Evaluating the Effect of Basic Insurance Inclusion on Physiotherapy Use: The INSPIRE Study (Insurance and Physiotherapy Research Evaluation)

Masterthesis

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ABSTRACT

Background: To promote substitution of care, the Dutch basic health insurance (BHI) package has expanded in recent years to include physiotherapy for conditions such as knee/hip osteoarthritis (KHOA), intermittent claudication (IC), and chronic obstructive pulmonary disease (COPD). These additions aim to improve access to evidence-based conservative care. However, it remains unclear how they have affected physiotherapy utilisation in practice.

Aim: This study examines trends in physiotherapy use for KHOA, IC, COPD, and urinary incontinence (UI) between 2015 and 2023. The primary aim is to assess the impact of BHI inclusion on utilisation patterns; the secondary aim is to evaluate changes in the number of consultations per treatment episode.

Methods: We conducted a retrospective cohort study using data from the Nivel Primary Care Database (Nivel-PCD), covering over 1.4 million patients from 626 physiotherapy practices in 2023 alone. Annual physiotherapy episodes per diagnosis group were analysed using multilevel Poisson regression models, with adjustment for practice-level clustering. Predicted yearly values were visualised to assess trends before and after inclusion in the BHI.

Results: The inclusion of physiotherapy in the BHI was associated with distinct utilisation patterns across diagnostic groups. Following coverage in 2017, IC treatment episodes increased, before stabilising at a higher level than before inclusion. KHOA showed a gradual decline in annual treatment episodes post-inclusion, while COPD annual treatment episodes dropped by nearly 50% after 2019. Across all groups, the number of consultations per treatment episode decreased over time.

Conclusion and key findings:
BHI coverage influences physiotherapy utilisation, but effects vary by condition. While access increased for some groups, other conditions showed declining use, potentially due to financial or administrative effects, or evolving guidelines. These findings highlight the need for policies that address both utilisation and equitable access to care.

Keywords:
Physiotherapy, Basic Health Insurance, Utilization Trends, Chronic Conditions, Health Policy, Multilevel Modelling, Nivel Primary Care Database

INTRODUCTION

Healthcare costs are rising, and policies are increasingly focusing on shifting hospital care to primary care. This strategy is known as substitution of care and follows the stepped care model[1–3]. The stepped care model advocates for a progression from conservative to more invasive treatment modalities while ensuring the quality and accessibility of care are maintained and optimised[4,5]. Clinical guidelines for knee or hip osteoarthritis (KHOA) and other chronic conditions recommend conservative treatments, such as physiotherapy, before considering more invasive options, such as joint replacement surgery[6,7]. In line with these guidelines, the Dutch government adjusted the BHI package to include physiotherapy for intermittent claudication (IC, 2017), KHOA (2018), and chronic obstructive pulmonary disease (COPD, 2019), aiming to align reimbursement policies with clinical recommendations and promote evidence-based conservative care[8].

The BHI, determined by the government based on recommendations from the National Health Care Institute (NHCI), health insurers, and healthcare professionals, defines which treatments are covered as essential healthcare[9]. Over time, new treatments or services may be added when proven effective. However, it remains unclear whether these inclusions have led to increased physiotherapy utilisation, defined as the annual number of treatment episodes, for these conditions. To provide a benchmark comparison, urinary incontinence (UI), covered by the BHI since 2006, is included as a long-term control group in this study.

This question is particularly relevant given the Dutch aging population. In 1990, 12.8% of the population was aged 65 or older; by 2024, this number has risen to approximately 20.5%, a trend expected to continue[10]. Aging is associated with a higher prevalence of chronic conditions such as osteoarthritis, COPD, IC, and urinary incontinence[11]. These conditions contribute substantially to healthcare costs, with direct medical costs for osteoarthritis alone reaching €1.1 billion in 2019, representing 19.3% of total musculoskeletal healthcare spending[12]. Knee and hip osteoarthritis affects 6%-18% and 4%-7%[12] of the population, respectively. Additionally, 37% of the population experiences urinary incontinence[13]. Physiotherapy is recognised as an effective intervention for managing these conditions. It helps improve mobility, reduce symptoms, and enhance quality of life, thereby reducing the need for more costly treatments[12–16].

In the Dutch health insurance system, the BHI covers essential care, including some physiotherapy treatments, while supplementary insurance provides additional coverage. Despite BHI coverage of physiotherapy, financial barriers such as the mandatory annual deductible may still hinder patient access. For example, studies show that patients with KHOA tend to use physiotherapy less frequently before their deductible is met, indicating cost-related access issues[17]. Recently, some insurers have begun covering the deductible for KHOA patients[18]. These financial dynamics are important to consider when interpreting utilisation trends following BHI inclusion, as effect may help explain the observed trends in physiotherapy use.

Coverage for physiotherapy is regularly reviewed and adjusted to determine the appropriate number of reimbursed treatment sessions for cost-effective care. For example, recent updates included increasing the number of reimbursed physiotherapy sessions for COPD patients to better align with patients' clinical needs[19]. Such adjustments reflect efforts to match reimbursement policies with patients' clinical needs and are important for understanding trends in physiotherapy utilisation and number of consultations per episode following inclusion in the BHI.

Although previous studies have examined physiotherapy use for KHOA, comparable analyses for COPD, IC, and urinary incontinence are limited. This study aims to fill this gap by examining utilisation trends across these conditions. In addition to analysing utilisation trends, this study assesses whether the number of physiotherapy consultations per treatment episode aligns with clinical guideline recommendations. This secondary objective helps evaluate whether increased access translates into appropriate treatment intensity.

Analysing trends over several years, this study aims to provide a comprehensive understanding of the effects of including physiotherapy in the BHI package for these conditions. UI, covered by the BHI since 2006, serves as a control group to provide a long-term benchmark for comparison. We hypothesise that BHI inclusion has increased physiotherapy utilisation among COPD, KHOA, and IC patients. In addition, we expect that utilisation and the number of consultations per episode will align with clinical guideline recommendations, indicating more appropriate and potentially higher-quality care.

