Identification of Adult Dermatomyositis Patients Using Real-World Data Sources

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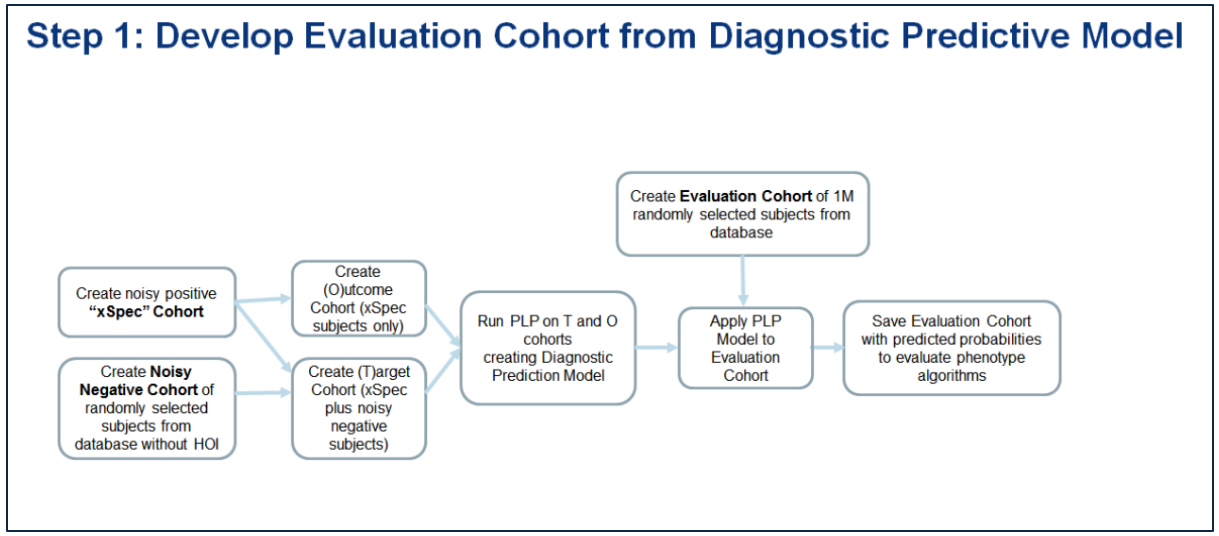
Objective: Develop and evaluate computable phenotypes for DM to enable coordinated analysis across multiple data sources.

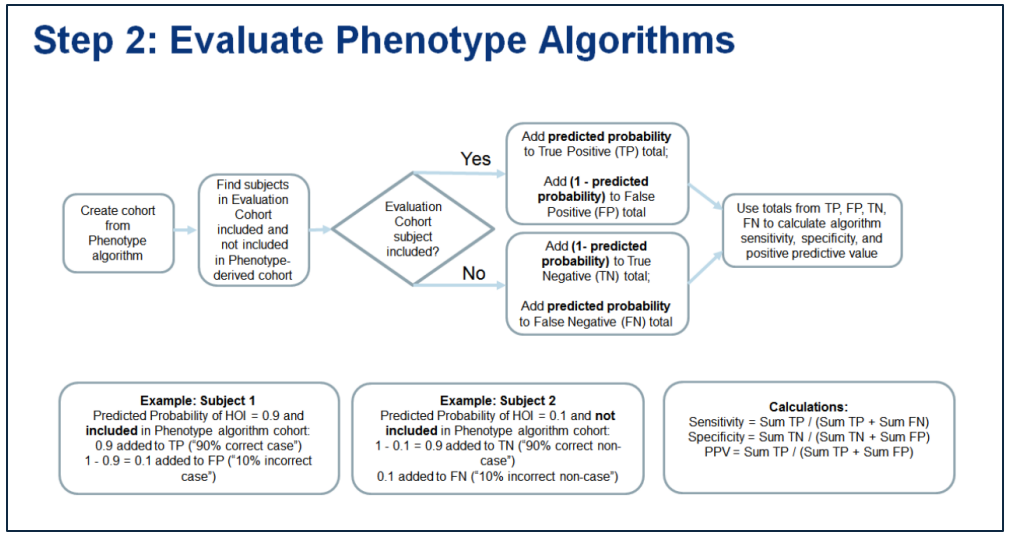
Rationale: Myositis is a rare disease that stands to benefit greatly from distributed data harmonization (incidence: 0.2 to 2 per 100,000 person-years; prevalence: 2 to 25 per 100,000 people)

