**Conclusions** Our cohort showed high rate of patient satisfaction with telemedicine healthcare. However, the relatively low healthcare provider satisfaction rate raises concern as to whether telemedicine constitutes a satisfactory alternative to conventional in-person care. Additional researches are required to investigate the feasibility of telemedicine in long-term disease activity evaluation and patient outcome measurement.

## 1106 PREDICTING ADVERSE PREGNANCY OUTCOMES IN WOMEN WITH SYSTEMIC LUPUS ERYTHEMATOSUS: A COMPARISON OF MACHINE LEARNING METHODS

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**Background** Nearly 20% of pregnancies in patients with Systemic lupus erythematosus (SLE) result in an adverse pregnancy outcome (APO); early identification of women with SLE who are at high risk of APO is vital. We previously derived a risk model for APO using logistic regression and data from the PROMISSE Study, a large multi-center, multi-ethnic/racial study of APO in women with mild/moderate SLE and/or aPL. While this highly interpretable regression model showed promising predictive performance, we sought to determine if novel and increasingly popular machine learning (ML) approaches would enhance APO risk prediction using all available predictors and potential complex relationships such as interactions or higher order terms. We compared logistic regression modeling to LASSO, a regression approach that handles high-dimensionality and correlated predictors through shrinkage of estimated coefficients, as well as several 'black box' ML algorithms. ML techniques are well-suited to high-dimensional data, require no variable selection, and unlike regression-based approaches are able to explore complex relationships without explicit input by the user.

**Methods** We used the original PROMISSE data (41 predictor variables from 385 subjects) with APO (71/385, 18.4%) defined as preterm delivery due to placental insufficiency or preeclampsia, fetal or neonatal death, or fetal growth restriction. Logistic regression with stepwise selection (LR-S) was compared to LASSO, random forest (RF), neural network (NN) with 2 hidden neurons, support vector machines with RBF kernel ($SVM_{RBF}$), and gradient boosting (GB). To summarize discrimination we present the area under the receiver operating curve (AUC), along with sensitivity (Sn) and specificity (Sp) at an optimal cut-point.

**Results** Regression based classifiers confirmed the predictors of APO identified in our previously reported model: non-white race, use of anti-hypertensive medication, low platelets, SLE disease activity, lupus anticoagulant (LAC) +, and high diastolic blood pressure (DBP). RF additionally revealed two novel interaction variables that increased APO risk: LAC+ with anti-β2GPI IgM, high DBP with low C3. LR-S and LASSO were observed to have similar overall discrimination (AUC=0.75 vs. 0.77, table 1) but LASSO had higher sensitivity (Sn=0.71 vs. 0.65). ML classifiers RF and $SVM_{RBF}$ had similar good performance (AUC=0.77-0.78), while NN and GB were inferior.

**Conclusions** Several popular ML algorithms did not provide meaningful improvements in the prediction of APO. The strong relative performance of regression-based models with this large and well-characterized clinical data set is notable as these models are highly interpretable, well-understood, and generally require fewer variables to generate a risk prediction. It is unlikely that complex ML algorithms with existing variables will yield superior APO predictions; new clinical and laboratory markers may improve predictions in the future.

**Abstract 1106 Table 1** Summary of 5x10 fold cross-validation results

| *Model* | *AUC* | *Sensitivity* | *Specificity* |
|---|---|---|---|
| *LR-S* | 0.75 | 0.65 | 0.78 |
| *LASSO* | 0.77 | 0.71 | 0.75 |
| *NN* | 0.71 | 0.70 | 0.61 |
| *RF* | 0.77 | 0.77 | 0.78 |
| *GB* | 0.72 | 0.72 | 0.72 |
| *SVM-RBF* | 0.78 | 0.78 | 0.73 |

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## 1107 ECONOMIC EVALUATION OF HYDROXYCHLOROQUINE USE IN AN INTERNATIONAL INCEPTION COHORT

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**Background** While there is overwhelming evidence for the beneficial role of hydroxychloroquine (HCQ) in SLE, little is known about its economic impact. We estimated annual direct, indirect, and total costs (DC, IC, TC) associated with HCQ use.

**Methods** A subset of patients from the Systemic Lupus Erythematosus International Collaborating Clinics (SLICC) inception cohort were assessed annually between 2014 and 2019 for health resource use, lost work-force/non-work-force productivity and concurrent HCQ use. Resource use was costed using 2021 Canadian prices and lost productivity using Statistics Canada age-and-sex specific wages. At each assessment, HCQ dose over the past year and weight were documented and patients were stratified into 1 of 3 HCQ dosage groups: non-users (0 mg/kg/day), low-intensity users (≤ 5 mg/kg/day), or high-intensity users (>5 mg/kg/day). Costs associated with HCQ dose were calculated by averaging all observations within each dosage group. Multiple random effects linear regressions adjusted for the possible confounding of age at diagnosis, sex, race/ethnicity, disease duration, geographic region, education, alcohol use, and smoking on the association between annual DC and IC and HCQ dose. A possible mediating effect of disease damage (SLICC/ACR DI) on these associations was also investigated.

