The impact of lockdown regulations caused by the COVID-19 pandemic on adherence to recombinant human growth hormone therapy: Evidence from real-world data

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CONCLUSIONS

Stringent lockdown regulations during the COVID-19 pandemic appear to have had a positive impact on the proportion of patients achieving optimal adherence to r-hGH therapy supported by the easypod™ connect ecosystem.

Families residing together more often during the pandemic, without holiday periods, may have contributed to the habit of administering a daily injection when using connected digital health technologies.

INTRODUCTION

- The COVID-19 pandemic has both positive and negative impacts on treatment adherence and self-management in pediatric patients with chronic medical conditions. Ongoing monitoring and promotion of adherence and self-management is critical and technology offers several opportunities for this.[1]
- The easypod™ connect ecosystem enables electronic monitoring and can provide insight into the impact of COVID-19 on adherence to recombinant human growth hormone (r-hGH) in patients with growth disorders.

OBJECTIVE

To investigate the impact of COVID-19 lockdown regulations on adherence to r-hGH therapy in patients with growth disorders, using connected digital health technologies and real-world data

METHODS

Adherence data extraction

From easypod™ connect on 7th June 2021 for the periods:

- March 2019–February 2020 (**before** COVID-19).
- March 2020–February 2021 (**during** COVID-19).
- Countries that provided adherence data for ≥50 patients aged 6–18 years before <u>and</u> during COVID-19 were selected.

Adherence categorization

- Optimal (≥85% of prescribed doses administered) versus suboptimal (<85%) in the period before and during COVID-19.

Measures of COVID-19 lockdown regulations

- Extracted from https://ourworldindata.org on 27th June 2021.

Stringency index (SI)

- Composite measure of nine indicators including school/workplace closures and travel bans, rescaled to a value of 0–100.
- Categorised as **high (≥68%** [75th percentile (P75) of SI of all countries with available data]) versus **low (<68%)**.

Proportion of days with school closures

- At all levels (Category 3) or;
- Only at some levels (Category 2).
  – Categorised as **high (≥88% [P75])** versus **low (<88%)**.

Proportion of days with stay-at-home requirements

- Not leaving the house with minimal exceptions (Category 3) or;
- Not leaving the house with exceptions (Category 2).
  – Categorised as **high (≥65% [P75])** versus **low (<65%)**.

RESULTS

- Adherence data were available for **9,562 patients before** and **7,782 patients during** the COVID-19 pandemic from 10 European countries, six South/Latin American countries, two Asian countries, and Canada.
- Data for 11,251 patients were available, of whom 6,093 had adherence data for before <u>and</u> during the pandemic.
  – Mean age was ~11–12 years and mean treatment duration ranged 0–4 years (**Table 1**).

Table 1. Patient demographics during and before the COVID-19 period, by country

Country	During COVID-19*				Before COVID-19†			
	n	Boys, %	Age (years), mean (SD)	Treatment duration (years), mean	n	Boys, %	Age (years), mean (SD)	Treatment duration (years), mean
Czech Republic	351	67	11.7 (3.0)	3.4	341	66	11.6 (3.1)	3.1
Finland	108	69	11.2 (3.3)	3.2	104	73	11.1 (3.1)	2.8
France	375	64	12.1 (2.8)	2.3	390	64	12.2 (2.7)	2.3
Germany	734	62	11.5 (3.1)	3.2	798	60	11.6 (3.1)	3.0
Ireland	76	68	12.5 (3.0)	2.2	74	70	12.1 (3.0)	1.5
Italy	282	56	12.3 (2.7)	2.0	281	56	12.2 (2.7)	1.9
Spain	2,665	54	11.5 (2.8)	2.0	2,528	55	11.4 (2.8)	1.8
Sweden	99	64	12.1 (3.1)	4.8	122	65	12.1 (2.9)	4.7
Switzerland	139	69	12.7 (3.1)	2.8	132	72	12.4 (3.1)	2.5
United Kingdom	513	61	11.8 (3.1)	3.1	540	61	11.6 (3.0)	2.8
Argentina	991	64	11.6 (2.9)	1.8	847	65	11.4 (2.9)	1.3
Brazil	93	60	11.0 (2.5)	1.8	189	60	11.1 (2.6)	1.4
Chile	130	52	12.2 (2.4)	2.2	689	57	11.9 (2.6)	1.5
Colombia	293	55	11.9 (2.7)	1.7	858	55	11.9 (2.6)	1.4
Guatemala	111	50	12.3 (2.7)	1.6	190	49	12.0 (2.6)	1.2
Peru	76	54	11.4 (2.9)	1.8	263	49	11.4 (2.7)	1.0
South Korea	176	58	11.7 (1.8)	1.0	647	53	11.4 (1.8)	0.3
Taiwan	445	58	12.6 (2.2)	1.3	467	58	12.5 (2.3)	1.0
Canada	125	58	11.9 (2.8)	1.1	102	59	11.7 (2.9)	1.1

*Between March 2020–February 2021; †Between March 2019–February 2020

- A **high SI (≥68%)** and a **high proportion of required school closure days (≥88%)** resulted in an **increase in the proportion of patients with optimal adherence to r-hGH therapy** versus the pre-COVID-19 period ($p<0.001$).
  – Stay-at-home requirements showed no statistically significant difference on adherence ($p=0.09$).
- Overall, the proportion of high adherence increased by 3% during the pandemic.
- Six of the nine countries with a high SI showed an absolute increase of >5% (range: 6–18%) in the proportion of patients with optimal adherence. None of the 10 countries with a low SI showed an increase of >5% (range: -3–5%) (**Table 2**).

Table 2. COVID-19 lockdown regulations and effect on optimal adherence, by country

Country	During COVID-19*				Before COVID-19†	
	SI, mean (SD)	Proportion of days with required school closure, %	Proportion of days with stay-at-home requirements, %	Optimal (≥85%) adherence, %	Optimal (≥85%) adherence, %	Absolute difference in optimal adherence (during-before)
Czech Republic	56 (18)	68	36	91	88	3
Finland	46 (14)	40	0	74	77	-3
France	64 (15)	60	52	88	83	5
Germany	64 (14)	63	36	85	80	5
Ireland	**70 (20)**	**88**	48	76	70	6
Italy	**70 (15)**	**94**	53	90	82	8
Spain	67 (13)	66	62	80	83	-3
Sweden	60 (10)	65	0	86	81	5
Switzerland	52 (13)	48	0	74	75	-1
United Kingdom	**70 (16)**	73	38	73	66	7
Argentina	**83 (16)**	**96**	**95**	65	62	2
Brazil	**68 (13)**	**97**	**82**	78	83	-4
Chile	**76 (16)**	**96**	**93**	74	68	6
Colombia	**75 (16)**	**96**	58	71	54	18
Guatemala	**71 (23)**	**96**	53	85	72	13
Peru	**80 (16)**	**97**	**96**	66	67	-1
South Korea	57 (9)	83	8	84	87	-3
Taiwan	25 (3)	0	0	66	69	-3
Canada	67 (13)	**96**	14	89	88	1

*Between March 2020–February 2021; †Between March 2019–February 2020
Bold text = above the cut-off of P75 (68% for SI; 88% for required school closure; 65% for stay-at-home requirements)

Abbreviations: P75, 75th percentile; **r-hGH**, recombinant human growth hormone; **SD**, standard deviation; **SI**, stringency index.

References: 1. Plevinsky JM, et al. *J Pediatr Psychol* 2020;45(9):977-982.

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