COST-EFFECTIVENESS ANALYSIS OF BIOSIMILAR BASED TREATMENT SEQUENCES FOR MODERATE-TO-SEVERE CROHN'S DISEASE IN SPAIN

Fernández Santos JM[1], **Monte Boquet E**[2], **Borrás Blasco J**[3], **Romero de la Cruz E**[1], **González Galán R**[1], **Singh MK**[4], **Sharma V**[4], **Merino-Bohórquez V**[5]

[1]Sandoz Farmacéutica (Novartis Group), Madrid, Spain; [2]Hospital Universitario y Politécnico La Fe, Valencia, Spain; [3]Hospital de Sagunto, Valencia, Spain; [4]Novartis Healthcare Private Limited, Hyderabad, India; [5]Hospital Universitario Virgen Macarena, Seville, Spain

ES2204216280

INTRODUCTION

- Amid the autoimmune diseases, Crohn's disease (CD) is particularly burdensome for the Spanish National Health System (SNS) and disabling for the patients who suffer from it[1,2]. Thanks to the advent of adalimumab and infliximab biosimilars (bADA, bINF), the disease's financial burden decreased substantially[1,3]. However, a further assessment on additional efficiencies is warranted. Thereby, SNS's Willingness to Pay (WTP) per additional Quality Adjusted Life Year (QALY) could be considered as a proxy to find out relevant benefits, such is the case of Net Monetary Benefit per Patient (NMB = WTP* ΔQALY – ΔCosts), and the Incremental Cost Effectiveness Ratio (ICER = ΔCosts / ΔQALY).

OBJECTIVES

- This study sought to quantify, taking into account actual drug acquisition costs (as of October 2021):

1. QALYs accrued per patient and ICER when comparing different sequences usually prescribed for moderate-to-severe CD treatment, starting with bADA or bINF or other biologics - vedolizumab (VED), ustekinumab (UST) - following loss of response to initial conventional therapy (CT), the latter comprising, amongst others, immunomodulators and/or corticosteroids.
2. NMB provided by each of above treatment sequences.

Figure 1.

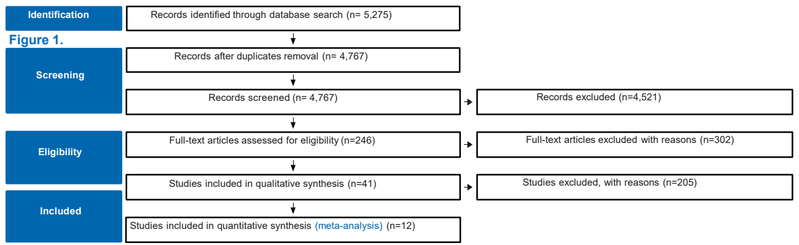
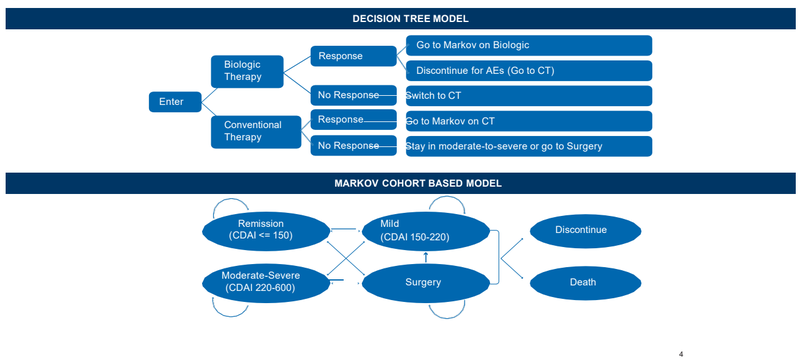


Figure 2.



