Real-World Assessment of Psoriasis Medication Costs Associated With Biologics Treatment in a Canadian Psoriasis Population

Neil H. Shear, MD[1]; Wendy Dobson-Belaire, PhD, MBA[2]; Ginger Tey, MASc[2];
Jason Goodfield, BSc/HBA[2]; Fei Fei Liu, BSc(Pharm), MBA[3]; Zeba M. Khan, RPh, PhD[4]

[1]University of Toronto, Toronto, ON, Canada; [2]IMS Brogan, Mississauga, ON, Canada; [3]Celgene Inc., Mississauga, ON, Canada; [4]Celgene Corporation, Summit, NJ, USA

BACKGROUND

- The high efficacy of biologic therapies has had a positive impact on patients suffering from moderate to severe forms of psoriasis.
- However, the relatively high efficacy of biologics comes at a significant cost compared with other psoriasis therapies.[1,2] In a 2007 report, Boudreau et al[3] estimated that the total costs of biologic medications used in psoriasis was ~$30.1 million annually in Canada based on standard recommended dosing regimens. Therefore, understanding the per-patient medication cost of biologic therapies is important for informing healthcare budgets and ensuring appropriate resource allocation.

OBJECTIVES

- Quantify the per-patient first-year cost of psoriasis treatment after initiating biologics in a Canadian psoriasis patient population

METHODS

Data

- The study was conducted using IMS Brogan's Canadian national private drug plan (PDP) and Ontario (OPDP) and Quebec (RAMQ) provincial public drug plan databases. All 3 are administrative claims–based databases, with ~70% national market coverage for PDP and 100% and 75% market coverage for OPDP and RAMQ, respectively.

Study Period

- This retrospective study was conducted from October 1, 2006 to December 31, 2011.

Patient Selection

- Psoriasis patient diagnosis was inferred using a medication claim algorithm validated previously. Briefly, patients were required to have ≥2 medication claims for psoriasis medications with limited multi-indication use, defined as "Psoriasis-Defining Molecules" between October 2007 and September 2013. See **Table 1** for a summary of molecules used.
- Patients meeting the diagnosis criteria were then selected if they had ≥1 claim (index claim) for either adalimumab, etanercept, infliximab, or ustekinumab from October 2007 to September 2010 and were naïve to biologic therapy based on a 12-month washout period prior to their index claim. A subset of patients persistent on their respective therapies for a minimum of 1 year was also analyzed. Persistence was defined as having ≤60-day gap between index medication refills.

Table 1. List of Molecules Used to Define the Patient Population

Molecules Used to Define a Psoriasis Patient*	Molecules Used to Define the Study Population§
Acitretin	Adalimumab
Calcipotriol	Etanercept
Calcipotriol + betamethasone dipropionate	Infliximab
Calcitriol	Ustekinumab
Methoxsalen	
Trioxsalen	

*Patients with ≥2 claims for any of these molecules from October 2007 to September 2013 were classified as psoriasis patients.
§Patients naïve to biologic therapy and persistent on one of these biologic therapies for ≥1 year were included in the study.

Dose Elevation Calculation

- A dose elevation event was identified if ≥2 consecutive claims with a dose elevation ratio of ≥1.2 were observed, signaling a ≥20% increase from the monograph-recommended dose.
- The dose elevation ratio was defined as the days' supply for the studied claim divided by the duration to the next refill claim.
- Days' supply was standardized based on the claim cost vs. the expected cost associated with the treatment intervals specified in Canadian drug monographs.

Drug Cost Calculation

- The total drug cost for any patient included in the analysis was a summation of the reported claim cost for all medications used for the management of psoriasis within the first year of biologic initiation, including topical agents, non-biologic systemic molecules, and biologic products. See **Table 2** for a summary of molecules included.

