EE330

ECONOMIC BURDEN OF BIOLOGIC THERAPY FOR CHINESE PATIENTS WITH CROHN'S DISEASE

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Background

- Crohn's disease (CD) is a chronic and recurrent inflammatory bowel disease with an estimated prevalence of up to 0.40 cases per 100,000 person-years in China[1].
- Patients with CD suffer from a heavy disease burden, poor quality of life, and financial problems[2].
- Currently, there is no cure for CD, and treatment modalities aim at prolonging the periods of remission by controlling inflammation and preventing flare-ups[3].
- Biological therapies, such as α4β7 integrin inhibitor, anti-TNF-α and IL-12/23, are used to treat moderately-to-severely active CD. The effectiveness of various biologic therapies has been demonstrated [4].
- In China, several biologic therapies and their biosimilars are available for treating CD, including vedolizumab, infliximab and its biosimilars, adalimumab and its biosimilars, and ustekinumab.
- However, the economic burden caused by each treatment is rarely discussed. Such information is particularly useful for informing clinical practice and hospital listing.

Objective

- **This study aimed to evaluate the economic burden of vedolizumab, infliximab and its biosimilars, adalimumab and its biosimilars, and ustekinumab for CD patients from Chinese societal perspective.**

Methods

- This study compared the economic burden of various treatments by calculating the average annual cost of each treatment.
- The economic burden of patients included direct medical costs, direct non-medical costs, and indirect costs.
- Direct medical cost consisted of drug acquisition, administration, adverse event, disease management and surgery (including surgical complication management).
  - The number of vials and injections for each treatment were taken from approved prescribing information.
  - The annual cost of drug acquisition was calculated based on the average cost of the induction and subsequent years.
  - Biosimilars were assumed to have the same number of injections and vials, disease status, surgery rate and adverse events as their proprietary biologics.
  - The price of proprietary biologics (i.e. branded vedolizumab, infliximab, adalimumab, and ustekinumab) was obtained from the Yaozhi database. The price of biosimilars infliximab and adalimumab was the average price of those biosimilar drugs.
  - Costs of administration, adverse event, disease management, surgery and surgical complication management were obtained from published literature.
- Direct non-medical cost considered transportation cost.
  - The transportation cost for a single patient visit was assumed to be 60 RMB.
- Indirect cost considered productivity loss.
  - The average work loss per visit was assumed as 0.5 days and the average daily wage of employed population was set as 293 RMB.
  - Also the proportion of labor force population to total population (96%), and the employment rate (0.55) obtained from China Statistical Yearbook (2022) were used to calculate the productivity loss of different treatments.
- All detailed parameters and unit prices are shown in Table 1 and Table 2, respectively.

Table 1. Parameters information

Parameter	Vedolizumab	Infliximab	Adalimumab	Ustekinumab
Induction year [1]				
No. of injection	8	8	26	5
No. of vial	8	24	30	iv 3+sc 4
Subsequent year [1]				
No. of injection	6.5	6.5	26	4.33
No. of vial	6.5	19.5	26	4.33
52-week clinical data[2]				
Remission	51.5%	27.9%	40.3%	48.8%
Response	65.2%	37.9%	46.6%	58.1%
Adverse event [3]				
Severe infection	1.87%	4.49%	1.80%	1.42%
Tuberculosis	0%	0.28%	0%	0%
Lymphoma	0%	0%	0%	0%
Acute allergic reaction	0%	0%	0%	0%
Skin reaction	0.53%	0%	0%	0%

Source: 1. SmPC; 2. Based on GEMINI-II, ACCENT-1(Hanauer et al., 2002), CLASSIC-Ⅱ(Sanborn et al., 2007) and CHARM(Colombel et al.,2002), IM-UNITI (Feagan et al., 2016) trials for anti-TNF naïve patients; 3. ENCORE (Targan et al., 2007), EXTEND (Rutgeerts et al., 2012), Colombel et al., 2010, Ghosh et al., 2003, Sandborn et al., 2005, Sandborn et al., 2007b, Sandborn et al., 2007c, Sandborn et al., 2011, Schreiber et al., 2005, Schreiber et al., 2007, Targan et al., 1997, Watanabe et al., 2011, Winter et al., 2004.

Table 2. Unit prices

Items	Unit cost (RMB)	Items	Unit cost (RMB)
Drug[1]		**Management[3]**	
Vedolizumab (per 300 mg vial)	4980	Relief (CDAI ≤ 150)	16,090
Infliximab (per 100 mg vial)	2006.8	Mild (CDAI 150-220)	18,337
Infliximab biosimilars (per 100 mg vial)	1272	Moderate/severe (> 220)	81,100
Adalimumab (40 mg)	1290	**Adverse event[4]**	
Adalimumab biosimilars (40 mg)	992	Severe infection	9,357
Ustekinumab (intravenous 130 mg)	2531.2	Tuberculosis	4,275
Ustekinumab (subcutaneous 90 mg)	7340.6	Lymphoma	67,222
Injection[2]	307.2	Acute allergic reaction	1,351
Surgery[2]	68,594	Skin reaction	257
Surgery complications[3]	2,132	**Transportation (per visit) [4]**	60
Work lost (per visit) [4]	0.5 (day)	**Daily wage[5]**	293

Source: 1. Yaozhi database, 2. Zhou T, et al. Front Public Health. 2021, 3. Expert survey, 4. Assumption, 5. China Statistical Yearbook 2022.

