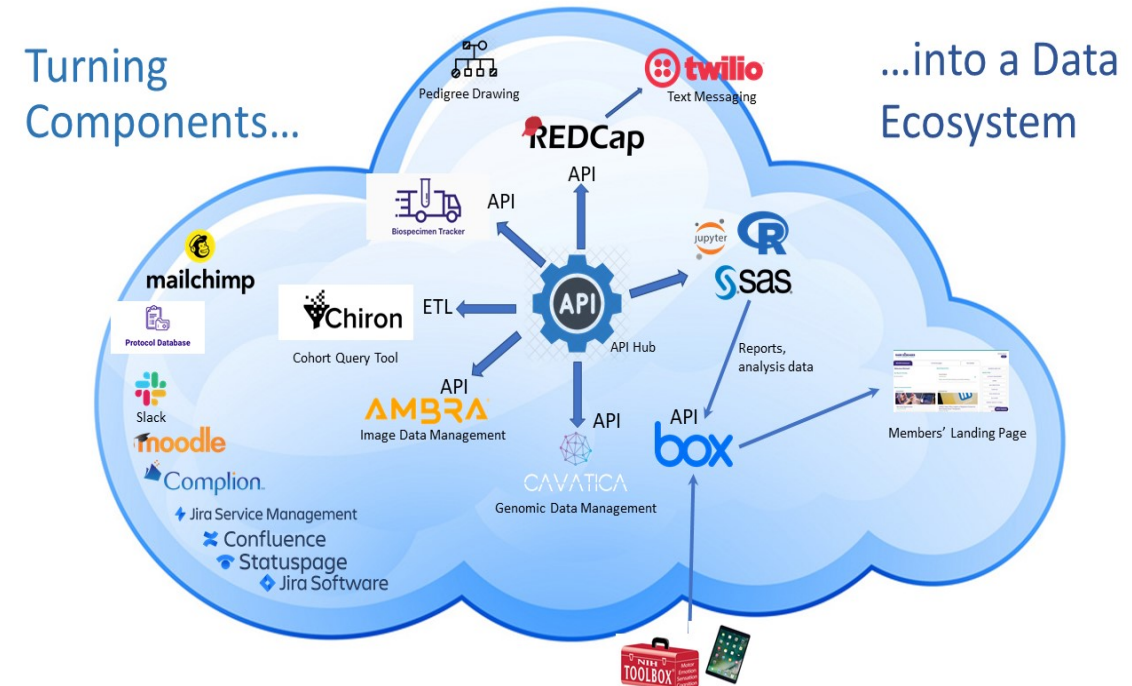
- Provides operational and logistical support to RDCRN consortia.
- Streamlines communication and scheduling.

Data Analysis and Reporting

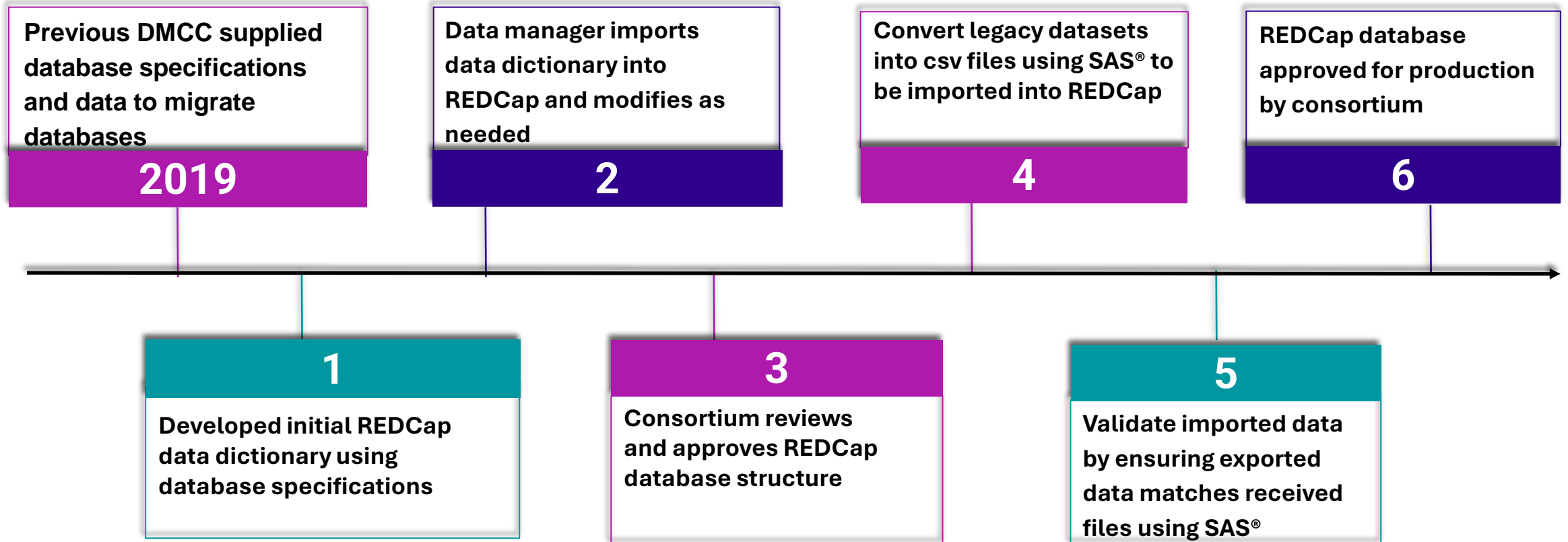
- Uses data to create reports and analysis datasets
- Supports regulatory submissions and research publications.

