The Economic Cost of Hemophilia A Treatment in Canada: A Multi-Center, Retrospective Study

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Introduction

- Hemophilia A (HA) is an inherited bleeding disorder, for which the standard treatment in Canada is prophylactic infusion of clotting factor (CF) VIII (FVIII).
- Additional on-demand infusions of FVIII or other CF may be administered to treat bleeds as needed.
- Up to 35% of patients with HA (PwHA) will develop inhibitors to FVIII.[1,2,3] These patients are treated with bypassing agents, which may involve frequent and/or large dose infusions.
- Although HA is a rare disease, there is a substantial economic burden.

Objectives

- Determine the average annual cost for the treatment of severe or moderate patients with HA with inhibitors (inh+) and without inhibitors (inh-) in Canada.

Subjects and Methods

- Retrospective study using the Canadian Bleeding Disorder Registry data and medical records from 2014 to 2016 at 4 Canadian Hemophilia Treatment Centres.
- Healthcare resource utilization (HRU) was quantified in Canadian dollars and included:
- CF
- Healthcare visits
- Tests, hospitalizations
- Emergency department (ED) visits

Results

- N=56 HA)(Table 1)(7 moderate, 49 severe)
- 5 of 56 patients were inh+)(Table 1), all severe
- There were 31 hospitalizations among 16 inh- and 4 among 2 inh+ patients
- Median annual ED visits was 1 (0,5) and 0 (0,7) for inh+ and inh- patients respectively
- Three inh+ patients had at least one surgery.

Results

- Average total healthcare cost was $310,774 CAD in 2014, $327,331 CAD in 2015 and $369,018 CAD in 2016 for inh- patients (Tables 2-4).
- Average total healthcare cost for inh+ increased from $1,049,488 CAD in 2014 to $1,707,589 CAD in 2016 (Tables 2-4).
- Over 97% of the cost was attributed to CF.

Table 1: ABR by year, inhibitor status and age groups

Year	Age	inhibitors + <12	inhibitors + 12 to 17	inhibitors + >17	inhibitors + Total	inhibitor - <12	inhibitor - 12 to 17	inhibitor - >17	inhibitor - Total
	Total Patients	3	2	---	5	19	17	15	51
2014	Patients with ABR*	3	2	---	5	9	7	12	28
	Total Bleeds (Patients with Bleeds)	10 (2)	34 (2)	---	44 (4)	10 (5)	9 (5)	93 (9)	112 (19)
	Mean [Min - Max]	5 [4 - 6]	17 [2 - 32]	---		2 [1 - 5]	1.8 [1 - 4]	10.33 [1 - 33]	
2015	Patients with ABR*	3	2	---	5	10	5	13	28
	Total Bleeds (Patients with Bleeds)	13 (3)	15 (1)	---	28 (4)	12 (7)	3 (3)	33 (10)	48 (20)
	Mean [Min - Max]	4.33 [3 - 7]	15 [15 - 15]	---		1.71 [1 - 4]	1 [1 - 1]	3.3 [1 - 7]	
2016	Patients with ABR*	3	2	---	5	8	8	14	30
	Total Bleeds (Patients with Bleeds)	8 (3)	36 (1)	---	44 (4)	13 (6)	3 (3)	60 (10)	76 (19)
	Mean [Min - Max]	2.67 [2 - 4]	36 [36 - 36]	---		2.17 [1 - 3]	1 [1 -1]	6 [1 - 26]	

Table 2: Average Health Care Costs in 2014 in CAD

2014	Severe				Moderate			
	Inhibitors +		Inhibitor -		Inhibitors +		Inhibitor -	
Item	Pediatric (n= 5)	Adult	Pediatric (n= 28)	Adult (n=13)	Pediatric	Adult	Pediatric (n= 4)	Adult
Factors	1,299,210.69	---	379,301.95	343,137.32	---	---	120,507.50	---
HTC Visits	1,220.60	---	569.00	1.049.38	---	---	807.75	---
Hospitalization	1,579.60	---	3,195.14	444.69	---	---	0	---
Laboratory testing	6,624	---	4,394.48	789.23	---	---	1,170	---
Other Test Costs	346.60	---	194.39	570.38	---	---	89.75	---
Total Average Cost	1,308,981.49	---	387,654.96	344,941.62	---	---	122,575.00	---

Table 3: Average Health Care Costs in 2015 in CAD

2015	Severe				Moderate			
	Inhibitors +		Inhibitor -		Inhibitors +		Inhibitor -	
Item	Pediatric (n= 5)	Adult	Pediatric (n= 31)	Adult (n= 13)	Pediatric	Adult	Pediatric (n= 5)	Adult
Factors	835,494.46	---	418,740.80	222,841.59	----	---	210,162.50	---
HTC Visits	1,077	---	532.71	938.92	---	---	502.6	---
Hospitalization	3,468.60	---	2,451.10	444.69	---	---	0	---
Laboratory testing	6,300	---	2,827.74	2,063.08	---	---	1,404	---
Other Test Costs	430.80	---	401.58	521.65	---	---	307	---
Total Average Cost	846,770.86	---	424,953.93	226,809.93	---	---	212,376.10	---

Table 4: Average Health Care Costs in 2016 in CAD

2016	Severe				Moderate			
	Inhibitors+		Inhibitors -		Inhibitors +		Inhibitors -	
Item	Pediatric (n= 5)	Adult	Pediatric (n= 29)	Adult (n= 13)	Pediatric	Adult	Pediatric (n= 5)	Adult
Factors	1,697,787.88	---	465,107.20	425,185.59	---	---	117,228.75	---
HTC Visits	933.30	---	569.45	635.15	---	---	502.6	---
Hospitalization	1,156.20	---	1,833.41	0	---	---	0	---
Laboratory testing	6,012	---	2,836.55	1,093.85	---	---	1,728	---
Other Test Costs	1,063.55	---	60.97	555.77	---	---	704.4	---
Total Average Cost	1,706,952.93	---	470,407.58	427,470.36	---	---	120,163.75	---

Conclusions

- Direct HRU and costs for standard treatment of HA in Canada increased from 2014 to 2016. The cost for inh+ patients is consistently higher than for inh- patients.
- Exploring treatments that reduce bleeding rates and require fewer infusions may be beneficial in lowering the overall cost of treatment for PwHA.

References

- [1]Hay C. R. M., "The epidemiology of factor VIII inhibitors," Hemophilia, vol. 12, no. s6, pp. 23-29, Dec. 2006. [Online]. http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2516.2006.01362.x/abstract
- [2]Peters M, van der Bom JG, Fijnvandraat K. van Velzen AS, "Effect of von Willebrand factor on inhibitor eradication in patients with severe haemophilia A: a systematic review," vol. 166, pp. 485–95, 2014.
- [3] van den Berg HM, Fischer K, et al. Gouw SC, "Intensity of factor VIII treatment and inhibitor development in children with severe hemophilia A: the RODIN study," vol. 121, pp. 4046-55, 2013.

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- A. Iorio, M. Belletrutti, R.J. Klaassen and A.K. Chan contributed to identifying the potential patients.
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