PHARMACY SYSTEMS OUTCOMES AND POLICY COLLEGE OF PHARMACY

The Impact of a Cost Savings Cap on the Cost Effectiveness of Valoctocogene Roxaparvovec for the Treatment of Hemophilia A in the United States

EE470

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OBJECTIVES

- Valoctocogene roxaparvovec (ValRox) is a new gene therapy for hemophilia A.
- The aim of this study was to assess the cost-effectiveness of ValRox compared with emicizumab, in hemophilia A patients without inhibitors eligible for factor prophylaxis.
- As emicizumab has an annual acquisition cost exceeding $600,000 in the US, we highlight in this assessment a scenario where the cost savings of ValRox were capped using an annual $150,000/quality-adjusted life-years (QALYs) willingness to pay (WTP) threshold.

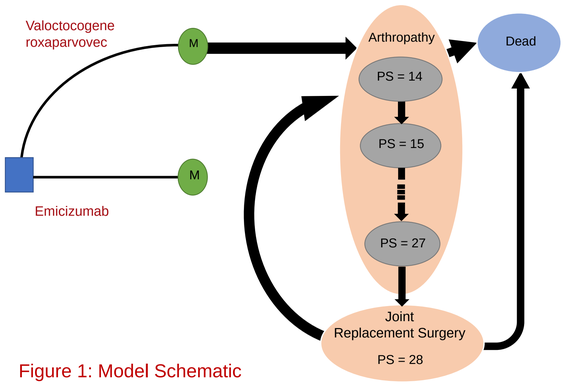


Figure 1: Model Schematic

METHODS

- We developed a semi-Markov model to simulate a cohort of hemophilia A patients' costs and health outcomes (expressed in QALYs) from a healthcare sector perspective across a lifetime time horizon.
- The model structure was based on Pettersson scores (PS) where bleed rates determined transitions across PS.
- Factor VIII (FVIII) level projections and intervention durability were extrapolated using evidence from clinical trials, with all patients switching to emicizumab when FVIII levels fall below 1%.
- ValRox was associated with a small evidence based utility gain.
- The incremental cost per QALY gained and cost per bleed averted were the primary outcomes of interest.
- Scenario analyses followed the "High-Impact Single and Short-Term Therapies" framework developed by ICER
- To explore model uncertainty, we also performed deterministic and probabilistic sensitivity analysis.

Figure 2: Projected Factor VIII Levels Across Cycle

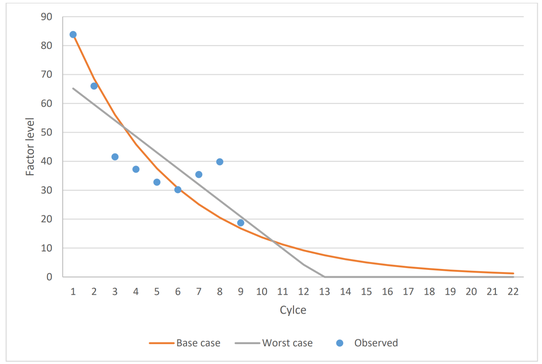


Table 1: Model Inputs

Bleed rates	
Emicizumab (all cycle)	3
Treated joint bleed at factor level 0	2.52
Treated joint bleed at factor level 1	2.52
Treated joint bleed at factor level 2	2.52
Treated joint bleed at factor level 3	2.52
Treated joint bleed at factor level 4	1.42
Treated joint bleed at factor level 5	0.91
Treated joint bleed at factor level 6	0.78
Treated joint bleed at factor level 7	0.8
Treated joint bleed at factor level 8	0.76
Treated joint bleed at factor level 9	0.67
Treated joint bleed at factor level 10	0.48
Treated joint bleed at factor level 11	0.16
Treated joint bleed at factor level 41	0

Utility Inputs	
Health state utility at age <30 and PS 0	0.940
Health state utility at age <30 and PS 1-27	0.820
Health state utility at age <30 and after surgery	0.715
Health state utility at age 30-40 and PS 0	0.840
Health state utility at age 30-40 and PS 1-28	0.740
Health state utility at age 30-40 and after surgery	0.648
Health state utility at age 40-50 and PS 0	0.860
Health state utility at age 40-50 and PS 1-28	0.690
Health state utility at age 40-50 and after surgery	0.607
Health state utility at age 50-60 and PS 0	0.830
Health state utility at age 50-60and PS 1-28	0.630
Health state utility at age 50-60and after surgery	0.557
Health state utility at age ≥60 and PS 0	0.730
Health state utility at age ≥60 and PS 1-28	0.540
Health state utility at age ≥60 and after surgery	0.482
Per cycle utility gain in gene therapy arm	0.012
Disutility of bleeding in a nontarget joint (per cycle)	0.002
Disutility of bleeding in a target joint (per cycle)	0.003

