Abstract CE-50 Table 1 Performance of traditional structured definitions and supervised machine learning algorithms in case identification of SLE in the electronic health record

Structured Definitions				Supervised Machine Learning			
	Recall		Precision		Recall		Precision
	(Sensitivity)	Specificity	(PPV)		(Sensitivity)	Specificity	(PPV)
Single ICD9 710.0	0.99	0.97	0.79	All ICD-9 codes and counts[1]	0.89	0.99	0.89
Single ICD9 710.0	0.96	0.98	0.86	All ICD-9 codes and counts	0.90	0.99	0.89
+ any lupus medication				+ NLP of clinical notes[2]			
Single ICD9 710.0	0.93	0.98	0.87	All ICD-9 codes and counts	0.91	0.99	0.92
+ any lupus medication				+ NLP of clinical notes			
+ any positive lupus-serology				+ all serologic data[3]			
				+ all medication data			
				All ICD-9 codes and counts	0.85	0.99	0.96
				+ NLP of clinical notes			
				+ all serologic data			
				+ all medication data			
				+ demographics[4]			

[1] Supervised Machine Learning algorithms included all available ICD-9 codes for patients as well as counts and locations in the medical records in which they were found (i.e. clinical encounters, problems lists, medications orders, etc.)
[2] All text data from clinical notes associated with a patient's medical record were included in the ML algorithm
[3] Serologic data included ANA, double-stranded DNA, anti-Smith antibody, anti-RNP, SSA, and SSB
[4] Demographic information included age, gender, race/ethnicity, insurance status, and employment status

predictive value approaching 96% in the most comprehensive algorithm.

Conclusions In an EHR-based data repository, a single ICD-9 was highly sensitive for SLE. Machine learning algorithms processed a multitude of structured and unstructured EHR data, allowing improved precision/positive predictive value. Further validation across different health systems will be necessary prior to implementing these algorithms on a national basis.

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CE-51 UTILITY OF LINKAGE OF A SURVEILLANCE REGISTRY TO STATE BIRTH RECORDS FOR CATEGORIZATION OF RACE AND ETHNICITY: MICHIGAN LUPUS EPIDEMIOLOGY & SURVEILLANCE (MILES) PROGRAM

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Abstract CE-51 Table 1 Comparison of race/ethnicity classification among SLE cases as part of a lupus surveillance registry: medical records versus Michigan birth files. Data from birth files represent the gold standard, as race/ethnicity was self-identified

		BIRTH CERTIFICATE (BC) – "gold standard"									
		Race								Ethnicity	
Medical	Records (MR)	Black	White	Asian	NHOPI	AIAN	Other	Unknown	Total	Hispanic	Not Hispanic
Race											
	Black	**962**	17	1	0	1	0	2	983	–	–
	White	9	**563**	2	3	2	0	2	581	–	–
	Asian	0	4	**5**	2	0	0	0	11	–	–
	NHOPI	0	3	0	**0**	0	0	0	3	–	–
	AIAN	0	0	0	0	**1**	0	0	1	–	–
	Other	2	28	1	0	0	**1**	0	32	–	–
	Unknown	3	15	4	0	0	0	**0**	22	–	–
Ethnicity											
	Hispanic	–	–	–	–	–	–	–	–	**20**	12
	Not Hispanic	–	–	–	–	–	–	–	–	12	**1589**
Total		976	630	13	5	4	1	4		32	
	Difference (BC-MR)	−7	49	2	2	3	−31	−17		0	
	Classification (BC/MR)	0.99	1.08	1.18	1.67	4.00	0.03	0.19		1.00	
	Sensitivity (of MR)	98.6	89.4	38.5	0.0	25.0	100.0	0.0		62.5	
	95% CI for sensitivity	(97.6, 99.2)	(86.7, 91.7)	(13.9, 68.4)	(0.0, 52.2)	(0.6, 80.6)	(2.5, 100.0)	(0.0, 60.2)		(43.7, 78.9)	

Abbreviations: NHOP = Native Hawaiian and Other Pacific Islander; AIAN = American Indian/Alaska Native

Background Race and ethnicity data based on medical record review may be missing or inaccurate, complicating chronic disease surveillance efforts aimed at understanding disease risk and burden in population subsets. Reliability has been reported to be lower for non-white and non-black populations in the US. Self-identification is the standard for racial and ethnic identification. Race/ethnicity data on birth records in the US is assigned based on self-identification (for the parents and child) on the birth certificate.