METHODS

Study Design

This retrospective cohort study uses routinely collected clinical data from the Nivel Primary Care Database (Nivel-PCD) to evaluate changes in physiotherapy utilisation over time. Data were structured hierarchically, with physiotherapy practices at the highest hierarchical level, containing individual patients. Each patient may have one or more treatment episodes, consisting of one or more physiotherapy consultations.

The study follows the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guideline, complemented by the RECORD (REporting of studies Conducted using Observational Routinely-collected health Data) extension, to ensure methodological transparency and robustness[20]. These guidelines provide a standardised framework for reporting observational studies and address challenges specific to routinely collected health data, such as data quality, completeness, and potential biases, thereby enhancing the reliability and interpretability of the results.

Nivel-PCD is part of Nivel, the Netherlands Institute for Health Services Research, and includes longitudinal, pseudonymised, linkable extracts from Electronic Health Record (EHR) data of participating general practices, out-of-hours general practice services, physiotherapy practices, and other primary care disciplines in the Netherlands[21]. Data are extracted from electronic patient records (EPR) by a Trusted Third Party (TTP[22]), where patient-identifying data, such as name or address, are pseudonymised in a secure environment[23]. The database contains information on patient characteristics, diagnoses, consultations, referrals and treatment trajectories.

In this study, a 'treatment episode' is defined as a sequence of physiotherapy consultations linked to a single diagnosis, as recorded by physiotherapy practices using the Diagnoses Code Systematics Paramedical Care (DCSPH) code. It is an administrative unit created for the physiotherapist that organises care around a specific diagnosis and consists of one or multiple consultations.

The focus of the study is on physiotherapy utilisation related to diagnoses included in the BHI package in recent years. Inclusion years for BHI coverage were 2017 for IC, 2018 for KHOA and 2019 for COPD, with UI included as a reference condition. The study period spans from 2015 to 2023, allowing trend analyses before and after inclusion in the BHI package.

Patient Sample

The study population comprises all patients within physiotherapy practices participating in Nivel-PCD between 2015 and 2023. Inclusion criteria were: 1) the practice contributed data to Nivel-PCD in at least one year within this period, and 2) the patient had at least one treatment episode recorded during that time. Participating physiotherapy practices in Nivel-PCD covered approximately 17% of all physiotherapy care provided annually in 2023, reflecting substantial representation[24,25].

Diagnoses were identified using DCSPH codes[26]. The following codes were included: 6223 and 7023 for KHOA, 9248 for IC, 2054, 2154 and 2554 for COPD, and 6486 for UI. All treatment episodes with these codes were selected for analysis. Treatment episodes with other DCSPH codes were aggregated per practice-year to calculate the total number of episodes per practice-year.

Variables

The dependent variable was the annual number of treatment episodes per physiotherapy practice for each of the selected DCSPH codes. These episode counts were modelled using Poisson regression to evaluate whether inclusion in the BHI package influenced utilisation. The total number of treatment episodes per practice-year combination (across all diagnoses) was included as an offset term, allowing the analysis to assess changes in the proportion of treatment episodes attributed to the selected diagnoses over time.

Independent variables are summarised in table 1:

Table 1: Overview of independent variables

Variable	Type/Categories	Description/purpose
Calendar year	categorical & continuous	Captures trends over time; used in models to estimate changes across years.
DSPCH specific patient count	Continuous (per practice/year)	Number of patients with a specific DCSPH code per practice per year; reflects proportional shifts in usage.
Age	Continuous	Mean age per diagnostic group per year
Gender	Binary (Male/Female)	Distribution of male and female patients per year
Referral type	Binary (referred/ Direct access)	Indicates whether patients were referred of self-referred. Required for BHI coverage for some diagnosis. Used to analyse changes in referral pathways and accessibility.
Number of sessions	Continuous	Based on unique consultation date per episode; measures treatment frequency
Treatment duration	Continuous	Time between first and last session per treatment episode; used to assess duration of care

Descriptive statistics were calculated separately for each diagnostic group per year, including means, standard deviations (SD), medians, interquartile ranges (IQR) for continuous variables, and proportions for categorical variables. Secondary analyses examined treatment duration and frequency relative to clinical guideline recommendations.

Statistical Analyses

Trends in physiotherapy utilisation were examined using multilevel Poisson regression models, incorporating a random intercept at the practice level to account for clustering. Separate models were estimated for each diagnostic group (KHOA, IC, COPD, and UI). The dependent variable was the number of treatment episodes per practice-year for the relevant DCSPH codes. To adjust for variation in practice size and patient volume, the natural logarithm of the total number of episodes per practice-year (across all diagnoses) was included as an offset. The hierarchical structure of the data was accounted for by fitting a random intercept model with the unique practice code as the grouping variable.

The primary independent variable was calendar year, modelled both as a categorical variable (to assess year-over-year differences) and as a continuous variable (to assess overall trends). In addition, a binary variable was created to indicate whether the episode occurred before or after the year of inclusion in the BHI, which varied across diagnostic groups. This allowed for a comparison of trends before and after policy inclusion.

Predicted marginal means were estimated for each year and diagnostic group to assess relative trends in treatment utilisation. These margins were visualised graphically, with and without 95% confidence intervals, to facilitate interpretation. Pairwise comparisons identified statistically significant differences between consecutive years, and overall trends across years were further evaluated using contrast testing. All statistical analyses were conducted using Stata Corp LLC, Version 16.1 (College Station, TX).

RESULTS

Patient Characteristics

Table 2 presents the characteristics of physiotherapy patients between 2015 to 2023. A distinction is made between the total physiotherapy patient population and the four diagnostic groups included in the Dutch BHI package in recent years: KHOA, IC, COPD and UI.

The total physiotherapy patients population comprises all patients registered in participating practices, regardless of diagnosis. For this group, available indicators include the number of practices, patient age (mean and SD), gender distribution. Between 2015 and 2023, the number of reporting practices increased from 133 to 626, resulting in a rise in the of number of recorded patients, from 39,027 in 2015 to 1,406,441 in 2023. During this period, the mean age decreased from 61.5 years (SD=18.7) to 56.0 years (SD=20.0), and the proportion of female patients slightly declined from 62,3% to 60.3%.