Cost Inputs	
Cost of Valoctocogene Roxaparvovec	$2,809,375
First cycle cost of Emicizumab	$349,620
Per cycle cost of Emicizumab	$303,004
Per bleed FVIII cost	$7,371
Per bleed non-drug cost (18-45years)	$4,914
Per bleed non-drug cost (45+ years)	$7,319
Per cycle arthropathy cost (PS14-28)	$660
Cost of surgery	$47,720
Societal cost per bleed	$1,235
Adverse effect cost (prednisolone)	$11
Adverse effect cost (Higher AE cost)	$2,213

RESULTS

Table 2: Base case results

	Valoctocogene roxaparvovec	Emicizumab	ICERs
Total Drug Cost	$14,282,000	$18,023,000	Dominant
Total Cost	$14,720,000	$18,624,000	Dominant
Bleeds	171	177	$650,742
QALYs	19.64	19.54	Dominant
LYs	27.13	27.13	-
evLYs	19.64	19.54	Dominant

QALYs = Quality Adjusted Life Years, Lys = Life Years, evLYs = Equal Value Life Years

Table 3: QALY-Based Threshold Analysis Results for Valoctocogene roxaparvovec

Treatment	Unit Price to Achieve $50,000 per QALY Gained	Unit Price to Achieve $100,000 per QALY Gained	Unit Price to Achieve $150,000 per QALY Gained	Unit Price to Achieve $200,000 per QALY Gained
$150,000 Cap Scenario	$1,961,000	$1,966,000	$1,971,000	$1,976,000
Shared Savings (50:50)	$3,560,000	$3,565,000	$3,570,000	$3,576,000
No Savings*	$334,000	$339,000	$344,000	$349,000
Full Cost-Offset Analysis	$6,901,000	$6,907,000	$6,913,000	$6,918,000

Figure 3: Tornado diagram of incremental cost for Valoctocogene roxaparvovec vs Emicizumab

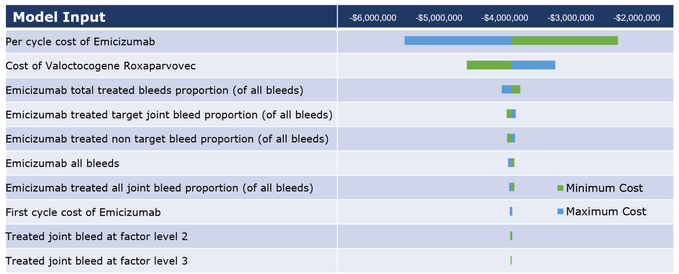
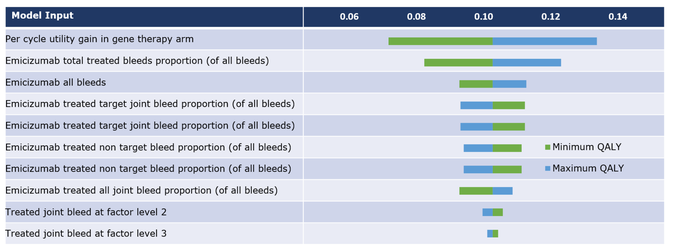


Figure 4: Tornado diagram of incremental QALY for Valoctocogene roxaparvovec vs Emicizumab



RESULTS (CONT.)

- ValRox priced at $2.8M was associated with a lifetime QALY gain of 0.1 and cost savings of $3.9 million in a conventional model.
- When we capped the cost offset attributed to emicizumab displacement at $150,000/year, the cost-effectiveness ratio rose to $8.2million/QALY.
- At a WTP of $150,000 per QALY, the value-based price using the $150,000 cost cap was $1,971,000.

Table 3: Non-SST Scenario Analysis Results

Scenario	Cost/QALY
Extending duration of disutility from bleeds to 7 full days from 2 full days and 5 half days.	Dominant
Doubling the bleed rates for patients with arthropathy across all treatments.	Dominant
A scenario where patients enter at the age of 40 and with a PS of 20.	Dominant
Scenario where surgery returns patients to PS of 20.	Dominant
Scenario where all patients switch at a factor level of 5 IU/ml.	Dominant
Scenario with high AE cost in cycle 1.	Dominant

Table 4: SST Scenario Analysis Results

Scenario	Cost/QALY
Shared savings in which 50% of lifetime health care cost offsets from ValRox are assigned to the health care system instead of being assigned entirely to the gene therapy.	Dominant
Cost-offset cap in which health care cost offsets generated by ValRox are capped at $150,000 per year.	$8,246,000
Optimistic assumptions regarding the benefit of treatment (capped projected bleeds at the 5% factor level)	Dominant
Conservative assumptions regarding the benefit of treatment (linear projected decline in factor levels)	Dominant
Zero net savings.	$23,954,000

CONCLUSION

- This is the first model comparing the cost-effectiveness of ValRox versus emicizumab.
- The $150,000 per year cost cap was highly influential in projecting the cost-effectiveness of ValRox as well as in determining a value based price.

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