

# Pharmacoeconomic Evaluation of Different Gonadotropin-Releasing Hormone Analogs in the Treatment Of Children with Central Precocious Puberty in China

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## BACKGROUND

- Central precocious puberty (CPP) is a progressive pediatric endocrine disorder resulting from premature activation of the hypothalamic–pituitary–gonadal axis. Evidence from multiple countries indicates a trend toward earlier pubertal onset and a rising annual incidence of CPP.
- Previous studies have shown that leuprorelin and triptorelin are comparable in terms of safety, clinical suitability and accessibility. However, there were differences in their pharmacoeconomic profiles under the premise that the price of the leuprorelin-3M formulation had not been adjusted at that time<sup>[1]</sup>.
- After volume-based procurements (VBP), there is a lack of latest pharmacoeconomic studies and evidence on Leuprorelin acetate in the treatment of CPP in China. To fill this gap, HEOR studies from different perspectives are needed to demonstrate the clinical and pharmacoeconomic evidences based on health policies, the latest clinical pathways, as well as the different stakeholder needs<sup>[2]</sup>.

## OBJECTIVE

- To evaluate the costs and benefits of three gonadotropin-releasing hormone analogs (GnRHa), leuprorelin acetate 11.25 mg 3-month (3M) depot, leuprorelin acetate 3.75 mg 1-month (1M) depot, and triptorelin 3.75 mg 1-month (1M) depot for the treatment of central precocious puberty children in China.

## Method: Model Design

Model Features	
Model design	Cost-minimization analysis model
Model perspectives	Societal, healthcare provider, patient, and payer perspectives
Target Patients	Children with central precocious puberty
Model comparators	Leuprorelin-3M vs. leuprorelin-1M vs. triptorelin-1M
Time horizon	4 years
Model cycle length	1- month or 3- month
Annual discount rate	4.5 % for the direct medical, direct non-medical and indirect costs
Model Inputs	<ul style="list-style-type: none"> <li>Drug cost</li> <li>Treatment and examination fees</li> <li>Storage costs</li> <li>Injection costs</li> <li>Transportation and accommodation</li> <li>Productivity loss (due to care)</li> </ul>
Reimbursement rate	<ul style="list-style-type: none"> <li>0% for GnRHa drug cost</li> <li>60% for other direct cost</li> </ul>
Model outcomes of interest	<ul style="list-style-type: none"> <li>Total costs</li> <li>Differences of detailed costs</li> </ul>