For the four diagnostic groups, more detailed data are available, including the number of patients per year, mean age, gender distribution, type of access, number of treatments per episodes, and treatment duration. Across all groups, a general trend toward younger patients was observed. At the same time, the number of treatment sessions declined substantially, treatment duration shortened, and referral data completeness improved.

However, patterns varied between groups.

- KHOA patients remained relatively stable in age (mean ≈ 67 years) and consistently included more women (64.1% –64.3%).
- IC patients were the oldest group, with a mean age around 70 years, and showed a notable decline in the percentage of female patients (from 48.6% to 38.4%).
- COPD patients showed a slight decrease in mean age (from 69.5% to 68.9 years), along with a modest increase in the proportion of women (from 53.6% to 55.3%). Their treatment duration declined sharply, from 2,743 to 360 days.
- UI patients were the youngest group, although their mean age increasing from 46.8 to 53.9 years. While women consistently formed the majority, their share declined from 92.5% to 81% over time. Referral data completeness also improved markedly in this group, and the number of sessions dropped from 24 to 6 by 2023.

Table 2

Patient characteristics for KHOA, IC, COPD, UI, and total physiotherapy patient population (Nivel-PCD, 2015–2023)

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total	39027	44951	70762	134634	361835	495073	1022352	1324389	1406441
Practices (N)	133	184	253	327	458	528	571	625	626
Age (years), (M,SD)	61,5 ±18,7	62,7 ±18,2	63,3 ±18,0	62,5 ±18,5	60,3 ±18,9	58,5 ±19,5	57,3 ±19,6	56,6 ±19,6	56,0 ±20,0
Female (N,%)	62,3	61,5	62,0	61,5	61,1	60,7	60,2	60,3	60,3
KHOA									
Characteristics									
Patients (N)	482	528	890	1120	3119	3272	7745	9662	9602
Age (years), M,SD)	66,9 ±12,6	67,6 ±12,8	67,7 ±12,7	68,6 ±12,1	68,4 ±11,7	67,5 ±11,6	67,9 ±11,6	67,3 ±11,6	67,1 ±11,6
Female (N,%)	309 (64,1)	339 (64,2)	588 (66,1)	736 (65,7)	2053 (65,8)	2127 (65,0)	5057 (65,3)	6169 (63,9)	6176 (64,3)
Referral type									
Direct access (N,%)	128 (26,6)	171 (32,4)	220 (24,7)	169 (15,1)	542 (17,4)	896 (38,4)	1893 (24,4)	2275 (23,6)	2715 (28,3)
Referral (N,%)	337 (69,9)	300 (56,8)	365 (41,0)	410 (36,6)	1316 (42,2)	2304 (70,4)	5791 (74,8)	7296 (75,5)	6798 (70,8)
Missing (N,%)	17 (3,5)	57 (10,8)	305 (34,3)	541 (48,3)	1261 (40,4)	72 (2,2)	61 (0,8)	91 (0,9)	92 (1,0)
Treatment									
Sessions (Md, IQR)	30 (11 - 67)	33 (12 - 80)	37 (14 - 87)	49 (20 - 99)	34 (15-73)	29 (13 - 60)	19 (9 -39)	12 (6 -26)	11 (5 – 20)
Duration, (Md, IQR)	1272 (205-2758)	1302 (350-2685)	1573 (377-2488)	1731 (712-2275)	1367 (546-1890)	945 (295-1481)	532 (100 - 1063)	174 (55-615)	106 (42 - 350)
IC									
Characteristics									
Patients (N)	35	52	292	590	1209	1661	3526	4533	3696
Age (years), (M,SD)	70,7 ±9,7	72,0 ±9,5	70,9 ±9,4	71,0 ±9,4	70,5 ±9,5	70,6 ±9,8	71,2 ±9,7	70,3 ±9,5	70,1 ±10,0
Female (N,%)	17 (48,6)	17 (32,7)	113 (38,7)	225 (38,1)	447 (37,0)	646 (38,9)	1390 (39,4)	1657 (36,6)	1419 (38,4)
Referral type									
Direct access (N,%)	0	5 (9,6)	4 (1,4)	11 (1,9)	50 (4,1)	66 (4,0)	113 (3,2)	163 (3,6)	170 (4,6)
Referral (N,%)	32 (91,4)	42 (80,8)	212 (72,6)	298 (50,5)	833 (68,9)	1577 (94,9)	3389 (96,1)	4340 (95,7)	3504 (94,8)
Missing (N,%)	3 (8,6)	5 (9,62)	76 (26,0)	281 (47,6)	326 (27,0)	18 (1,1)	24 (0,7)	30 (0,7)	22 (0,6)
Treatment									
Sessions (Md, IQR)	68 (38 - 119)	74 (37 - 147)	46 (27 - 81)	48 (29 - 88)	41 (23 - 73)	37 (24 - 57)	32 (19 - 47)	26 (14 - 37)	24 (11 - 37)
Duration, (Md, IQR)	2511 (827-3220)	1998 (706-2892)	1202 (343-2219)	1328 (367-2130)	994 (329-1708)	581 (270-1238)	363 (175-885)	264 (111-456)	226 (92-363)
COPD									
Characteristics									
Patients (N)	209	311	812	1290	3320	2745	5371	5174	4845
Age (years), (M,SD)	69,5 ±8,9	70,0 ±8,5	70,2 ±9,8	70,6 ±9,1	69,9 ±9,5	69,7 ±9,6	69,5 ±9,6	69,1 ±9,4	68,9 ±9,8
Female (N,%)	112 (53,6)	159 (51,1)	465 (57,3)	661 (51,2)	1865 (56,2)	1447 (52,7)	2839 (52,8)	2914 (56,3)	2680 (55,3)
Referral type									
Direct access (N,%)	5 (2,4)	13 (4,2)	29 (3,6)	26 (2,0)	167 (5,0)	104 (3,8)	220 (4,1)	217 (4,2)	256 (5,2)
Referral (N,%)	174 (83,3)	224 (72,0)	521 (64,2)	767 (59,5)	2625 (79,1)	2596 (94,6)	5097 (94,9)	4885 (94,4)	4528 (93,5)
Missing (N,%)	30 (14,4)	74 (23,8)	262 (32,3)	497 (38,5)	528 (15,9)	45 (1,6)	54 (1,0)	72 (1,4)	61 (1,3)
Treatment									
Sessions (Md, IQR)	235 (122 – 431)	288 (140 – 444)	197 (102 – 327)	183 (102 – 298)	150 (79 – 235)	109 (52 – 195)	76 (33 – 148)	50 (19 – 106)	34 (12 – 70)
Duration, (Md, IQR)	2743 (1659-3451)	2709 (1932 - 3074)	2102 (1460 – 2692)	1946 (1352-2389)	1672 (1071-2084)	1340 (686-1677)	876 (373 – 1274)	565 (187 – 896)	360 (102 – 589)
UI									