AEs: Adverse events, CT: Conventional therapies, CDAI: Crohn's Disease Activity Index

METHODS

- Targeted Literature Review was performed and reported according to the "Preferred Reported Items for Systematic Reviews and Network Meta-analyses" (PRISMA) standards. **(Figure 1).**
- A previous Single Technology Appraisal (STA) model from the National Institute for Clinical Excellence (NICE)[4] was tailored to Spain in terms of both Costs and QALY gains, whilst maintaining the statistical analysis and structure. WTP, in accordance to local guidelines was set to €20,000 per QALY gained.
- In line with the above, and in order to keep consistency, the model structure, itself, was a hybrid of a decision tree –to accommodate the induction phase- and a Cohort Based (Semi-Markov) model, to simulate the maintenance phase. Both induction and maintenance stages mirror actual CD's Clinical Practice with biologics. **(Figure 2).**
- Transition probabilities between different Health States were derived from (4) and (5), to cover all treatments and different lines (biologic naïve and biologic experienced patients).
- Both Costs and Benefits were discounted at an annual rate of 3%, in line with current SNS guidelines[6].
- Actual drug acquisition costs in 2021 were obtained from a Public Procurement database[7] .
- Different treatment sequences were simulated according to standard clinical practice, treatment guidelines[8]; whilst using currently licensed dosages in Spain[9].
- Deterministic and Probabilistic Sensitivity Analyses were performed with 95% Confidence Intervals (95% CI).

RESULTS

- Over a 10-year time horizon, a treatment sequence commencing with two biosimilars -cycling- remain the most cost-effective choice for the SNS. Treatment sequence starting with bADA followed by bINF provides with additional 0.06 QALYs, and €2,045 NMB versus UST followed by bADA, becoming dominant too (less expensive and more effective; **Table 1**). Shortening the time horizon to 5 years, results were 0.07 and €6,532 respectively, while maintaining the dominancy(**Table 2**).
- In general, sequences commencing by either biosimilar –bADA, bINF- topped those starting with other biologics; both in terms of costs and accrued QALYs.
- Costs seemed to be accrued mostly within the first half (5 years) of the time horizon, likely as a result of rapid and sustained clinical improvement across time –and potential drug optimizations-; and so the QALY gains.
- With a fixed budget (10 year time frame) compared with the most expensive treatment sequence , up to a roughly 33% additional patients could be treated –assuming similar efficacy and disease condition- (Table 1).

Table 1.

Treatment Sequence	Costs	QALYs	ΔCosts	ΔQALYs	ICER vs REFERENCE	NMB (REFERENCE)
bADA->bINF->UST->CT	€ 88,570.7	5.082	REFERENCE	REFERENCE	REFERENCE	REFERENCE
bADA->UST->bINF->CT	€ 89,675.0	5.082	€ 1,104.4	0.000	€ 27,236,612	€ 1,104
UST->bADA->INF->CT	€ 89,328.5	5.018	€ 757.8	-0.064	dominated	€ 2,045
bINF->bADA->VED->CT	€ 90,555.5	4.859	€ 1,984.8	-0.223	dominated	€ 6,445
bINF->VED->bADA->CT	€ 93,503.4	4.859	€ 4,932.7	-0.223	dominated	€ 9,402
bADA->UST->VED ->CT	€ 106,541.3	5.047	€ 17,970.6	-0.035	dominated	€ 18,666
UST->bADA->VED->CT	€ 107,131.4	4.981	€ 18,560.7	-0.101	dominated	€ 20,575
bADA->VED->UST-> CT	€ 107,987.7	5.043	€ 19,417.0	-0.039	dominated	€ 20,207
UST->VED->bADA->CT	€ 109,921.3	4.981	€ 21,350.6	-0.101	dominated	€ 23,375
bINF->UST->VED->CT	€ 114,802.9	4.902	€ 26,232.2	-0.180	dominated	€ 29,830
bINF->VED->UST->CT	€ 116,316.2	4.897	€ 27,745.5	-0.185	dominated	€ 31,441

Table 2.