**Results** 661 patients (89.4% female, 59.3% non-Caucasian race/ethnicity, mean age and mean disease duration at the start of economic assessments was 42.1 years and 9.5 years, respectively) were followed over a mean of 2.8 years. Across 1536 annual assessments, 36.1% of observations were provided by HCQ non-users, 43.1% by low-intensity users (mean dosage 3.4 mg/kg/day), and 20.8% by high-intensity users (mean dosage 5.9 mg/kg/day). Annual adjusted DC were higher in non-users ($9599) versus low-intensity users ($6344) and high-intensity users ($6333) (table 1). When disease damage was included in the regression, there were no significant differences in DC between dosage groups. While unadjusted IC were higher in non-users ($37,610) versus low-intensity users ($32,480) and high-intensity users ($31,418), adjusted IC did not differ. Adjusted TC were higher in non-users ($46,157) versus low-intensity users ($39,257) and high-intensity users ($37,634).

**Conclusion** SLE patients reported higher adjusted annual DC and TC during periods of HCQ non-use versus periods of use, regardless of the intensity of use. There was no additional cost savings in those using high intensity dosages. The cost-savings effect of HCQ could potentially be partially mediated through reduced damage. In addition to its well-established therapeutic potential, there may be an economic imperative for HCQ use in SLE patients.

**Abstract 1107 Table 1** Unadjusted and adjusted annual direct, indirect, and total costs (in 2021 Canadian dollars) stratified by HCQ dose. Values are the mean (95% CI)

| | Non-users (0 mg/kg/day) | Low-intensity users (≤5 mg/kg/day) | High-intensity users (>5 mg/kg/day) | Difference between non-users and low-intensity users | Difference between non-users and high-intensity users | Difference between low- and high-intensity users |
|---|---|---|---|---|---|---|
| **Unadjusted** | | | | | | |
| **DC** | 10116 | 5682 | 6466 | **4434 (2517, 6351)** | **3650 (1362, 5938)** | −784 (−2420, 852) |
| **Hosp** | 1415 | 1081 | 1527 | 334 (−222, 890) | −112 (−1254, 1031) | −446 (−1531, 639) |
| **Meds** | 2364 | 1694 | 2047 | 670 (−118, 1458) | 317 (−673, 1307) | −353 (−1177, 472) |
| **Physicians** | 1168 | 1035 | 990 | 133 (−77, 343) | 178 (−31, 387) | 45 (−113, 203) |
| **Dialysis** | 3249 | 258 | 268 | **2990 (1613, 4367)** | **2981 (1540, 4422)** | −10 (−620, 600) |
| **Other** | 1920 | 1614 | 1634 | 307 (−57, 670) | 286 (−114, 686) | −21 (−406, 364) |
| **IC** | 37610 | 32480 | 31418 | **5131 (422, 9839)** | **6193 (806, 11579)** | 1062 (−4498, 6622) |
| **TC** | 47726 | 38162 | 37884 | **9565 (4258, 14871)** | **9843 (3905, 15780)** | 278 (−5492, 6048) |
| **Adjusted** | | | | | | |
| **DC*** | 9599 | 6344 | 6333 | **3255 (309, 6201)** | **3266 (844, 5687)** | 10 (−1806, 1826) |
| **IC**** | 36558 | 32914 | 31301 | 3645 (−1765, 9054) | 5257 (−1133, 11647) | 1613 (−5158, 8383) |
| **TC** | 46157 | 39257 | 37634 | **6900 (720, 13080)** | **8523 (1223, 15823)** | 1623 (−6112, 9358) |

Boldface indicates significant results.
*Abbreviations:*
DC: direct costs; IC: indirect costs; TC: total costs.
*Adjusted for age at diagnosis as the other predictors (sex, race/ethnicity, disease duration, geographic region, education, alcohol use, and smoking) were not significant.
** Adjusted for disease duration, geographic region, and education as the other predictors (age at diagnosis, sex, race/ethnicity, alcohol use, and smoking) were not significant.

## 1108 FREQUENCY-DOMAIN OPTICAL IMAGING CAN DIAGNOSE LUPUS ARTHRITIS

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**Background** Joints are affected in up to 95% of patients with systemic lupus erythematosus (SLE) and 11.7% of lupus patients develop permanent joint damage. Additionally, arthritis is present in 70-80% of lupus patients in clinical trials. There is continued debate as to whether tenderness in the absence of swelling constitutes active lupus arthritis and should be scored on activity instruments. The confusion over arthritis scoring impacts both clinical care and trials. There is an unmet need for a simple tool that can objectively assess lupus arthritis; near-infrared optical imaging has the potential to address this need. Over the last decade the technology has been optimized for use in brain imaging, breast cancer, and peripheral ischemia. Studies have also shown its utility in rheumatoid arthritis. Near-infrared light illuminates the tissues