OHDSI Tools: Atlas, CohortDiagnostics, PheValuator

PheValuator

1. Developing a “diagnostic predictive model” using PLP
2. Using the model to test one or more phenotype algorithms





https://ohdsi.github.io/PheValuator/

https://doi.org/10.1016/j.jbi.2022.104177

Phenotypes Tested on 11 Databases

Johns Hopkins OMOP CDM	EHR
Stanford Research Repository (STARR)	EHR
Columbia OMOP CDM (CUMC)	EHR
JMDC	Claims
Truven MDCD - Merative MarketScan® Multi-State Medicaid Database	Claims
Truven MDCR- Merative MarketScan® Medicare Supplemental and Coordination of Benefits Database	Claims
Optum DOD , Optum's Clinformatics® Extended Data Mart – Date of Death (DOD)	Claims
Optum EHR	EHR
IQVIA Pharmetrics-PharMetrics Plus	Claims
Truven CCAE-Merative MarketScan® Commercial Claims and Encounters Database	Claims
Health Verity Comprehensive Claims - Closed Claims Enrollment	Claims/EHR

Results

Cohort ID	Case Identification Algorithm	Criteria	Database	Cohort Count	Sensitivity (95% CI)	PPV (95% CI)
1781804	1	- Age >18 at index date - 2nd diagnostic code of DM within 30-365 days of index date - Incident: 365 day min observation period prior to index	Johns Hopkins	740	0.525 (0.462 - 0.588)	0.951 (0.901 - 0.980)
			STARR	603	0.624 (0.574 - 0.673)	0.886 (0.842 - 0.921)
			Columbia	444	NR	NR
			Optum EHR	7442	0.561 (0.479 - 0.640)	0.599 (0.515 - 0.679)
			Optum DOD	8006	NR	NR
			Health Verity	18575	0.614 (0.529 - 0.693)	0.574 (0.492 - 0.653)
			IQVIA Pharmetrics	9849	0.571 (0.467 - 0.671)	0.709 (0.596 - 0.806)
			JMDC	4494	0.662 (0.616 - 0.706)	0.818 (0.774 - 0.856)
			Truven CCAE	9421	0.542 (0.448 - 0.634)	0.780 (0.675 - 0.864)
			Truven MDCD	1534	0.488 (0.398 - 0.579)	0.635 (0.531 - 0.731)
			Truven MDCR	1897	0.375 (0.321 - 0.432)	0.768 (0.693 - 0.833)
1787425	2	- Age >18 at index date - 2nd diagnostic code of DM within 30-365 days of index date - At least one immunosuppressive medication prescribed - Incident: 365 day min observation period prior to index	Johns Hopkins	485	0.389 (0.329 - 0.452)	0.962 (0.904 - 0.989)
			STARR	434	0.484 (0.434 - 0.536)	0.917 (0.870 - 0.951)
			Columbia	248	NR	NR
			Optum EHR	4999	0.503 (0.422 - 0.584)	0.725 (0.631 - 0.806)
			Optum DOD	5729	NR	NR
			Health Verity	13567	0.534 (0.450 - 0.617)	0.703 (0.609 - 0.786)
			IQVIA Pharmetrics	5853	0.378 (0.282 - 0.481)	0.881 (0.744 - 0.960)
			JMDC	2070	0.340 (0.296 - 0.386)	0.944 (0.897 - 0.974)
			Truven CCAE	7098	0.458 (0.366 - 0.552)	0.857 (0.746 - 0.933)
			Truven MDCD	975	0.336 (0.254 - 0.426)	0.724 (0.591 - 0.833)
			Truven MDCR	1398	0.307 (0.256 - 0.362)	0.812 (0.729 - 0.878)
1789289	3	- Age >18 at index date - At least one immunosuppressive medication prescribed - Incident: 365 day min observation period prior to index	Johns Hopkins	697	0.638 (0.576 - 0.697)	0.911 (0.860 - 0.948)
			STARR	621	0.687 (0.638 - 0.733)	0.858 (0.814 - 0.895)
			Columbia	427	NR	NR
			Optum EHR	8920	0.777 (0.704 - 0.840)	0.646 (0.573 - 0.714)
			Optum DOD	9435	NR	NR
			Health Verity	21109	0.651 (0.567 - 0.728)	0.534 (0.458 - 0.609)
			IQVIA Pharmetrics	8290	0.643 (0.540 - 0.737)	0.750 (0.644 - 0.838)
			JMDC	2443	0.423 (0.377 - 0.470)	0.922 (0.876 - 0.955)
			Truven CCAE	11457	0.695 (0.603 - 0.776)	0.752 (0.660 - 0.830)
			Truven MDCD	1666	0.544 (0.453 - 0.633)	0.567 (0.473 - 0.657)
			Truven MDCR	2363	0.612 (0.555 - 0.666)	0.756 (0.698 - 0.808)