Table 2. List of Molecules Used in Total Drug Cost Calculation

Topical Molecules/Treatments	Non-biologic Systemic Molecules/ Treatments	Biologic Molecules/ Treatments
Amcinonide	Acitretin	Adalimumab
Anthralin	Azathioprine	Etanercept
Anthranol	Cyclosporine	Infliximab
Beclomethasone dipropionate	Hydroxychloroquine	Ustekinumab
Betamethasone dipropionate	Leflunomide	
Calcipotriol	Methotrexate	
Calcipotriol + betamethasone dipropionate	Methoxsalen	
Calcitriol	Sulfasalazine	
Coal tar	Trioxsalen	
Clobetasol		
Clobetasone		
Desonide		
Desoximetasone		
Diflucortolone		
Diphenhydramine HCl + menthol		
Dithranol		
Fluocinolone		
Fluocinonide		
Fluticasone		
Halobetasol		
Halcinonide		
Hydrocortisone		
Mometasone		
Prednicarbate		
Salicylic acid		
Tazarotene		
Triamcinolone		

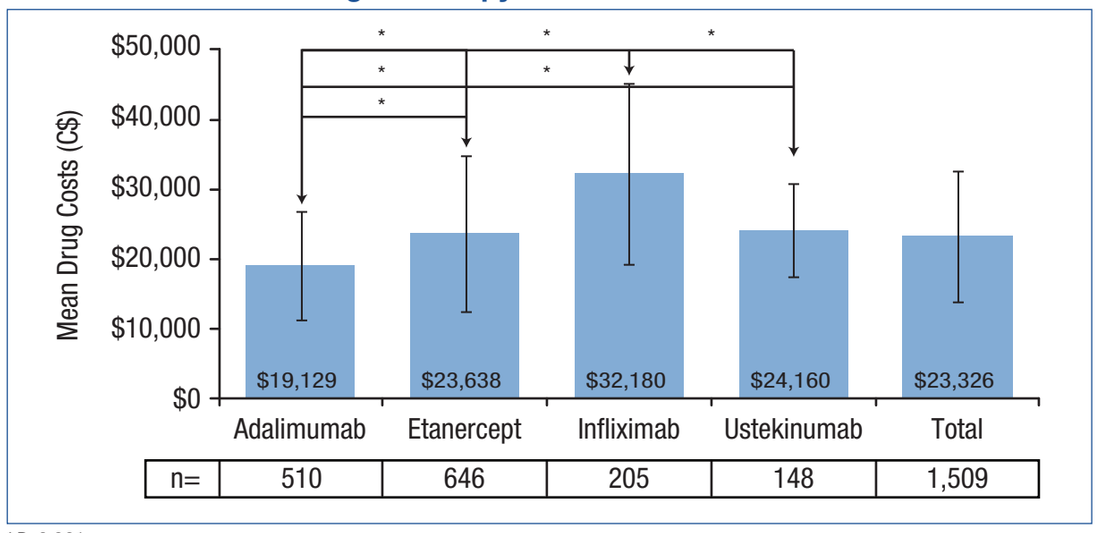
Statistical Testing

- One-way analysis of variance (ANOVA) followed by pairwise comparisons was used to evaluate cost differentials among patients taking differing index biologic products.