Treatment Sequence	Costs	QALYs	ΔCosts	ΔQALYs	ICER vs REFERENCE	NMB (REFERENCE)
bADA->bINF->UST->CT	€ 53,725.5	2.847	REFERENCE	REFERENCE	REFERENCE	REFERENCE
bADA->UST->bINF->CT	€ 56,237.3	2.845	€ 2,511.8	-0.002	dominated	€ 2,555
bINF->bADA->VED->CT	€ 55,023.1	2.695	€ 1,297.6	-0.152	dominated	€ 4,338
UST->bADA->INF->CT	€ 59,015.7	2.785	€ 5,290.2	-0.062	dominated	€ 6,532
bINF->VED->bADA->CT	€ 61,989.3	2.695	€ 8,263.8	-0.152	dominated	€ 11,308
bADA->UST->VED ->CT	€ 67,191.9	2.822	€ 13,466.4	-0.025	dominated	€ 13,964
bADA->VED->UST-> CT	€ 70,408.6	2.812	€ 16,683.0	-0.035	dominated	€ 17,380
UST->bADA->VED->CT	€ 71,261.9	2.759	€ 17,536.4	-0.088	dominated	€ 19,289
bINF->UST->VED->CT	€ 73,711.8	2.726	€ 19,986.3	-0.121	dominated	€ 22,398
bINF->VED->UST->CT	€ 76,896.4	2.716	€ 23,170.9	-0.130	dominated	€ 25,779
UST->VED->bADA->CT	€ 78,426.5	2.759	€ 24,701.0	-0.088	dominated	€ 26,458

Note: CT= Conventional Therapy, bADA= Adalimumab biosimilar, bINF= Infliximab biosimilar, VED= Vedolizumab, UST= Ustekinumab, QALY= Quality Adjusted Life Year, ICER= Incremental Cost-Effectiveness Ratio, NMB= Net Monetary Benefit, Dominated= More Costly and Less Effective

CONCLUSIONS

- In the context of moderate-to-severe CD's management, it has been previously shown that early introduction of biologic treatments might become cost-effective[1]. The present study adds up value, by reporting that a biosimilar cycling (bADA then bINF) yield better outcomes (NMB) and QALYs for both the SNS and patients.
- Models such as the one employed here, which incre- mentally compare treatment strategies, are useful to support decision-making since are in line with routine clinical practice where a broad choice of interventions exists. Results warrant further research.

REFERENCES

1. Pillai N, Dusheiko M, Burnand B, Pittet V. A systematic review of cost-effectiveness studies comparing conventional, biological and surgical interventions for inflammatory bowel disease. PLoS One. 2017 Oct 3;12(10):e0185500. doi: 10.1371/journal.pone.0185500.
2. Cortés X F-SL, Márquéz L, Ramos L, Díaz Rubio C, Planellas L, Gasche David. The Burden of Ulcerative Colitis and Crohn's Disease in Spain. Revista Española de la Economía de Salud (EDS). 2016;11(5):902-13.
3. Biosim. Análisis de impacto presupuestario de los medicamentos biosimilares en el Sistema Nacional de Salud de España (2009-2022).
4. Vedolizumab for treating moderately to severely active Crohn's disease after prior therapy. National Institute for Health and Care Excellence (NICE). 2015. Available from: https://www.nice.org.uk/ guidance/ta352/documents/crohns-disease-moderate-to-severe-vedolizumab-committee-papers2. [Accessed: March 30th, 2022].
5. Hodgson R, Biswas M, Mebrahtu T, Walton M, Harden M,Woolacott N, Ustekinumab for treating moderately to severely active CD after prior therapy: A Single Technology Appraisal. CRD/CHE, University of York, 2017.
6. https://tools.ispor.org/PEguidelines/countrydet.asp?c=20&t=4 . Accessed March 2022
7. Asesoría en Contratación Pública Sanitaria. Available from: https://www.acobur.es/. [Accessed: March 30th, 2022].
8. Torres J, et al. ECCO Guidelines on Therapeutics in Crohn's Disease: Medical Treatment. J Crohns Colitis. 2020;14(1):4-22. Epub 2019/11/12.
9. Centro de información online de medicamentos de la Agencia Española de Medicamentos y Productos Sanitarios. Available from: https://cima.aemps.es/cima/publico/home.html. [Accessed: March 30th, 2022].

Poster – Congress ISPOR 2022 - May 15-18