Characteristics									
Patients (N)	67	61	107	237	992	1177	2629	3787	4246
Age (years), (M,SD)	46,8 ±16,2	53,8 ±19,5	52,6 ±18,3	54,7 ±18,5	55,0 ±18,0	53,9 ±18,1	53,7 ±18,3	53,9 ±18,6	53,9 ±18,8
Female (N,%)	62 (92,5)	52 (85,3)	93 (86,9)	208 (87,8)	810 (81,7)	943 (80,1)	2176 (82,8)	3152 (83,2)	3441 (81,0)
Referral type									
Direct access (N,%)	11 (16,4)	9 (14,8)	15 (14,0)	20 (8,4)	79 (8,0)	157 (13,3)	408 (15,5)	575 (15,2)	705 (16,6)
Referral (N,%)	53 (79,1)	44 (72,1)	34 (31,8)	98 (41,4)	605 (61,0)	1014 (86,2)	2213 (84,2)	3197 (84,4)	3518 (82,9)
Missing (N,%)	3 (4,5)	8 (13,1)	58 (54,2)	119 (50,2)	308 (31,1)	6 (0,5)	8 (0,3)	15 (0,4)	23 (0,5)
Treatment									
Sessions (Md, IQR)	24 (9 - 54)	18 (7 - 58)	20 (9 - 62)	25 (10 - 56)	13 (7 – 35)	11 (6 - 26)	8 (5-17)	7 (4 – 13)	6 (4 – 9)
Duration, (Md, IQR)	1814 (131 – 2653)	1167 (98 – 2695)	1586 (190 – 2465)	1385 (312 – 2153)	662 (103 – 1603)	350 (91 – 1173)	182 (70 – 718)	112 (49 – 291)	84 (36 – 175)

KHOA=knee/hip osteoarthritis, IC= intermittent claudication, COPD= chronic obstructive pulmonary disease, UI= urinary incontinence, SD= standard deviation; M= Mean, Md= Median N= number of patients; IQR= interquartile range

Primary Outcome Measure: Trends in Physiotherapy

Figure 1 shows the proportional share of physiotherapy episodes for each diagnosis group relative to the total number of episodes in each year. This visualisation helps illustrate how the utilisation of each diagnostic group has changed over time in relation to overall physiotherapy use. A vertical red line marks the last year before the inclusion of the diagnosis group in the BHI, highlighting the timing of the policy change. The figure is descriptive and highlight visual trends before presenting model-based estimates.