Materials and methods MILES is a population-based, SLE surveillance program that used multiple sources of case-finding to identify and validate SLE cases in southeastern, MI (2002–2005). Detailed medical record (MR) reviews were performed, including race (5 categories) and ethnicity (Hispanic/Latino) data. Using birth certificate (BC) data as the "gold standard", we calculated the classification ratio (count from BC/count from MR) and sensitivity of MR race/ethnicity categories.

Results 1633 cases meeting ACR SLE criteria (4+) were linked to MI birth data. 1099 cases were listed as the infant on a MI birth certificate, and 1169 as a parent. Comparison of race/ethnicity classifications are displayed in Table 1.

Conclusions Sensitivity of MR race categorization for non-white and non-black groups was poor. For Hispanic ethnicity, although an equivalent number of cases overall were identified by both sources, sensitivity was moderate. For uncommon diseases such as lupus, where the number of cases in population subsets is low, even small changes in the numerator may have discernable impact on incidence and prevalence rates. Race/ethnicity data derived from birth files may be useful for adjusting surveillance estimates.

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CE-52 BIOLOGIC AND CLINICAL EFFECTS OF AUTOIMMUNITY ON THE MATERNAL/FETAL DYAD

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Background Progress in the management of pregnancy in patients with lupus and asymptomatic women with anti-Ro antibodies has been made on several fronts in the last year.

Results Data from the PROMISSE study (**P**redictors of P**R**egnancy **O**utcome: Bio **M**arkers **I**n Antiphospholipid **S**yndrome and **S**ystemic Lupus **E**rythematosus) under the leadership of Dr. Jane Salmon which enrolled 389 women with or without anti-phospholipid antibodies, identified several important and potentially actionable baseline predictors of adverse pregnancy outcomes (APO). These include: taking hypertensive medications, having a platelet count less than 100 k, being positive for the lupus anticoagulant (LAC), and having a physician global assessment of lupus activity at >1. The absence of a rise in C3 during the second trimester also constituted a risk factor. Being non-Hispanic white was protective. Both mild/moderate and severe flares were infrequent, 13% and 3%, respectively. De novo renal disease was rare, occurring in 3/265 patients who never met ACR renal criteria. Overall, in patients with no risk factors at baseline, the APO rate was 7.8%; fetal/neonatal mortality 3.9%. In contrast, in patients who are either LAC positive, or LAC negative but non-White and treated with antihypertensives, the APO rate was 58%; fetal/neonatal mortality 22%. With regard to clinical and basic translational work in neonatal lupus, there have been several advances. Based on review of 156 cases of heart block absent any extranodal involvement the use of fluorinated steroids did not reverse the block, influence the cumulative probability of extranodal disease, the cumulative probability of survival, or the cumulative probability of pacemaker implantation. Accordingly, these data do not support the use of dexamethasone in isolated block for the sole purpose of preventing more progressive disease. Evaluation of umbilical cord blood from 139 anti-Ro exposed neonates with and without heart block suggests innate and parenchymal immune cell activation in the affected fetus. Specifically, cord CRP, NT-proBNP, MMP-2, uPA, uPAR, and plasminogen levels were higher in affected fetuses than in unaffected cases, independent of maternal rheumatic disease, season at highest risk of heart block, and medications taken during pregnancy. These biomarkers were positively associated with a disease severity score derived from known risk factors for mortality. Based on the consistent demonstration of fibrosis of the atrioventricular node surrounded by macrophages and multinucleated giant cells in anti-Ro antibody exposed fetuses dying with heart block, investigational studies focused on macrophage signalling stimulated by ssRNA associated (hY3) with the Ro60 protein and the impact of antagonising innate cell drivers such as TLR7/8. Ligation of TLR7/8 resulted in increased histone methylation as measured by increased H3K4me2, a requirement for binding of NF-κB at certain promoters, specifically the kB1 region in the TNF promoter which was significantly decreased by hydroxychloroquine.

Conclusion Translation of these finding to the bedside suggests that hydroxychloroquine may be efficacious in preventing heart block. An ongoing study is currently addressing secondary prevention.