Cost-Effectiveness of a Connected Injection Device for Pediatric Growth Hormone Deficiency (GHD) in Spain: A Scenario-Based Microsimulation Analysis Using Real-World Data

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CONCLUSIONS

Easypod® vs Non-connected r-hGH devices in pediatric growth hormone deficiency (GHD)

- **Greater height gains**
- **Lower costs per cm gained**
- **Improved QALYs and efficiency**

- **Easypod® enables early detection of suboptimal adherence, helping clinicians optimize treatment and avoid unnecessary dose increases.**
- **Improved adherence leads to better outcomes (3.9 cm height gained) and reduces treatment burden for parents.**
- **Long-term outcomes and efficiency: Cost-effective within the Spanish NHS threshold, reducing resource use costs and achieving QALY gains.**

INTRODUCTION

- Pediatric growth hormone deficiency (GHD) is associated with impaired growth, reduced adult height, and diminished quality of life.[1]
- Recombinant human growth hormone (r-hGH) is effective when adherence is maintained, but adherence typically declines over time.[2,3]
- Easypod®, a connected injection device, records dosing data and enables real-time monitoring of adherence by patients, caregivers, and physicians.[4]
- By distinguishing suboptimal adherence from low biological response, Easypod® helps avoid inappropriate dose escalations and optimizes treatment.[4]

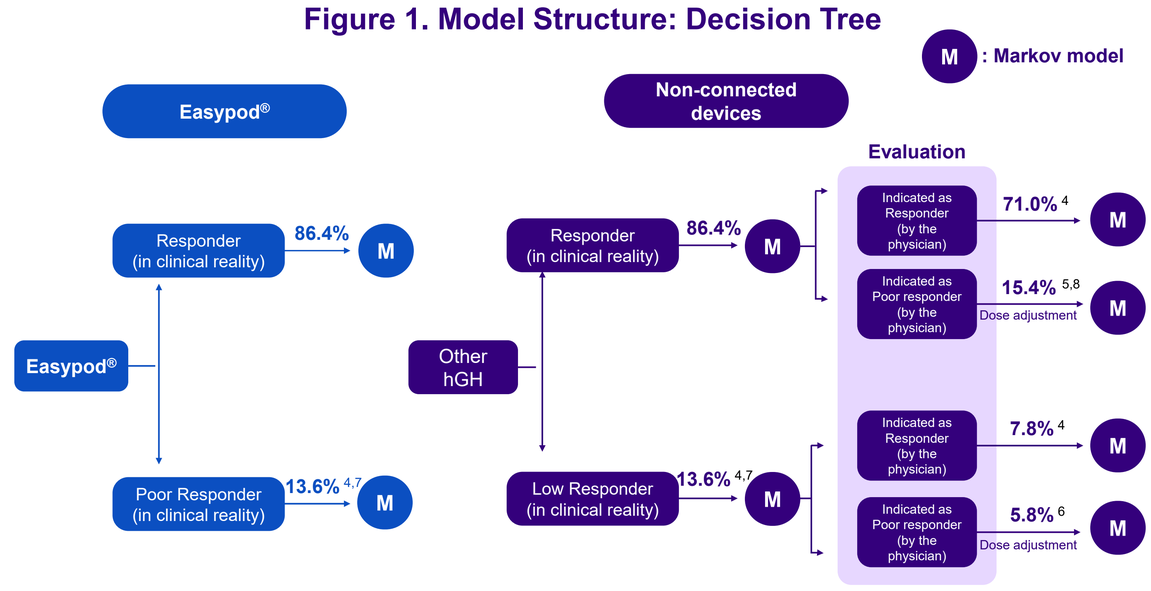
OBJECTIVES

To evaluate the cost-effectiveness of Easypod® versus non-connected devices for pediatric GHD treatment leveraging RWE in Spain.

METHODS

Model type:	Microsimulation of 10,000 pediatric patients (ages 2–13)
Perspective:	Spanish Health System
Time horizon:	Until bone maturation (girls 15 y; boys 17 y)
Structure:	• Decision tree (treatment response) • Markov model (6-month cycles) with 3 adherence states: continuous (>85%), intermittent, discontinuation
Inputs:	• Easypod® adherence from Spanish Real-World Evidence (RWE)[3] • Non-connected device adherence extrapolated from RWE[5] and expert opinion
Adherence-specific scenario analyses:	• **Basecase** continuous adherence Easypod from 96% to 80% by year 4; non-connected devices from 75% to 50% • **Scenario 1:** Initial 6 months adherence as per De Pedro et al. with a decline aligned with Easypod® trend (79% → ~61% by Year 4)[3,5] • **Scenario 2:** First year adherence on average as per De Pedro (79%) with a higher initial adherence for non-connected devices (84% → ~58% by Year 4)[6]
Costs:	Direct medical costs (drugs, visits, monitoring), discounted at 3% annually
Outcomes:	Final height gain (cm), QALYs, ICER, and cost per cm gained