Compliance and Quality Control

- Ensures adherence to ethical guidelines and regulatory standards.
- Maintains quality and integrity of research.



Migrating data into REDCap



DMCC reports and tools to assist consortia (using SAS[®] 9)

Standard reports as RTF or PDF files:

- Demographics tables
- Enrollment by month/quarter displays in tables and charts
- Study status counts (ex: active, withdrawn, etc)
- Adverse events and associated severity, etc
- Protocol deviations

Custom reports:

- Form completion – assessment of form completion rates based on consortia specific criteria
- Query reports – counts of outstanding data queries by site in table and bar chart format



Demographics by site table

	Site 1	Site 2	Site 3	Site 4
Age at registration in years				
N	14	9	14	37
Min-Max	13.10-39.90	13.20-36.00	13.60-38.20	13.10-39.90
Mean (SD)	22.73 (9.43)	20.08 (8.88)	23.14 (7.47)	22.17 (8.34)
Median (Q1, Q3)	19.45 (14.30, 28.60)	16.60 (14.30, 20.00)	20.10 (17.60, 28.70)	19.00 (15.90, 28.60)

Severity of adverse events by preferred term

	Site 1	Site 2	Site 3	Total N ¹ =10					
				Mild	Moderate	Severe	Life-threatening	Fatal	
				Preferred Term	n ² (%) ³	n(%)	n(%)	n(%)	n(%)
Gender									
Female	5 (35.71%)	6 (66.67%)	5 (35.71%)						
Male	9 (64.29%)	3 (33.33%)	9 (64.29%)						
Race									
Asian	1 (7.14%)	3 (33.33%)	2 (14.29%)						
Black/African American	6 (42.86%)	1 (11.11%)	0 (0.00%)						
Other	0 (0.00%)	2 (22.22%)	2 (14.29%)						
White	7 (50.00%)	3 (33.33%)	10 (71.43%)						
Ethnicity									
Hispanic or Latino	1 (7.14%)	0 (0.00%)	5 (35.71%)						
Not Hispanic or Latino	7 (50.00%)	6 (66.67%)	8 (57.14%)						
Not reported	2 (14.29%)	3 (33.33%)	0 (0.00%)						
Other	4 (28.57%)	0 (0.00%)	1 (7.14%)						
				Investigations - Other, specify	3 (30%)				
				Malaise	2 (20%)				
				Menorrhagia	1 (10%)				
				Musculoskeletal and connective tissue disorder - Other, specify	1 (10%)		2 (20%)		
				Nausea	2 (20%)				
				Nervous system disorders - Other, specify		2 (20%)			
				Pain	1 (10%)	1 (10%)			
				Pain in extremity		2 (20%)			

¹ Total number of participants experiencing an AE.

