# Development of Novel Progression Score to Quantify Disease Progression in Crohn's Disease

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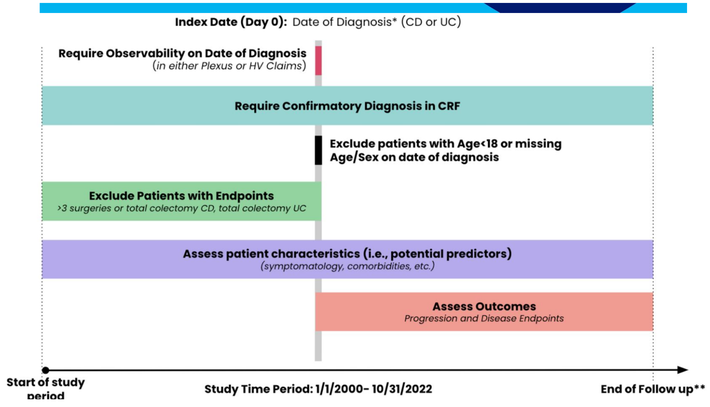
## BACKGROUND

- Despite being a progressive disease, there is no standard definition for disease progression in Crohn's disease (CD)
- The Crohn's & Colitis Foundation formed a Workgroup to address unmet need for CD patients who progress despite treatment
- The study aimed to develop a CD progression score that could be applied prospectively using real world data.

## METHODOLOGY

- The Crohn's & Colitis Foundation formed The IBD Plexus Disease Progression Workgroup to define disease progression using real world data into three categories: low, moderate, and high progression categories.
- We applied these definitions to CD participants from the SPARC IBD and IBD Qorus cohorts linked to claims and lab data from Health Verity.
- Next, we generated Kaplan-Meier curves for the different categories to track probability of reaching the endpoint
- Finally, extended cox proportional modelling was applied to test various KOL-chosen covariates' effect on risk of progression

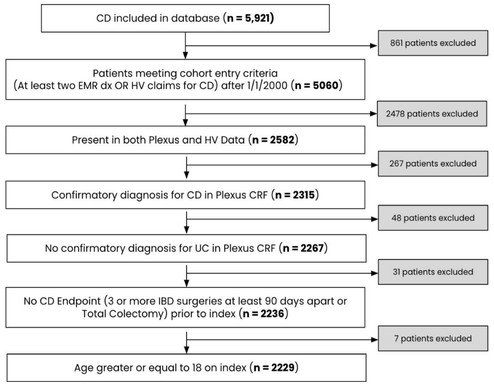
### Figure 1: Study Design




### Table 1. Progression Score Component and Weights

| Criteria (Grouped by Criteria Category) | Weight (Number of points assigned) | Progression Category |
|---|---|---|
| **Medication Exposure** | | |
| 5ASA | 0 | LOW |
| Prolonged Systemic Steroid Use (>= 60 days) | 1 | LOW |
| Immunomodulators | 2 | LOW |
| **Advanced Therapies (AT)** | | |
| 1 AT | 4 | LOW |
| 2 AT | 13 | MODERATE |
| 3+ AT | 42 | SEVERE |
| **Number of Surgeries** | | |
| 0 Surgeries | 0 | LOW |
| 1 Surgery | 20 | MODERATE |
| 2 Surgeries | 50 | SEVERE |
| 3 or more Surgeries or Total Colectomy | NA | ENDPOINT |