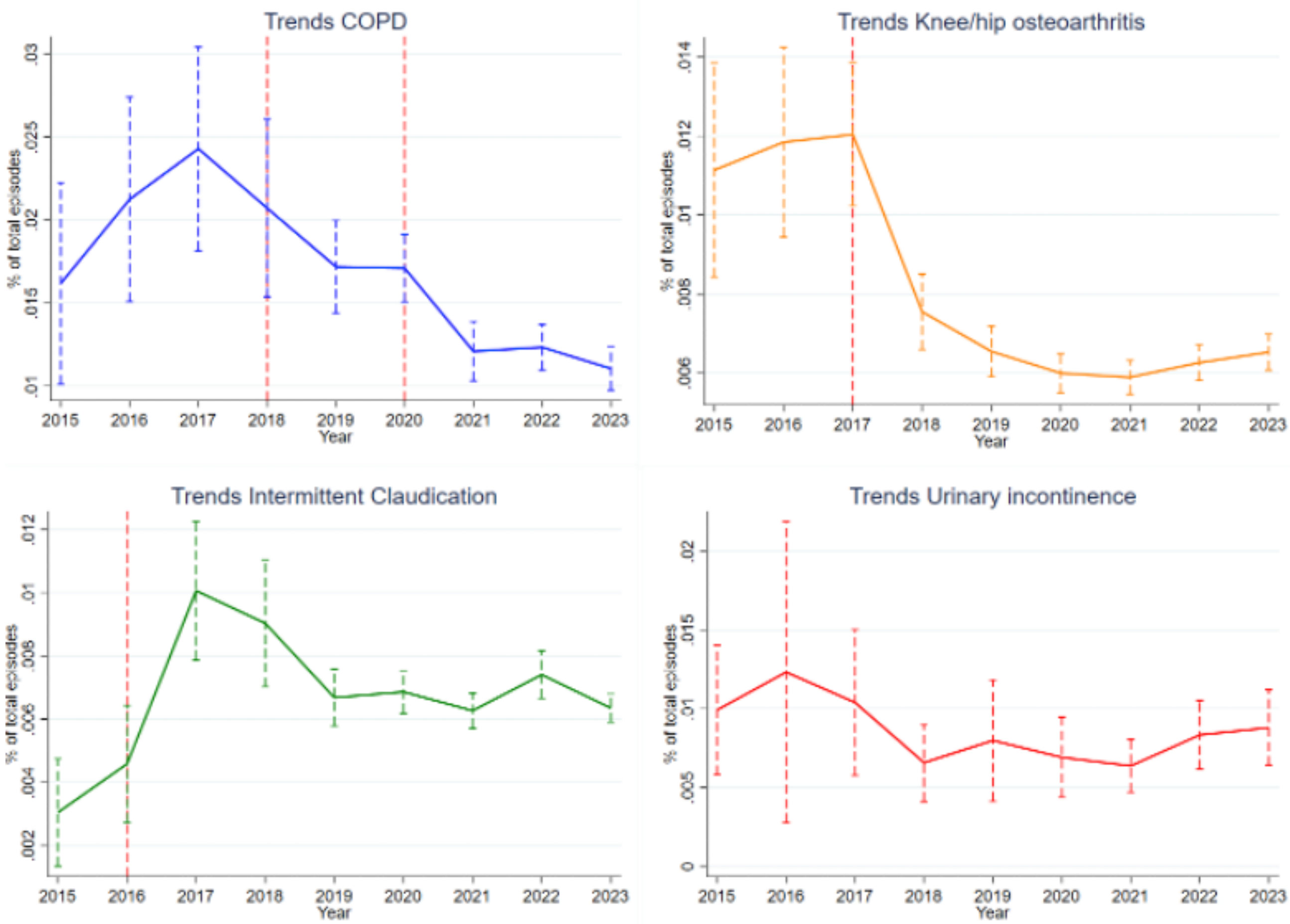


Figure 1.The y-axis displays the share of episodes per diagnostic group (COPD, urinary incontinence, intermittent claudication, and knee/hip osteoarthritis) as a percentage of the total number of episodes between 2015–2023, with 95% confidence intervals. The red vertical line indicates the last year before inclusion in the basic health insurance.

To formally assess changes in physiotherapy utilisation, multilevel Poisson regression models with random intercept at the practice level were used to account for clustering. These models consistently demonstrated superior fit compared to standard Poisson models ($p < 0.0001$). We report incidence rate ratios (IRRs) to quantify yearly changes in physiotherapy use for each diagnosis group. All year effects were statistically significant (Wald χ^2 tests, $p < 0.0001$). Detailed results including IRRs are provided in Appendix I.

In addition, pairwise comparisons were conducted to assess year-on-year differences in episodes numbers. To explore temporal trajectories in more detail, models with continuous time variables and segmented trends for pre- and post-policy inclusion were fitted. Together, these analyses provided a comprehensive view of utilisation trends across the study period.

Diagnosis-specific trends

For knee and hip osteoarthritis, a gradual decline in episode incidence was observed from 2016 onward, with significant reductions particularly between 2018 and 2021. The IRR dropped to 0.497 in 2020 compared to the reference year 2015 ($p < 0.0001$), and the continuous time model confirmed a downward linear trend (Coef = −0.0338, $p < 0.0001$). Some of the more recent year-to-year changes were no longer statistically significant (e.g., 2022 vs 2020: $p = 0.069$), suggesting stabilisation after 2021.

For intermittent claudication, physiotherapy utilisation increased sharply between 2015 and 2018 (IRR 2018 = 3.46, $p < 0.0001$), with the largest rise occurring in 2017, the year of BHI inclusion (2017 = 3.23, $p < 0.0001$). This was followed by a slight decline in 2018 and 2019 (IRR 2019 = 2.59, $p < 0.0001$), although utilisation remained well above 2015 levels throughout the study period. A modest but significant negative linear trend was observed over time (Coef = −0.04, $p < 0.0001$), suggesting a modest decline after the peak years. Compared to the pre-policy years, the post-policy period was associated with a significantly higher episode count (IRR = 2.14, $p < 0.0001$). Practice-level variance was substantial($\sigma^2 \approx 0.78$).

For COPD, a gradual but consistent decline in physiotherapy episodes was observed, particularly after 2018. Year-on-year changes were mostly significant, except between 2016 and 2017 ($p = 0.259$). The IRR dropped to 0.71 in 2019 and further to 0.44 by 2023, compared with the reference year 2015. A 48% decline followed the 2019 policy change (IRR = 0.52, $p < 0.0001$). Between-practice variation was substantial ($\sigma^2 \approx$ 1.25–1.30).

For urinary incontinence, physiotherapy utilisation declined sharply after 2017. From that year onward, all IRRs were below 1, with the lowest observed in 2020 (IRR = 0.361), and consistently low through 2023 (IRR = 0.446). The most pronounced annual decreases occurred between 2016–2018 and 2019–2020; with the pairwise comparisons indicating consistent and significant reductions, except for the periods 2018-2019 and 2020-2021. The overall trend across all years was downwards and statistically significant.

Secondary outcome: Number of sessions per treatment episode

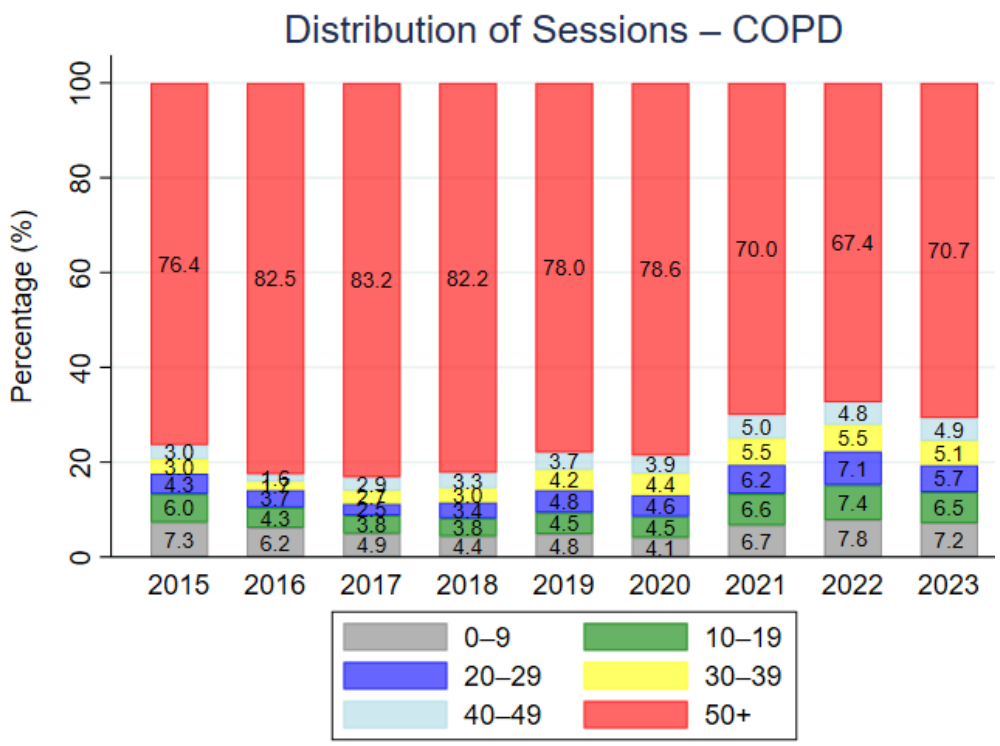
The secondary outcome is the distribution of treatment sessions per episode, as illustrated in Figure 2 A-D. For each diagnostic group, episodes were categorised by the number of treatment sessions received. A consistent shift toward lower treatment volumes per episode was observed over time.