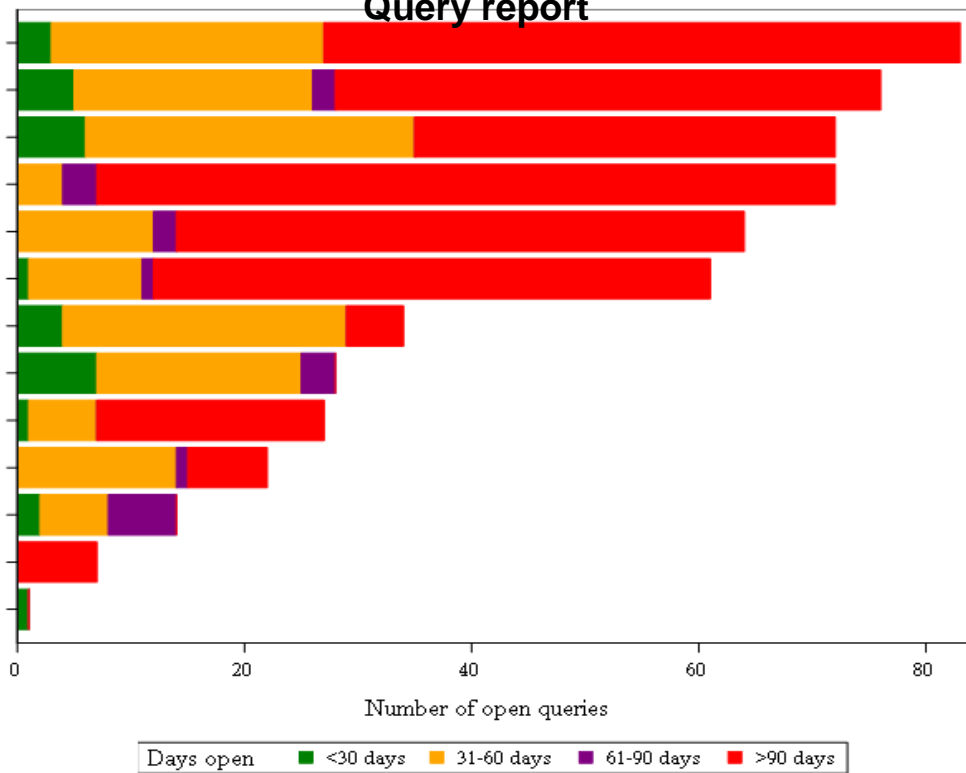
² Number of participants experiencing a certain severity of an AE where each participant is counted only once at highest level of severity.

³ % of participants experiencing a certain severity of an AE.



Number of open queries by site for UCDC 5101 as of 2024-09-03

Query report



Form completion report

Event	PROMIS Parent Proxy Bank v1.0 - Physical Activity			PROMIS Parent Proxy Bank v1.0 - Strength Impact		
	Count	Expected	Percent	Count	Expected	Percent
Baseline	187	324	57.7	186	324	57.4
Follow Up 1	102	190	53.7	100	190	52.6
Follow Up 2	62	107	57.9	62	107	57.9
Follow Up 3	17	32	53.1	17	32	53.1
Follow Up 4	2	4	50	2	4	50



Scoring programming and Z-Scores (using SAS[®] 9)

Standardized programs for scoring familiar questionnaire data

- PROMIS
- Mullen
- ADI-R
- ADOS
- etc

Z-scores

- CDC Macro – standard SAS[®] macro to calculate z-scores based on pediatric growth charts
- Incorporating CDC macros where needed for z-score calculations



Derived Analysis Datasets

- Macros to create derived datasets for demographics, enrollment, adverse events and protocol deviations.
 - API used to export data directly from REDCap
 - Specifications in Excel file used to name variables, assign labels, lengths, etc.
 - Uses existing standards for data domains (e.g. CDISC/CDASH, NDAR)
- Used as source for standard reports and Visual Analytics



Transition from SAS[®] 9 to VIYA[®]

- In 2024, the network decided to transition from using SAS[®] 9 to VIYA[®]
 - Cloud-based, secure infrastructure (transition from internal CCHMC server infrastructure)
 - Allows for easier collaboration
 - Allows for easier integration with programming languages and tools currently being used
- With the help from our SAS Customer Success Manager, Meredith Jerrett, all programmers involved with RDCRN were trained in VIYA[®]
- All activities using SAS[®] 9 have been transitioned to VIYA[®]



Using VIYA[®] for Report Automation

Standard and custom reports can be automated

- Environment Manager to automate running programs and flows to
 - pull data
 - build derived datasets
 - develop reports