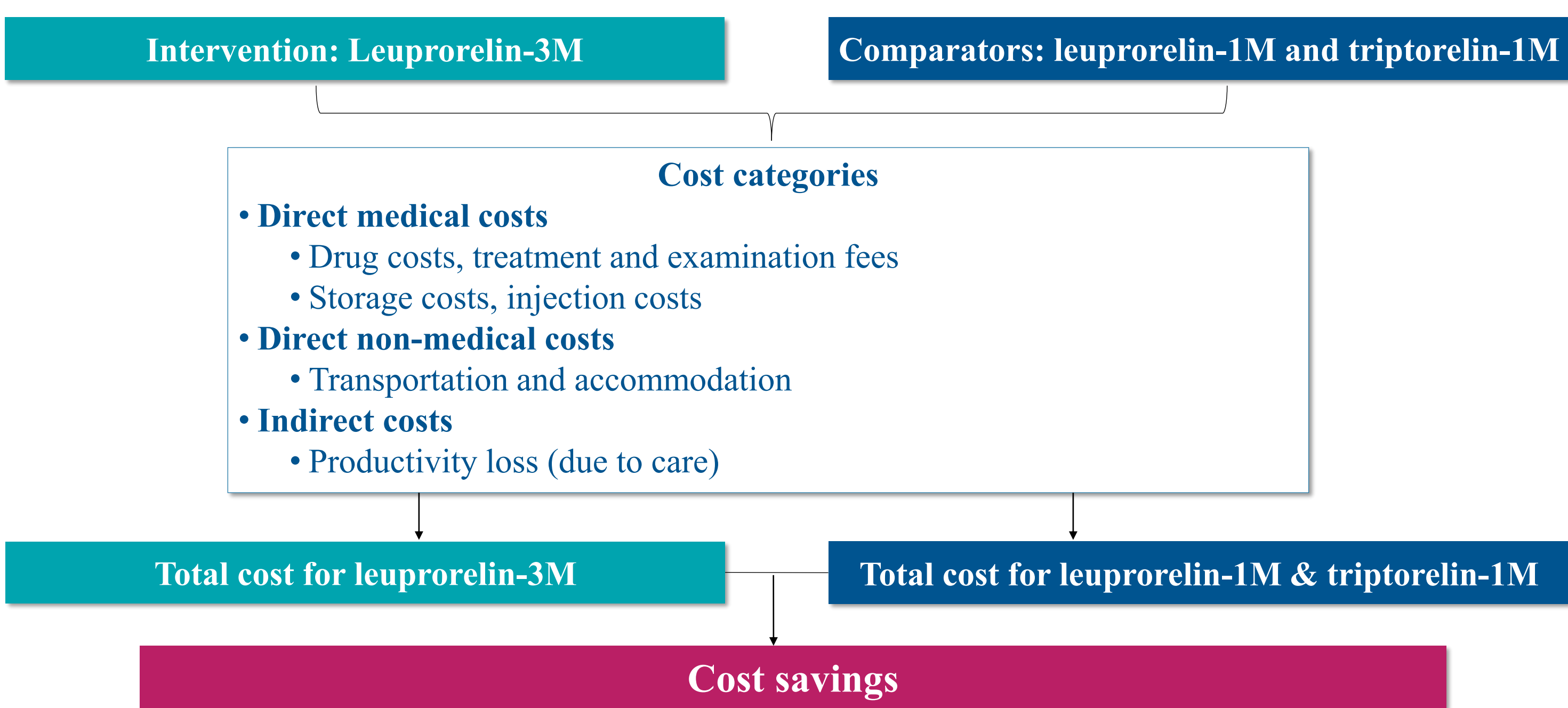


Figure 1: Diagram of Model Structure

## Method: Model Inputs

- Data used in this model were from the published literature and public data sources.
- For the adherence data, it is assumed that the annual visit frequency of treatment-discontinued patients is 50% of that of fully adherent patients<sup>[3]</sup>.

### 2.1 Key Cost Inputs

Key Cost	Amount
<b>Direct Medical Costs</b>	
<b>Drug Unit Prices</b>	
Leuprorelin-3M	\$296.99
Leuprorelin-1M	\$127.95
Triptorelin-1M	\$140.64
<b>Medical Service Item Unit Prices<sup>#</sup></b>	
Registration Fee	\$5.32
Injection (including syringe cost)	\$0.78
<b>Examination &amp; Test Item Unit Prices<sup>#</sup></b>	
Sex Hormone Test	\$36.60
Male B-ultrasound	\$5.67
Uterine B-ultrasound	\$9.93
Breast B-ultrasound	\$5.67
Bone Age Assessment	\$14.75
Medical Insurance Reimbursement Rate	60.0%
<b>Direct Non-Medical Costs</b>	
<b>Transportation Costs<sup>[3]</sup></b>	
Average Transportation Cost Per Visit for Local Patients	\$10.35
Average Transportation Cost Per Visit for Non-Local Patients	\$36.74
<b>Accommodation &amp; Meal Costs<sup>[3]</sup></b>	
Average Daily Meal Cost Per Person	\$12.20
Average Daily Accommodation Cost Per Visit	\$48.94
<b>Added Costs<sup>[4-5]</sup></b>	
Cold Storage Cost	\$0.03
Drug Administration Cost & Injury Management Cost	\$1.16
Drug Administration Cost - Leuprorelin 3M	\$0.23
<b>Indirect Costs<sup>[6]</sup></b>	
<b>Productivity Loss</b>	
Average Number of Sick Leave Days Per Visit for Caregivers of Local Patients	0.50
Average Number of Sick Leave Days Per Visit for Caregivers of Non-Local Patients	1.50
Employment Rate of China's Labor Force in 2025	94.9%
Average Daily Wage Per Capita in 2025	\$54.75
Discount Rate	4.50%

\*All included medical costs were adjusted to 2025 Chinese currency values according to the historic inflation rate of China, which are reported in 2025 US dollars using the exchange rate as of December (¥7.05 for \$1). <sup>#</sup>Based on the medical service price schedules of six provinces/municipalities in China.