The categorisation of treatment sessions differs between the diagnosis groups due to variation in the number of treatments reimbursed under the BHI package. For IC and COPD, the reimbursed sessions are substantially higher. Therefore, broader categories were used (0-9, 10-19, 20-29, 30-39, 40-49 and 50+ sessions). In contrast for KHOA and UI, the coverage is considerably more limited, and narrower intervals were applied (0-4, 5-9, 10-14, 15-19, 20-24 and 25+).

Diagnosis-specific trends:

- KHOA: The proportion of episodes with <14 sessions increased from 40% (2015) to 59% (2023), accompanied by a corresponding decline in the highest category.
- IC: Episodes with >50 sessions declined from 42% to 24%, indicating reduced volume despite remaining high overall.
- COPD: This group retained the highest treatment volume. However, episodes with >50 sessions declined from around 83% (2016-2018) to 71% in 2023.
- UI: The proportion of episodes with <9 sessions increased from 42% (2015) to 62% (2023), while >25 sessions declined from 25% to 15%.

Secondary Outcome Measure: Treatment Frequencies Over Time



Figuur 1A Distribution of physiotherapy sessions per episode over time for COPD (2015-2023), Each bar represents the relative share of treatment frequency categories per year

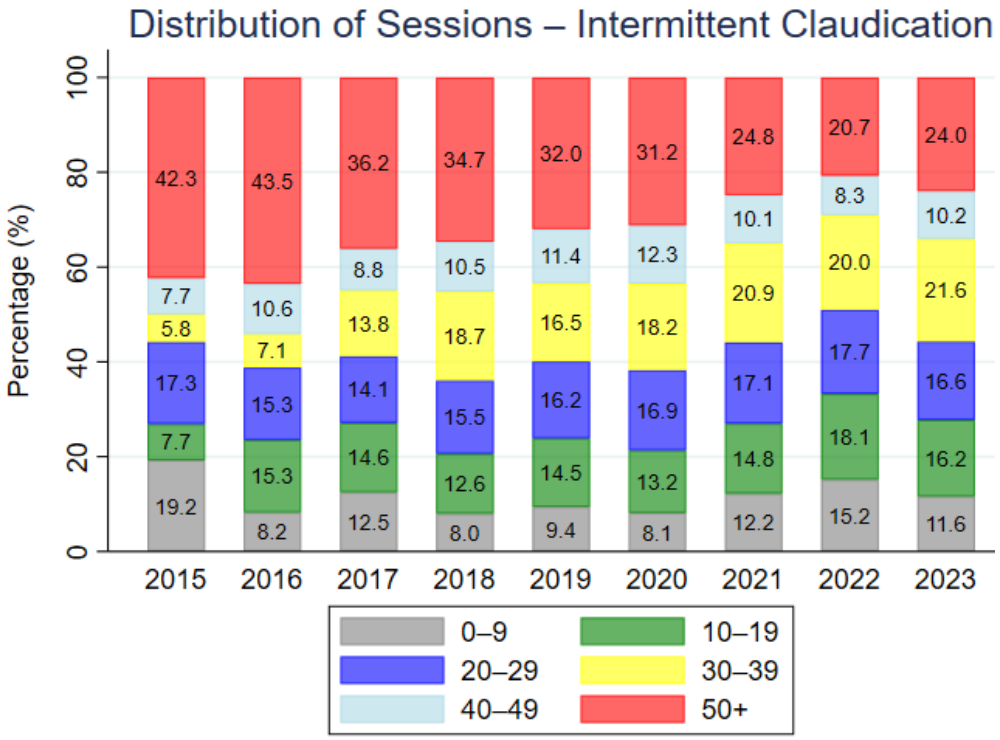


Figure 2B Distribution of physiotherapy sessions per episode over time for Intermittent Claudication (2015-2023), Each bar represents the relative share of treatment frequency categories per year