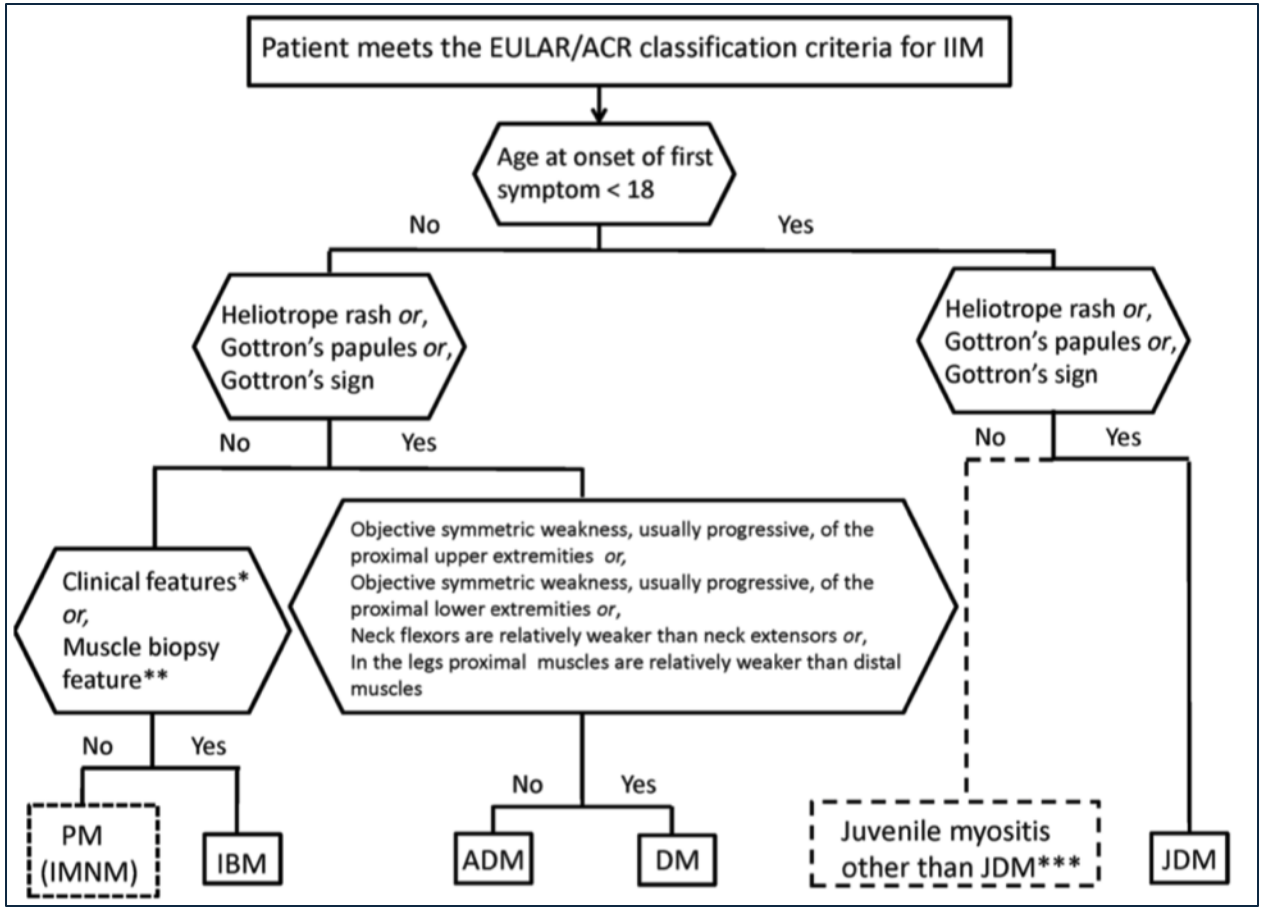
Cohort ID	Case Identification Algorithm	Criteria	Database	Cohort Count	Sensitivity (95% CI)	PPV (95% CI)
1788503	4	- Age >18 at index date - 2nd diagnostic code of DM within 30-365 days of index date - At least one immunosuppressive medication prescribed - Prevalent: 0 days min observation period prior to index	Johns Hopkins	637	0.440 (0.412 - 0.467)	0.982 (0.968 - 0.992)
			STARR	476	0.502 (0.459 - 0.544)	0.927 (0.891 - 0.954)
			Columbia	301	NR	NR
			Optum EHR	5402	0.536 (0.466 - 0.606)	0.750 (0.672 - 0.817)
			Optum DOD	7320	NR	NR
			Health Verity	16274	0.586 (0.524 - 0.645)	0.701 (0.636 - 0.760)
			IQVIA Pharmetrics	7874	0.489 (0.429 - 0.550)	0.824 (0.757 - 0.879)
			JMDC	2308	0.363 (0.323 - 0.403)	0.950 (0.912 - 0.975)
			Truven CCAE	9275	0.544 (0.482 - 0.606)	0.850 (0.787 - 0.901)
			Truven MDCD	1175	0.411 (0.348 - 0.475)	0.783 (0.702 - 0.851)
			Truven MDCR	1779	0.398 (0.360 - 0.437)	0.837 (0.790 - 0.876)
1788567	5	- Age >18 at index date - 2nd diagnostic code of DM within 30-365 days of index date - Prevalent: 0 days min observation period prior to index	Johns Hopkins	1043	0.712 (0.686 - 0.737)	0.971 (0.958 - 0.981)
			STARR	656	0.628 (0.586 - 0.668)	0.899 (0.865 - 0.928)
			Columbia	519	NR	NR
			Optum EHR	8143	0.594 (0.524 - 0.662)	0.609 (0.538 - 0.677)
			Optum DOD	10649	NR	NR
			Health Verity	23036	0.664 (0.604 - 0.720)	0.571 (0.514 - 0.626)
			IQVIA Pharmetrics	13519	0.716 (0.659 - 0.768)	0.703 (0.646 - 0.756)
			JMDC	5261	0.669 (0.629 - 0.708)	0.829 (0.791 - 0.862)
			Truven CCAE	12910	0.636 (0.574 - 0.694)	0.769 (0.706 - 0.823)
			Truven MDCD	1976	0.573 (0.509 - 0.636)	0.681 (0.613 - 0.744)
			Truven MDCR	2473	0.515 (0.475 - 0.554)	0.783 (0.740 - 0.821)
1789031	6	- Age >18 at index date - Myositis-specific autoantibody test ordered - Prevalent: 0 days min observation period prior to index	Johns Hopkins	308	0.193 (0.171 - 0.215)	0.968 (0.938 - 0.986)
			STARR	138	0.119 (0.093 - 0.149)	0.835 (0.735 - 0.909)
			Columbia	138	NR	NR
			Truven CCAE	383	0.023 (0.008 - 0.049)	0.600 (0.262 - 0.878)
			Truven MDCR	43	0.005 (0.001 - 0.014)	0.750 (0.194 - 0.994)
1789032	7	- Age >18 at index date - Myositis-specific autoantibody test positive - Prevalent: 0 days min observation period prior to index	All Databases	0	---	---
178875	8	- Age >18 at index date - 2nd diagnostic code of DM within 30-365 days of index date - Seen by Rheumatologist, Neurologist, or Dermatologist - Prevalent: 0 days min observation period prior to index	All Databases	0	---	---

