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Costs of Treating Hereditary Angioedema (HAE) Attacks with C1 Inhibitors in Four European Countries

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BACKGROUND

Hereditary angioedema (HAE) is a rare genetic disease caused by the deficiency or dysfunction of C1 esterase inhibitor (C1-INH)[1], and characterized by recurring episodes of severe swelling, commonly affecting the skin, gastrointestinal tract, or upper airway (which can be life-threatening). Frequency and severity of attacks vary. Replacement C1-INH therapies provide effective relief; however, there is a lack of comparative data on economic outcomes. Our objective is to compare the differences in costs of treating acute HAE attacks with recombinant and human plasma-derived C1-INHs in four European countries.

Table 1. Acquisition costs of C1 inhibitors in 4 European countries.

	UK	Netherlands	Czech Republic*	Bulgaria*
Ruconest® 2100 U powder and solvent for solution for injection	£750	€863.39	€831.09	€744.02
Berinert® 500 IU / powder and solvent for solution for injection	£550	€535	€518.06	€438.03
Berinert® 1500 IU powder and solvent for solution for injection	£1.650	€1.665	**	**
Cinryze® 500 IU / powder and solvent for solution for injection	£668	€550	**	**

**Prices derived from public database in local currency with the exchange rate of 1/1/2022.*
***Product not available*

METHODS

Acquisition costs recombinant and human plasma-derived C1-INH were collected from public databases for the UK[2], Netherlands[3], Czech Republic[4], and Bulgaria[5] (Table 1). Attack rate (26.9 per year[17]) and the mean number of doses required to control each attack were collected from published studies; data from real-world and open-label studies (OLE) were analyzed separately from randomized controlled studies (RCT) [6–11] (Table 2). Cost per attack was estimated considering the distribution of patient weights and labelled dose regimens[12,13] (Table 3).

Table 2. Re-dosing rates of C1-INH.

	Dose	Real-world/ OLE	RCT
Ruconest®	50 U/kg[14]	0.2%	9.1%
Berinert®	20 U/kg[15]	1.1%	18.6%
Cinryze®	1000 IU[16]	30.9%	65.7%

Table 3. Weight distribution.

Weight category	Proportion of HAE patients
<25 kg	5%
25 – 42 kg	8%
42 – 50 kg	5%
50 – 75 kg	28%
75 – 84 kg	13%
84 – 100 kg	21%
100 – 125 kg	16%
125 – 150 kg	3%
150 – 175 kg	0%

RESULTS

The proportion of patients requiring multiple doses to control an attack ranged from 0.2% to 30.9% in real-world studies and 9.1% to 65.7% in randomized controlled studies. In general, recombinant C1-INH was less expensive than plasma-derived options, due to lower re-dosing rates. Recombinant therapy was less expensive on average in all countries, saving €61 to €520* per attack and €1.640 to €14.000* per patient per year including real-world re-dosing rates, and saving €274 to €843* per attack and €7.376 to €22.673* per patient per year including re-dosing rates from RCT studies (Table 4, Figure 1).

**UK costs, assuming average exchange rate EUR/GBP 2021*

CONCLUSIONS

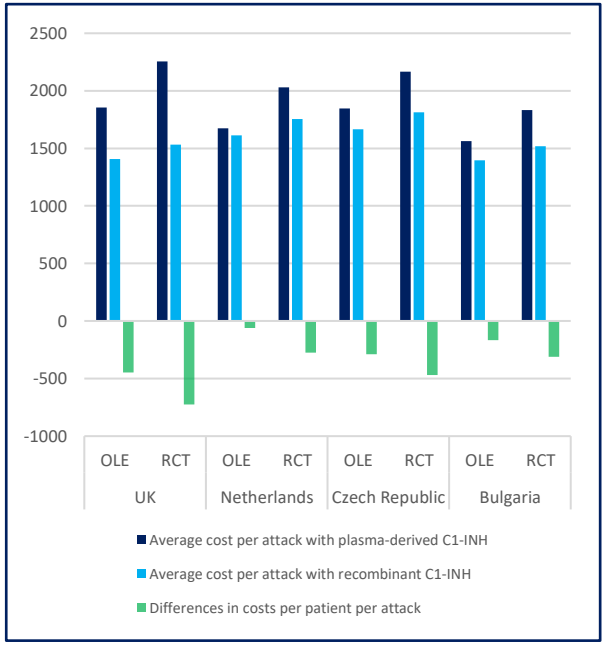
Based on published studies and drug prices, HAE acute attack treatment with recombinant C1-INH may provide savings when compared with plasma-derived products and require fewer repeat doses to control an HAE attack. In addition to the economic impact of re-dosing, future analyses should consider the humanistic impact of rapid control of attacks.

Table 4. Average cost per attack in recombinant versus plasma-derived C1 Inhibitors including re-dosing rates.

	UK		Netherlands		Czech Republic		Bulgaria	
	OLE	RCT	OLE	RCT	OLE	RCT	OLE	RCT
Average cost per attack with Berinert® 500 IU	£1.961	£2.301	€1.908	€2.238	€1.847	€2.167	€1.562	€1.832
Average cost per attack with Berinert® 1500 IU	£1.961	£2.301	€1.908	€2.238	**	**	**	**
Average cost per attack with Cinryze®	£1.749	£2.214	€1.440	€1.823	**	**	**	**
Average cost per attack with Ruconest®	£1.408	£1.533	€1.613	€1.756	€1.560	€1.698	€1.396	€1.520
Average savings per patient per attack	£447	£725	€61	€274	€288	€469	€166	€312
Average savings per patient per year*	£12.036	£19.492	€1.640	€7.376	€7.735	€12.610	€4.454	€8.391

**Annualized costs based on mean attacks per year: 26.9[17]*
***Product not available*

Figure 1. Average cost per attack: recombinant versus plasma-derived C1INH.



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