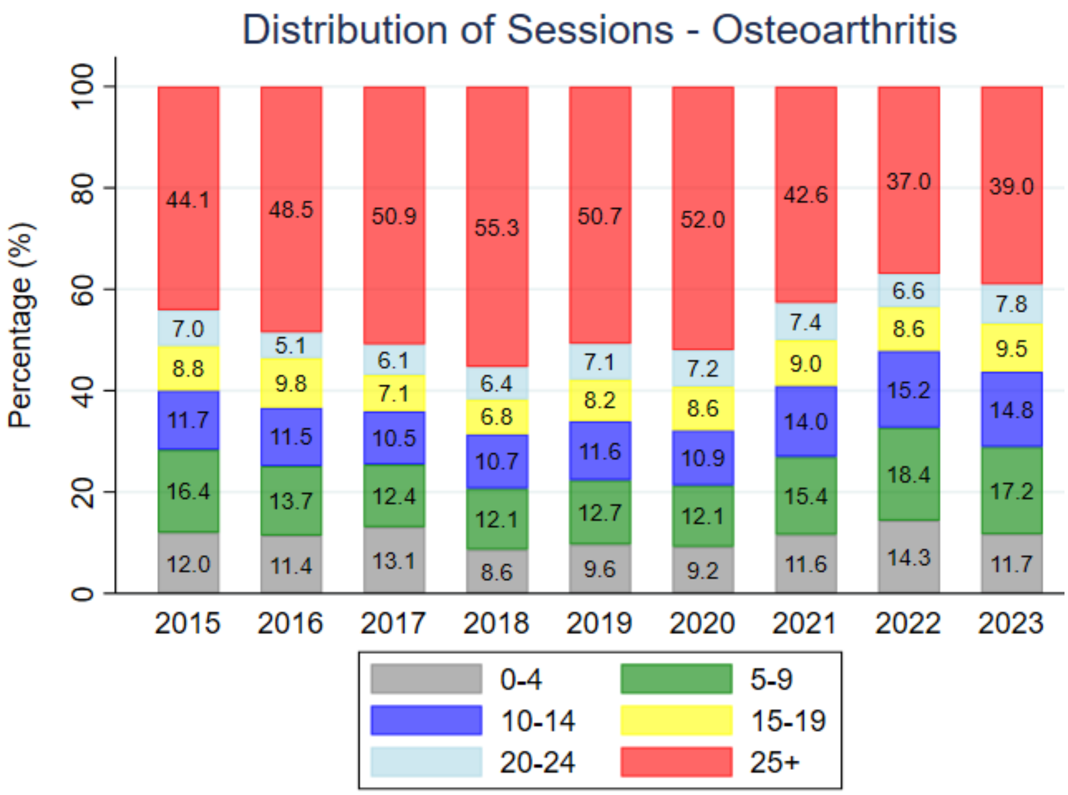


Figure 2C:Distribution of physiotherapy sessions per episode over time for Knee and Hip Osteoarthritis (2015-2023), Each bar represents the relative share of treatment frequency categories per year

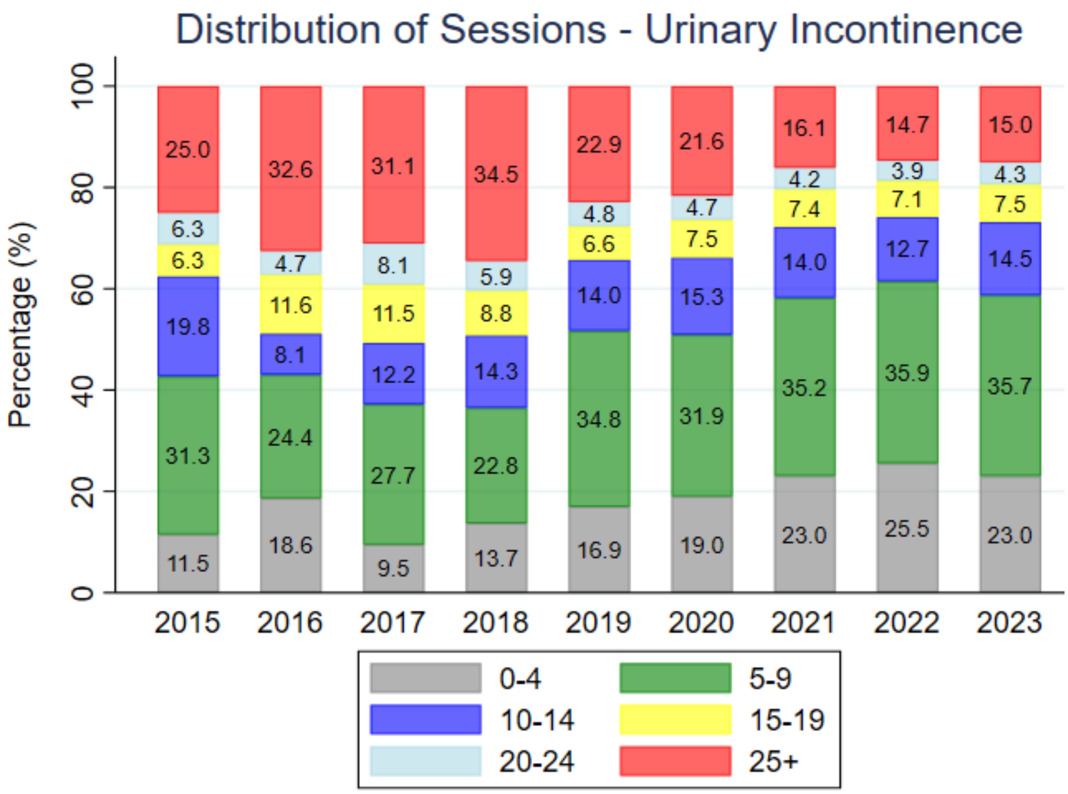


Figure 2D: Distribution of physiotherapy sessions per episode over time for Urinary Incontinence (2015-2023), Each bar represents the relative share of treatment frequency categories per year

DISCUSSION

Main Findings

This study analysed trends in physiotherapy utilisation across four diagnostic groups with changes in coverage under the BHI between 2015 and 2023. The data revealed divergent patterns in physiotherapy use across different conditions, with noticeable shift around the years when policy changes were implemented. For example, utilisation for KHOA decreased after its inclusion in the BHI in 2018, whereas a sharp increase in utilisation for IC was seen in 2017 the year of its policy changes, followed by a gradual decline.

Although patterns align with reimbursement timing, many other factors influence care utilisation over time. Therefore, the observed associations should not be interpreted as causal effects but rather as changes occurring within a policy-shifting context.

Interpretation and contextualization

Several contextual factors could help explain the observed patterns. One notable finding is the reduction in KHOA-related physiotherapy use after BHI coverage, which appears counterintuitive at first glance, but may be explained by prior research on patients with KHOA that suggests that, deductibles and out of pocket payments can still pose barriers to accessing care[17,27–29]. For those with more complex needs, such barriers may weigh less heavily. Whether similar dynamics apply to groups like COPD, IC, and UI, remains unclear and warrants further investigation.

Similarly, the downward trend in physiotherapy utilisation for UI, despite the absence of reimbursement changes, suggests that broader system-level factors may influence utilisation patterns. UI functioned as a long-term control condition, with a consistent post-2017 decline likely reflecting broader practice trends. However, estimates for UI in earlier years should be interpreted with caution due to wider confidence intervals, reflecting smaller sample sizes and greater uncertainty.

In contrast, the sharp rise in IC treatment episodes in 2017 may reflect increased awareness and referral following the reimbursement change, possibly supported by targeted professional networks such as Chronic CareNet[30]. The subsequent decline could indicate saturation or changes in referral behaviour. Interestingly, while COPD is also included in Chronic CareNet, treatment episodes for this condition decreased significantly following its inclusion in the BHI, suggestion that participation in such a network alone may not be sufficient to sustain or increase utilisation.