### Figure 2. Attrition table for Crohn's Disease Cohort

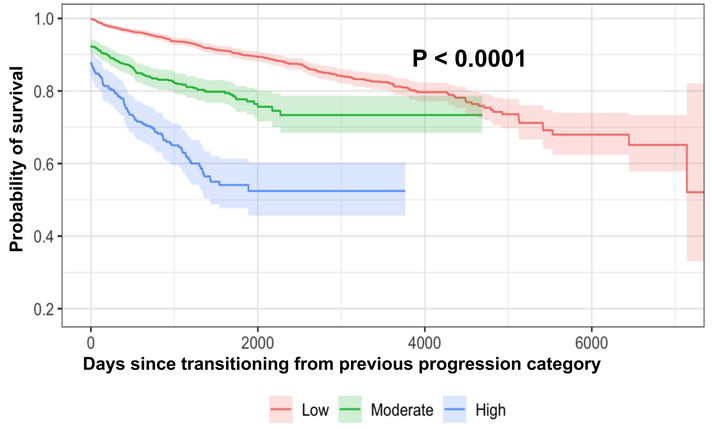



### Table 2. Extended Cox Proportional Modeling of Covariates with Disease Progression

| Characteristic | Hazard Ratio | 95% CI | p-value | Characteristic | Hazard Ratio | 95% CI | p-value |
|---|---|---|---|---|---|---|---|
| Progression Category | | | | Fatigue | 0.95 | 0.86, 1.05 | 0.3 |
| Low | — | — | | Anal Fissures | 1.25 | 0.82, 1.91 | 0.3 |
| Moderate | 2.60 | 2.03, 3.34 | <0.001 | GI Fistula | 0.97 | 0.93, 1.01 | 0.14 |
| High | 2.68 | 1.97, 3.64 | <0.001 | GI Hemorrhage | 1.03 | 0.98, 1.08 | 0.3 |
| Abdominal Pain | 0.98 | 0.94, 1.02 | 0.4 | GI Mass | 1.00 | 0.94, 1.06 | >0.9 |
| Abdominal Abscess | 1.61 | 1.22, 2.12 | <0.001 | High Dose Steroids | 1.32 | 1.16, 1.51 | <0.001 |
| Age | 1.00 | 0.99, 1.00 | 0.4 | Intestinal Infectious Diseases | 1.17 | 0.85, 1.59 | 0.3 |
| Anemia | 1.03 | 0.99, 1.07 | 0.2 | Kidney Stones | 1.44 | 1.03, 2.01 | 0.031 |
| Anxiety | 1.26 | 1.00, 1.60 | 0.054 | Gender | | | |
| Antibiotic Use | 1.04 | 0.97, 1.10 | 0.3 | Female | — | — | — |
| Arthralgia | 0.98 | 0.90, 1.06 | 0.5 | Male | 0.88 | 0.72, 1.07 | 0.2 |
| Bowel Obstruction | 1.01 | 0.98, 1.05 | 0.5 | Malnutrition | 1.01 | 0.96, 1.06 | 0.7 |
| C. Diff Test | 1.79 | 1.33, 2.42 | <0.001 | Nausea/Vomiting | 1.07 | 0.97, 1.18 | 0.2 |
| Colon Cancer | 0.77 | 0.06, 10.1 | 0.8 | Obesity | 1.18 | 0.88, 1.59 | 0.3 |
| High C-Reactive Protein | 1.04 | 0.99, 1.09 | 0.12 | Perianal Disease | 1.33 | 1.01, 1.75 | 0.043 |
| CT/MRI | 1.03 | 0.92, 1.15 | 0.6 | Stricturing CD | 1.16 | 0.94, 1.43 | 0.2 |
| Diarrhea | 1.00 | 0.93, 1.07 | >0.9 | Time Since Cohort Enrollment | 0.99 | 0.98, 1.00 | 0.11 |
| CD Disease Location | | | | Upper GI Disease | 1.17 | 0.65, 2.11 | 0.6 |
| Ileocolonic | — | — | | Uveitis/Iritis | 1.18 | 0.64, 2.15 | 0.6 |
| Ileal | 0.93 | 0.74, 1.17 | 0.5 | Viral/Fungal Infection | 1.50 | 1.14, 1.96 | 0.004 |
| Colonic | 0.86 | 0.65, 1.14 | 0.3 | Vitamin B12 User | 0.94 | 0.88, 1.00 | 0.037 |
| Skin Complications (EIM) | 1.21 | 0.98, 1.49 | 0.077 | Weight Loss | 1.52 | 1.13, 2.02 | 0.005 |

## RESULTS

### Figure 3: Kaplan-Meier Curve for Disease Progression in Crohn's Disease




- Progression scores were calculated for the patient cohort over time and were fitted to a Kaplan-Meier Curve
- Log-rank testing demonstrated statistical significance between progression category and time to further progression
- The Extended Cox Proportional Hazards model indicated significantly higher risk of progression, while controlling for covariates, for patients already in moderate and severe progression groups and several other clinical variables, validating the potential utility of the score.

## CONCLUSION

- We created a KOL-informed score and tested it against IBD Plexus data link with a claims data set
- Patients can be easily scored using real world data. This can be helpful for patient segmentation in future research and clinical decision making
- Next steps are to expand the usage of this score and validate it in another cohort.

CROHN'S & COLITIS FOUNDATION IBD PLEXUS AETION