RESULTS

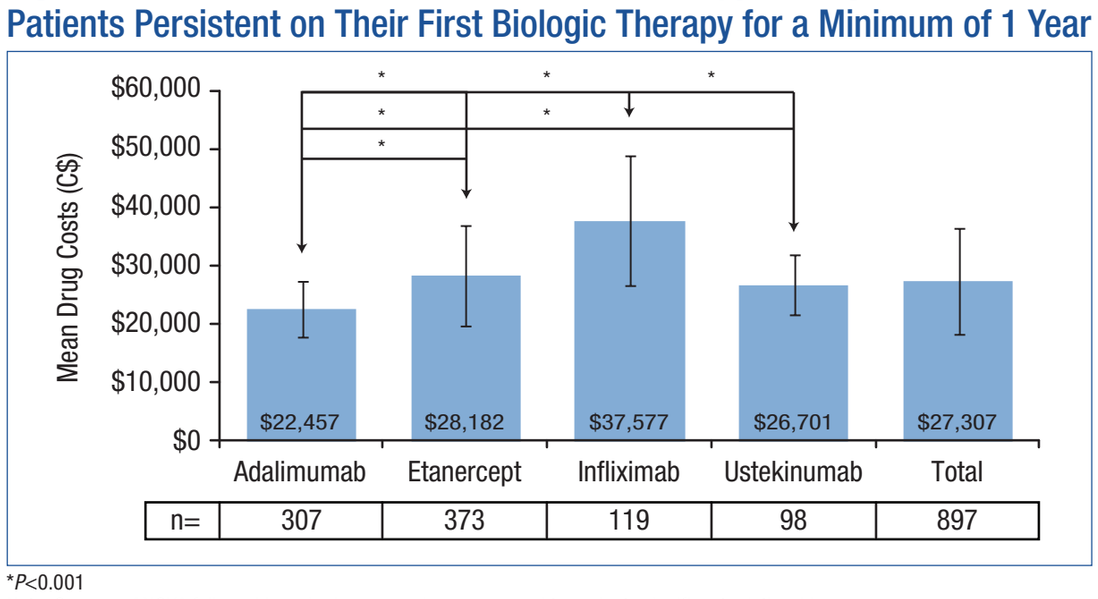
- A cohort of 1,509 patients met the criteria for inclusion in the study (i.e., were naïve to biologic therapy and submitted a claim for their first biologic product within the selection period). A subset of 897 patients persistent on their first biologic therapy for a minimum of 1 year were also selected for the comparison study.
- As shown in **Figure 1**, the mean first-year medication cost across all patients after biologic initiation was C$23,326 (N=1,509). Patients treated with infliximab had the highest drug cost (C$32,180; n=205) vs. ustekinumab (C$24,160; n=148; *P*<0.001), etanercept (C$23,638; n=646; *P*<0.001), and adalimumab (C$19,129; n=510; *P*<0.001). Both ustekinumab (*P*<0.001) and etanercept (*P*<0.001) patient costs were significantly higher than those for adalimumab.
- Similar trends were seen among the subset of persistent patients (n=897), but, compared with all patients who initiated on a biologic, costs were higher across all studied biologics (mean: C$27,307), as shown in **Figure 2**.
- As shown in **Figure 3**, biologic dose elevation among persistent patients was associated with significantly higher costs across all studied biologics for the first year of treatment (n=262; *P*<0.002), with a mean increase of C$9,841.

Figure 1. Mean Cost of Psoriasis Therapy Among Psoriasis Patients in Their First Year of Biologic Therapy