The COVID-19 pandemic also influenced physiotherapy use. Lockdowns in 2020 disrupted service provision, and post-lockdown utilisation did not fully return to pre-pandemic levels[31]. This drop may have long-term implications, particularly for vulnerable groups. Additionally, the rise of digital health services as tele-rehabilitation may have altered how physiotherapy is delivered, potentially reducing the number of in-person consultations captured in the dataset.

Furthermore, changes in clinical guideline may also contribute to the observed trends. Recent years have seen greater emphasis on stepped-care approaches and evidence-based interventions, particularly for musculoskeletal complaints[6,7,32–34]. These approaches often start with self-management strategies before physiotherapy is initiated, potentially leading to fewer but more targeted treatment episodes. Such shifts align with the observed reduction in treatment duration across the years, as illustrated in Figure 2.

Demographics

Differences in physiotherapy use may also reflect changing demographic profiles across patients' groups. For example, COPD and IC patients tend to be older, often with multiple comorbidities and longer care trajectories, which may influence both the decision to seek care, and the number of sessions required[33–36]. Conversely, UI-related episodes more often recorded among younger women, potentially with shorter treatment courses and different health-seeking behaviour. These demographic characteristics, shown in Table 2, may partly explain variations in trends and highlight the importance of differences between and within populations when interpreting utilisation patterns.

Strength and Limitations

A key strength of this study is the use of routinely collected HER data, which offer high external validity and minimize issues such as recall bias or selective nonresponse[27,37,38]. These data enabling analysis of long-term trends and the potential effects of policy changes in real-world practice. The large sample size and broad coverage contribute to a strong representation of the Dutch population using physiotherapy care.

Another strength lies in the inclusion of a diverse range of diagnostic groups, including UI, which served as a long-term control group unaffected by policy changes. This allowed for meaningful comparisons with diagnostic groups that experienced reimbursement changes during the study period.

However, several important limitations must be acknowledged. First, as an observational study, it cannot establish causality. While trends coincide with policy changes, unmeasured confounding and secular trends cannot be ruled out[39,40]. Second, although data came from a large number of physiotherapy practices, these were mainly from practices voluntarily participating in structured data sharing initiatives. Such practices may differ in their care processes, limiting generalisability[27–29,41,42].

Third, the number of participating practices increased sharply between 2015 and 2023, leading to substantial variation in the number of patient episodes (from ≈ 39.000 to >1.4million). This expansion could influence the observed trends, particularly in earlier years where estimates are based on smaller and potentially more selective samples. Wider confidence interval reflects this uncertainty.

Fourth, the important patient-level variables such as comorbidities, socioeconomic status, and insurance status (e.g., supplementary coverage) were not available. These factors are likely to influence physiotherapy utilisation and limit the ability to account for differences in access, treatment adherence, or financial barriers[27–29,43].

Finally, the way data are administratively processed may influence results. For example, in line with national registry procedures, treatment episodes without recorded activity for more than six weeks are automatically closed[44]. This may artificially shorten the average episode duration and contribute to the observed decline in treatment length.

Implications and Future Directions

This study highlights the relevance of diagnosis-specific utilisation trends amid policy reforms. While reimbursement changes appear to coincide with shifts in physiotherapy use, multiple factors such as guideline revisions, population characteristics, and healthcare system dynamics, must be considered when interpreting these patterns. Future research should aim to incorporate richer patient-level data and compare practices with different registration obligations to further elucidate the role of policy in shaping physiotherapy use. Moreover, exploring the impact of insurance coverage types, regional variation, and practice networks could offer deeper insights into accessibility and equity of care.

OTHER INFORMATION

This study received no external funding. The dataset used was obtained from Nivel under a data use agreement, and access may be granted with permission from Nivel. Due to data protection regulations, the data are not publicly available. However, access to the

study protocol and statistical code can be provided by the corresponding author upon reasonable request.

Artificial intelligence (AI) was utilised in certain aspects of this article, specifically as a grammar and spelling editor. Additionally, AI was employed to optimize sections of the code-writing process for data analysis using the STATA software program.

CONCLUSION

This study highlights significant changes in physiotherapy utilisation between 2015 and 2023, with notable shifts following policy adjustments between 2017 and 2019. The observed trends suggest that reimbursement policies play a role in influencing healthcare utilisation. However, variation across diagnosis groups also points to other contextual factors, such as patient demographics and potential financial barriers. Future research should focus not only on evaluating the overall impact on physiotherapy utilisation, but also on patient outcomes, patient and therapist experiences, equity in access, and the influence of clinical guidelines on treatment patterns.

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APPENDIX I

	COPD			UI		
Year	IRR	95% CI	P value	IRR	95% CI	P
2015						
2016	1.284	1.138 -1.449	0.000	.882	.647-1.203	0.429
2017	1.217	1.090-1.359	0.000	.616	.464-.817	0.001
2018	.975	.877-1.085	0.644	.417	.320-.542	0.000
2019	.781	.705-.866	0.000	.391	.306-.500	0.000
2020	.711	.642-.787	0.000	.361	.284-.461	0.000
2021	.491	.444-.543	0.000	.373	.293-.475	0.000
2022	.457	.413-.506	0.000	.418	.329-.532	0.000
2023	.436	.394-.482	0.000	.446	.351-.566	0.000

	KHOA			IC		
Year	IRR	95% CI	P value	IRR	95% CI	P value
2015						
2016	.985	.891-1.088	0.760	1.495	1.030-2.170	0.034
2017	.970	.884-1.064	0.520	3.226	2.343-4.442	0.001
2018	.640	.583-.701	0.000	3.464	2.537-4.730	0.000
2019	.552	.506-.601	0.000	2.594	1.905-3.532	0.000
2020	.497	.456-.542	0.000	2.633	1.936-3.582	0.000
2021	.476	.437-.518	0.000	2.261	1.663-3.073	0.000
2022	.512	.471-.557	0.000	2.372	1.745-3.223	0.000
2023	.535	.492-.582	0.000	2.185	1.608-2.970	0.000