Figure 1. Model Structure: Decision Tree



RESULTS

Base Case

- Easypod® increased final height to **163.0 cm** compared with **159.2 cm** for non-connected devices, corresponding to an incremental gain of **+3.9 cm**.
- The cost per cm gained was **€2,625 with Easypod®** compared with **€3,166 with non-connected devices**, corresponding to a saving of **€541 per cm** (Figure 2).
- The cost per QALY gained with Easypod® was **€27,824**, confirming cost-effectiveness as per Spanish NHS threshold.[9]

Sensitivity and Scenario Analyses

- Easypod® delivered incremental height gains across all scenarios, ranging from **1.3 cm** in patients aged ≥12 years to **7.0 cm** in those aged 2–4 years.
- Gains of **3.8–5.0 cm** were also observed under alternative assumptions, including extended time horizons and higher HSDS responses.
- Across all scenarios, the cost per cm gained remained consistently lower with Easypod®, producing savings of **€359–€647 per cm** (Table 2).
- The cost per QALY ranged from **€20,904** in the extended horizon scenario to **€31,261** in the Years 2-4 subgroup.
- The results were robust across sensitivity analysis and scenario analysis. Under **Adherence Scenarios 1 and 2**, Easypod® achieved **3.1–3.2 cm additional height** compared with non-connected devices. These gains translated into cost savings of **€406–€432 per cm.**

Figure 2. Costs per cm Gained

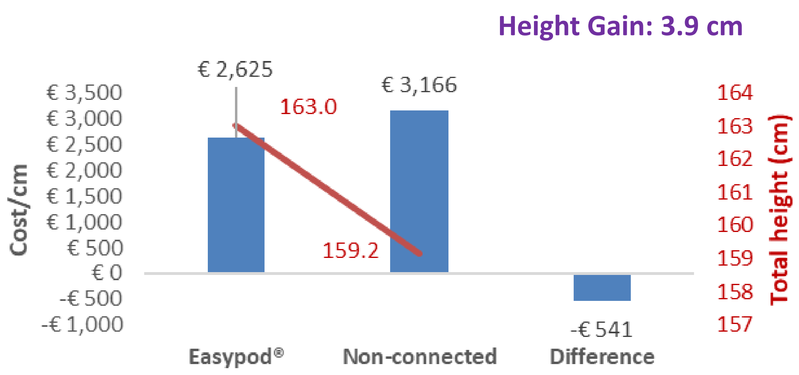


Table 2. Sensitivity and Scenario Analysis

	Difference in cm	Cost per cm Difference (€)	Cost per QALY(€)
Boys (55%)	4.0	€-557	€ 27,945
Time horizon: 17 girls, 19 boys	3.8	€ -560	€ 20,904
Higher HSDS gain	5.0	€ -647	€ 28,471
Years 2 – 4	7.0	€ -559	€ 31,261
Years 5 – 7	4.7	€ -623	€ 27,903
Years 8 – 11	2.9	€ -491	€ 24,767
Years 12+	1.3	€ -359	€ 29,228
Adherence Scenario 1	3.2	€ -432	€ 28,374
Adherence Scenario 2	3.1	€ -406	€ 31,565

Abbreviations: cm, centimeter; €, euro; GHD, growth hormone deficiency; HSDS, height standard deviation score; ICER, incremental cost-effectiveness ratio; NHS, National Health System; QALY, quality-adjusted life year; r-hGH, recombinant human growth hormone; RWE, real-world evidence; y, year

References: [1]Grimberg A, et al. GH/IGF-I treatment guidelines in children. Horm Res Paediatr. 2016;86:361–97. [2]Ranke MB, Lindberg A. Growth responses in prepubertal disorders. J Clin Endocrinol Metab. 2010;95:1229–37. [3]de Arriba A, et al. Connected device and catch-up growth. Front Endocrinol. 2024;15:1450573. [4]Alcón Sáez J, et al. Cost-consequence analysis for recombinant human growth hormone treatment administered via different devices in children in Spain. Economía de la Salud. 2022;17:91–107.[5]De Pedro S, et al. Adherence variability in r-hGH therapy. Growth Horm IGF Res. 2016;26:32–5. [6]Expert opinion [7]Carrascosa A, et al. Height gain at adult-height age in 184 short patients treated with growth hormone from prepubertal age to near adult-height age is not related to GH secretory status at GH therapy onset. Horm Res Paediatr. 2013;79:145-56. [8]Kaspers S, Ranke MB, Han D, et al. Implications of a data-driven approach to treatment with growth hormone in children with growth hormone deficiency and Turner syndrome. Appl Health Econ Health Policy. 2013;11:237-249. [9]Reckers-Droog V, et al. Willingness to pay for health-related quality of life gains in relation to disease severity and the age of patients. Value Health. 2021;24:1182–1192.

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