Results

- The economic burden of various treatment options ranked from high to low is as follows: infliximab (103,126 RMB), adalimumab (98,053 RMB), adalimumab biosimilar (89,709 RMB), infliximab biosimilar (87,144 RMB), ustekinumab (79,396 RMB), and vedolizumab (78,072 RMB). These results are shown in Figure 1.
- Disease management and drug acquisition cost contributed to most of the burden, representing ≥40% and 30% of total annual cost, respectively.
- Due to the high drug acquisition and disease management costs, infliximab has the highest economic burden.
- Compared to other treatments, adalimumab has the highest number of annual visits, therefore resulting in higher administration costs, transportation costs, and productivity loss.
- Due to lower adverse event and surgery rates and better disease status after treatment, both ustekinumab and vedolizumab resulted in a lower economic burden.

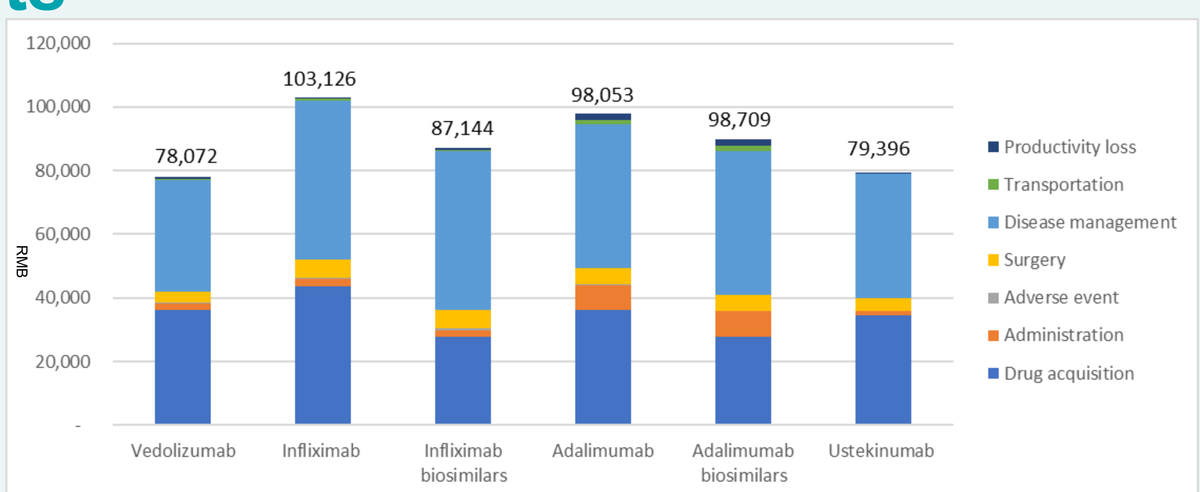

Figure 1. Economic burden of each treatment (annual cost)

Discussion

- To the best of the authors knowledge, the current study is the first study to examine the economic burden of biologic therapy for treating Chinese patients with CD.
- The results show that ustekinumab and vedolizumab are associated with lower economic burden than other biologic therapies.
- In a separate study, vedolizumab demonstrated its cost-effectiveness in treating moderately-to-severely active CD patients in a Chinese setting, compared with conventional therapy [5].
- In the existing literature, one study[6] surveyed 3000 Chinese patients with IBD (1922 with CD) and estimated that the average direct medical cost is 80,734 RMD (11,669 USD) and indirect cost as 518 RMD (74.9 USD). However, it did not separately report the cost of biological therapy.
- Both biosimilars are associated with higher costs than those of ustekinumab or vedolizumab. when considering all cost items (including non-drug costs), biosimilar might not always be the most cost-effective.
- The strength of this study is that all unit prices used in the estimates represented the local costs, reflecting the current situation in China.
- A shortcoming of this study is that it did not include all possible items of non-medical direct cost and indirect cost, such as accommodation or productivity loss of family. Therefore, the economic burden is underestimated.
- To estimate the full impact of biologic therapy to society, future research should explore other items in non-medical direct and indirect costs that are missing in the current study.

Conclusions

- **Vedolizumab and ustekinumab are more economically feasible treatments. These findings can inform clinical practice and hospital listing, ultimately improving the quality of care for CD patients in China.**

Disclosure

- Acknowledgments
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- Conflicts of interest
  - Yanan Sheng and Yaqiu Hu are employees of Takeda (China) International Trading Company.

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