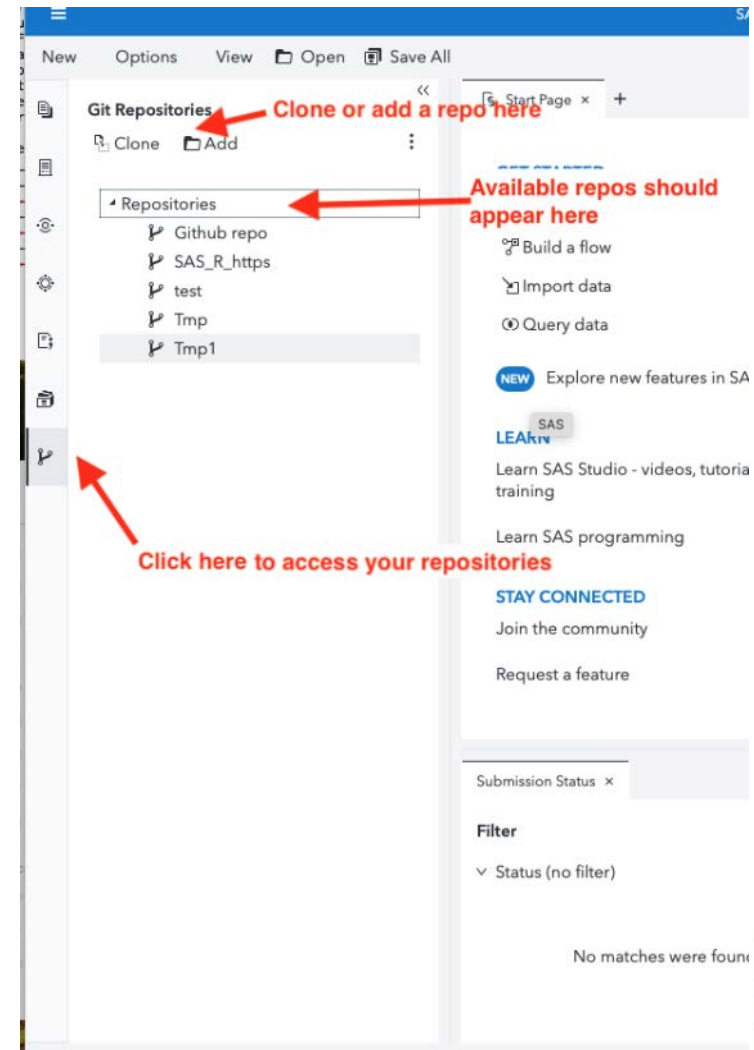
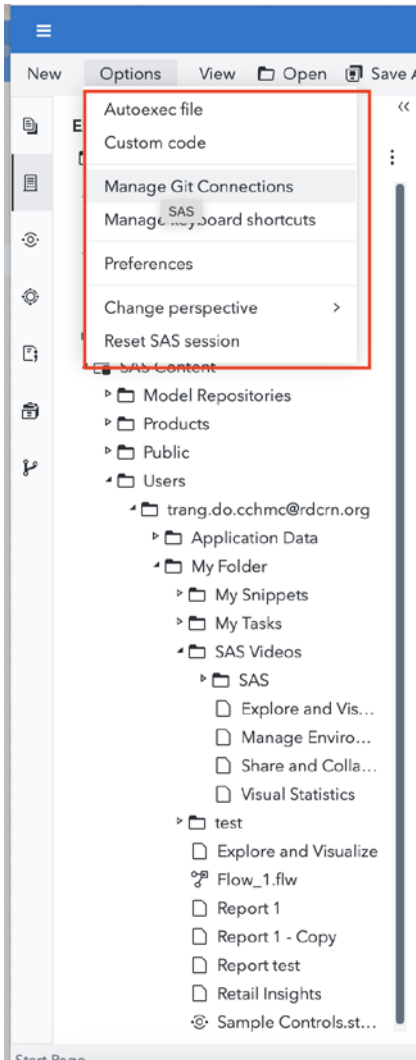
Includes as previously provided:

- Standard reports
- Custom reports
- Derived datasets



Using VIYA[®] Integration with Git

- Using VIYA[®] with GitHub integration enables team to manage version control, development versioning with collaboration, and updating code
- Referencing repository date and hash/id values for determining program version using `git_commit_get` and `git_commit_log`



Reports using Visual Analytics in VIYA®

- Provides consortia access to interactive dashboards and visualizations
- Example for Visualizations:
<https://sas.rarediseasesnetwork.org/links/resources/report>



Next Steps and Questions

Next Steps:

- \$27 million renewal grant from NIH will support current structure for RDCRN for another five years
- The new cycle will begin with new consortia being onboarded

For more information:

<https://www.rarediseasesnetwork.org/>

Questions:

Contact us:

Kelly Olano – Kelly.Olano@cchmc.org

Pierce Kuhnell – Pierce.Kuhnell@cchmc.org

Laurie Smith – Laurie.Bishop@cchmc.org



Thank You

- Laurie Smith
- Cincinnati Children's Hospital Medical Center
- 3333 Burnet Ave, Cincinnati, Ohio 45229
- Laurie.Bishop@cchmc.org
- <https://www.linkedin.com/in/smithlauriea/>

