

Can Patients Monitor Response To Ustekinumab In The Real World?

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Background

Real time monitoring of patients with Crohn's disease (CD) gives us the opportunity to examine disease trajectory. We have demonstrated the feasibility of using a monitoring platform with patient reported data, collected prospectively and routinely in clinical practice. The question is whether it can be used for specific drugs.

Methods

TrueColours-IBD (TC-IBD) is a real time, web based platform that through email prompts linked to questionnaires, collects longitudinal patient reported outcome measures (for CD, symptoms measured Harvey Bradshaw Index (HBI) and quality of life by IBD Control-8). It is routinely used by >2000 patients in Oxford. This study examined 114 patients with Crohn's: 45 males (median age 36, IQR 28-51) and 69 females (median age 34.8, IQR 28-47), treated with ustekinumab for a maximum of 16 months (range -2 months to 14 months). A linear mixed-effects model was used to approximate longitudinal trends of HBI and IBD Control-8. Three individual items of the HBI scale (general well-being, abdominal pain and stool frequency) were also assessed. The TC-IBD platform has the capacity to analyse and show patients' data automatically, using customised models and algorithms through the feedback loop. Model coefficients, intercept and slope were estimated using the restricted maximum likelihood (REML) approach. The intercept corresponds to the expected cohort mean value of the scale (e.g. HBI, IBD Control-8) at baseline (time zero) and the slope describes the rate of the change over time.

Results

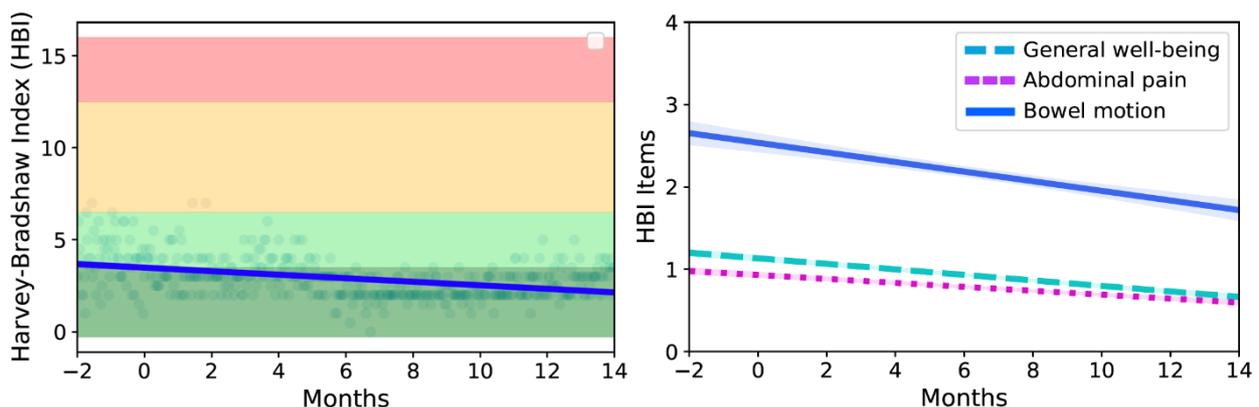
The models' coefficients, the intercept and slope of both HBI and IBD Control-8 scales were found to be statistically significant and are summarised in Table 1 along with their confidence intervals. Both linear trends (slopes) describing HBI ($p < 0.001$) and IBD Control-8 ($p < 0.001$) confirmed the improvements for patients. The bowel movement component from the HBI scale dominated over a general well-being and abdominal pain, while keeping a similar downward trend over time (Fig 1a, 1b and Fig 2).

Scale	Intercept (95%CI)	Slope (95%CI)
HBI (total)	4.414 (3.847, 4.982)	-0.065 (-0.079, -0.051)
General well-being	1.109 (0.979, 1.239)	-0.024 (-0.028, -0.021)
Abdominal pain	0.952 (0.828, 1.075)	-0.018 (-0.02, -0.014)
Bowel motion	2.497 (2.044, 2.951)	-0.029 (-0.04, -0.018)
IBD Control	8.798 (8.027, 9.569)	0.183 (0.134, 0.231)

Table 1: Statistical summary of linear models shown in Figs 1 and 2

Conclusions

Patient reported data through the TC-IBD platform can be used for statistical analyses and continuous monitoring of drug effect over time. The current analysis is limited by the lack of a comparator group, but the models may be used with the TrueColours platform as a decision support tool for other drugs.



a)

b)

Figure 1: Linear trends with 95%CI of 116 patients treated with ustekinumab of a) HBI scale presented on the Red-Amber-Green background and b) individual components of the HBI.

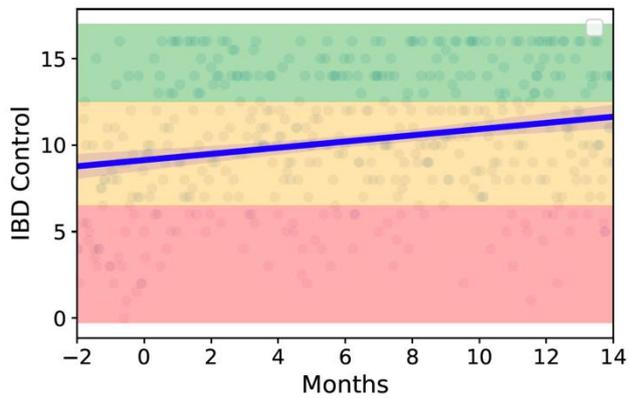


Figure 2: Linear trend and 95%CI of the quality-of-life IBD Control scale of 116 patients treated with ustekinumab presented on the Red-Amber-Green background

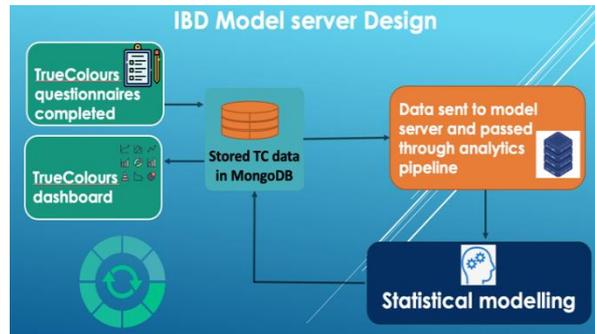


Figure 3: Statistical and machine learning loop integrated into the TC-IBD platform. The data from patients is securely processed by the analytic engine and feeds back into the TCUC dashboard