### 2.2 Adherence Inputs<sup>[3]</sup>

Drug	Indicator	Year 1	Year 2	Year 3	Year 4	Annual Visit Frequency
Leuprorelin-3M	Persistence Rate	100.00%	90.00%	90.00%	80.00%	4
	Discontinuation Rate	0.00%	10.00%	0.00%	10.00%	2
Leuprorelin-1M	Persistence Rate	100.00%	90.00%	90.00%	80.00%	12
	Discontinuation Rate	0.00%	10.00%	0.00%	10.00%	6
Triptorelin-1M	Persistence Rate	100.00%	90.00%	90.00%	80.00%	12
	Discontinuation Rate	0.00%	10.00%	0.00%	10.00%	6

### 2.3 Product Cost per Unit<sup>[4-5]</sup>

	Leuprorelin-1M (Branded Drug)	Leuprorelin-1M (Generic Drug)	Triptorelin-1M	Difference(*20000 vials)
Storage Conditions	Store at room temperature; no refrigeration required	Refrigeration required	Refrigeration required	/
Cold Storage Cost	-	\$0.02 (¥0.17)	\$0.02 (¥0.17)	\$480 (¥3387)
Administration Time (minutes)	0.81	1.24	1.24	8600
Administration Cost	\$0.23 (¥1.62)	\$0.35 (¥2.48)	\$0.35 (¥2.48)	\$2,440 (¥17200)
Additional Syringe Cost	-	\$0.04 (¥0.30)	\$0.04 (¥0.30)	\$851 (¥6000)
Scratch Treatment Cost	-	\$0.76 (¥5.38)	\$0.76 (¥5.38)	\$15,276 (¥107692)
Total Cost	\$0.23 (¥1.62)	\$1.18 (¥8.33)	\$1.18 (¥8.33)	\$19,047 (¥134279)

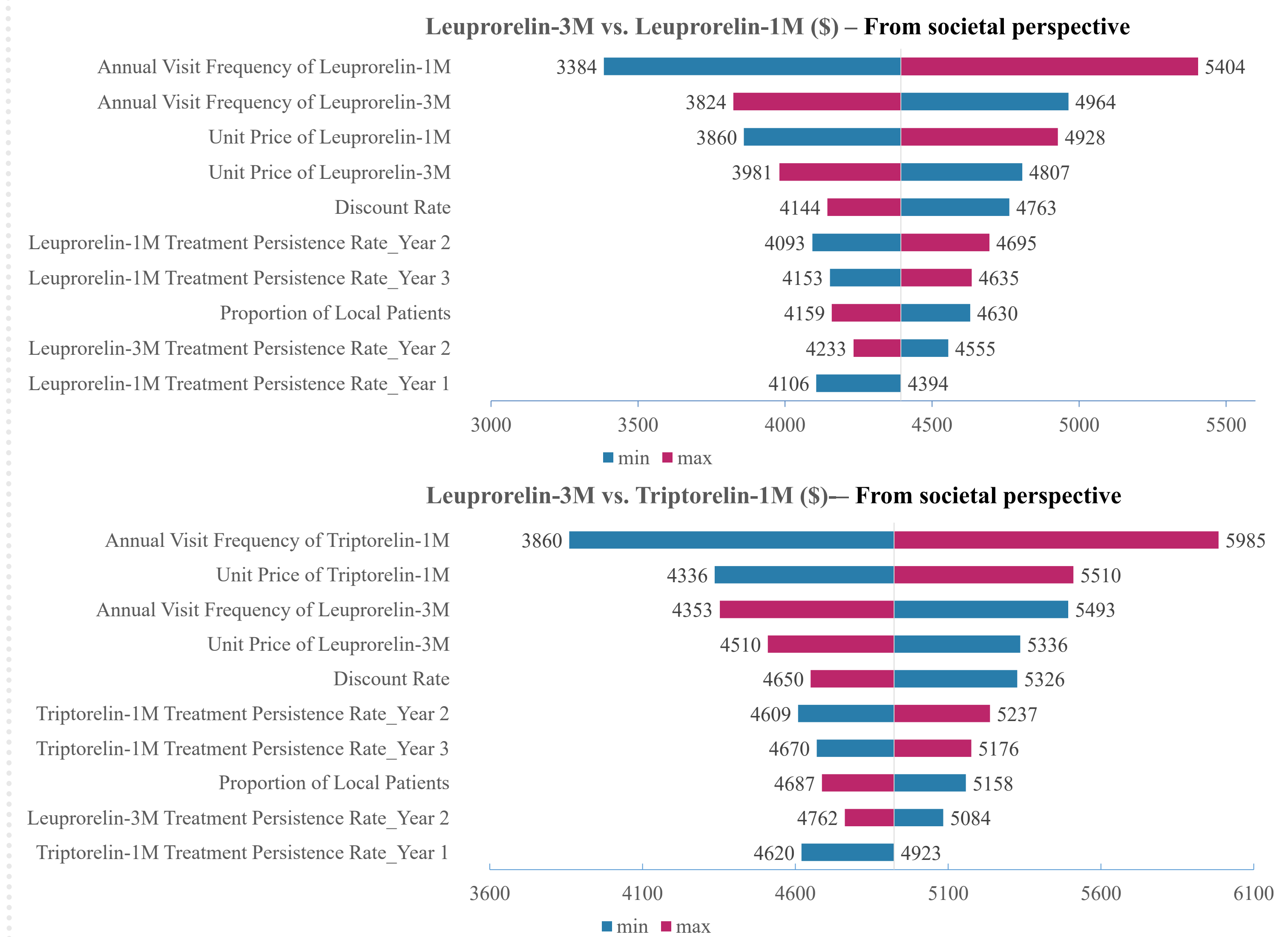
Assuming that a hospital uses 20,000 vials of 1M GnRHa formulations annually, Leuprorelin-1M (branded drug) could save \$ 19,047 and reduce administration time by 143.33 hours compared with Leuprorelin-1M (generic drug) and Triptorelin-1M. For GnRHa drugs with the same 3-month formulation, direct non-medical costs and indirect costs are expected to be comparable; therefore, the economic comparison can be based primarily on drug price.