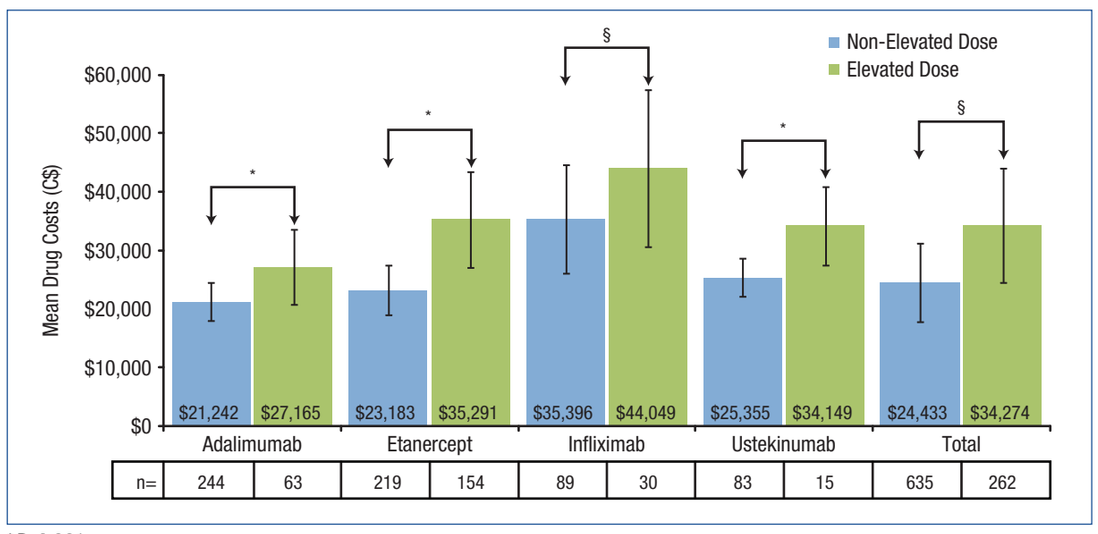
*P<0.001
Note: One-way ANOVA followed by pairwise comparisons was used to evaluate significant relationships.

Figure 2. Mean First-Year Cost of Psoriasis Therapy Among Psoriasis Patients Persistent on Their First Biologic Therapy for a Minimum of 1 Year



*P<0.001
Note: One-way ANOVA followed by pairwise comparisons was used to evaluate significant relationships.

Figure 3. Comparison of the Mean First-Year Cost of Psoriasis Therapy Among Psoriasis Patients Persistent on Their First Biologic Therapy for a Minimum of 1 Year Who Dose Elevate or Do Not Dose Elevate



*P<0.001
§P<0.002
Note: One-way ANOVA followed by pairwise comparisons was used to evaluate significant relationships.

LIMITATIONS

- Psoriasis diagnosis was inferred based on a validated medication claims algorithm; therefore, the studied biologics' use for the treatment of psoriasis cannot be completely assured.
- Drug costs are based on list price plus pharmacy markup and do not reflect negotiated pricing agreements or manufacturer assistance programs.
- The costs shown include the loading dose and therefore should not be extrapolated past the first year.
- Since the amount of biologic therapy for dose elevation consideration was standardized to claim cost, dose increases in drugs with flat pricing, such as ustekinumab, could be underestimated.
- Dose elevation among individuals who were not persistent on their respective biologic therapies was not evaluated.
- This study does not consider the efficacy, safety, or clinical value of the mentioned therapies, which are other key metrics in patient therapy decisions.

CONCLUSIONS

- Biologic treatments represent significant changes to the treatment paradigm of psoriasis. However, they represent a substantial medication cost burden, which can be further amplified by the impact of dose elevation.
- Our research suggests that the cost of biologic treatment in Canada may be even higher than previous estimates[3] when considering the need for additional therapies or higher doses in some patients.

REFERENCES

1. Beyer V, Wolverton SE. Recent trends in systemic psoriasis treatment costs. *Arch Dermatol*. 2010;146:46-54.
2. Poulin Y, Langley RG, Teixeira HD, et al. Biologics in the treatment of psoriasis: clinical and economic overview. *J Cutan Med Surg*. 2009;13(Suppl 2):S49-S57.
3. Boudreau R, Blackhouse G, Geree R, et al. Adalimumab, alefacept, efalizumab, etanercept, and infliximab for severe psoriasis vulgaris in adults: budget impact analysis and review of comparative clinical- and cost-effectiveness. Available at: https://www.cadth.ca/sites/default/files/pdf/I3011_TIMS-Severe-Plaque-Psorasis_tr_e.pdf.

This research was sponsored by Celgene Corporation. The authors would like to acknowledge Richard Borrelli, Rolin Wade, Kristen Reidel, Marc Duclos, and Oliver Sang for their contributions.

Presented at: the 23rd World Congress of Dermatology; June 8-13, 2015; Vancouver, BC, Canada.