PheValuator vs. Gold Standard Review

Actual gold standard manual chart review

EULAR/ACR classification criteria for adult and juvenile idiopathic inflammatory myopathies and their major subgroups

https://doi.org/10.1136/rmdopen-2017-000507



PheValuator vs. Gold Standard Review

Table 2. Comparison between manual chart review and probabilistic gold standard (PheValuator) using data at Johns Hopkins.

Case Identification Algorithm	Sensitivity			PPV		
	Reference = Manual Chart Review for ACR/EULAR 2017 Classification Criteria	*Reference = Probabilistic Gold Standard (PheValuator)*	*Delta*	*Reference = Manual Chart Review for ACR/EULAR 2017 Classification Criteria*	*Reference = Probabilistic Gold Standard (PheValuator)*	*Delta*
1	0.55	0.53	0.02	0.93	0.86	0.07
2	0.35	0.39	-0.04	0.91	0.91	0.01
3	0.41	0.64	-0.22	0.88	0.74	0.14
4	0.40	0.44	-0.04	0.90	0.95	-0.06
5	0.68	0.71	-0.03	0.92	0.93	-0.004
6	0.24	0.19	0.04	0.83	0.91	-0.08

Kappa agreement: 0.70 “substantial agreement”

Key Collaborators

https://github.com/OHDSI/PheValuator

- Developed and maintains the **PheValuator** package
- Limitless patience in helping our team understand and apply this tool

Thank you, Joel Swerdel!

Key Collaborators

- Gowtham Rao, Azza Shoaibi (OHDSI Phenotyping WG)
- Hannah Morgan-Cooper (for running our package!)
- Thomas Falconer (for running our package!)