## Result 1: Base-Case Analysis

Societal Perspective – 4 Years Total	Leuprorelin-3M	Leuprorelin-1M	Triptorelin-1M
<b>Direct Medical Costs</b>	<b>\$4,485.89</b>	<b>\$5,910.27</b>	<b>\$6,438.97</b>
Drug Costs	\$4,131.82	\$5,340.36	\$5,870.06
Treatment Fees	\$84.86	\$254.57	\$254.57
Examination Fees	\$266.01	\$266.01	\$266.01
Storage Costs	\$0.00	\$1.00	\$0.00
Injection Costs	\$3.20	\$48.34	\$48.34
<b>Direct Non-Medical Costs</b>	<b>\$898.53</b>	<b>\$2,695.60</b>	<b>\$2,695.60</b>
Transportation Costs	\$336.63	\$1,009.88	\$1,009.88
Accommodation & Meal Costs	\$561.90	\$1,685.71	\$1,685.71
<b>Indirect Costs</b>	<b>\$585.72</b>	<b>\$1,757.15</b>	<b>\$1,757.15</b>
Caregiver Labor Productivity Loss	\$585.72	\$1,757.15	\$1,757.15
<b>Total Cost</b>	<b>\$5,970.14</b>	<b>\$10,363.02</b>	<b>\$10,891.73</b>

Over the 4-year study period, treatment with leuprorelin-3M resulted in total cost savings of \$4,393 (vs. leuprorelin-1M) and \$4,922 (vs. triptorelin-1M) from the societal perspective, and yielded cost savings from other perspectives. With a 1-year time horizon, Leuprorelin-3M remained economically favorable versus Leuprorelin-1M and Triptorelin-1M across different perspectives.

## Result 2: One-Way Sensitivity Analysis



One-way sensitivity analysis suggested that the most influential factors were the annual visit frequencies of leuprorelin-1M, triptorelin-1M, and leuprorelin-3M. But the uncertainty has limited impact on results.

## CONCLUSIONS

- Leuprorelin-3M has economic advantages over leuprorelin-1M and triptorelin-1M by reducing the number of hospital visits and lowering treatment costs, benefiting multiple parties including healthcare providers, patients and payers.
- Sensitivity analyses suggested that model uncertainty had a limited effect on the results, further supporting Leuprorelin-3M as a favorable treatment option.

## LIMITATIONS

- For triptorelin-6M has a low market share, it is not included in the model.

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