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ORIGINAL ARTICLE

The impact of lidocaine plaster prescribing reduction strategies: A comparison of two national health services in Europe

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Aims: In 2017, two distinct interventions were implemented in Ireland and England to reduce prescribing of lidocaine medicated plasters. In Ireland, restrictions on reimbursement were introduced through implementation of an application system for reimbursement. In England, updated guidance on items which should not be routinely prescribed in primary care, including lidocaine plasters, was published. This study aims to compare how the interventions impacted prescribing of lidocaine plasters in these countries.

Methods: We conducted an interrupted time-series study using general practice data. For Ireland, monthly dispensing data (2015–2019) from the means-tested General Medical Services (GMS) scheme was used. For England, data covered all patients. Outcomes were the rate of dispensings, quantity and costs of lidocaine plasters, and we modelled level and trend changes from the first full month of the policy/guidance change.

Results: Ireland had higher rates of lidocaine dispensings compared to England throughout the study period; this was 15.22/1000 population immediately pre-intervention, and there was equivalent to a 97.2% immediate reduction following the intervention. In England, the immediate pre-intervention dispensing rate was 0.36/1000, with an immediate reduction of 0.0251/1000 (a 5.8% decrease), followed

Frank Moriarty is the principal investigator of this study.

by a small but significant decrease in the monthly trend relative to the pre-intervention trend of 0.0057 per month.

Conclusions: Among two different interventions aiming to decrease low-value lidocaine plaster prescribing, there was a substantially larger impact in Ireland of reimbursement restriction compared to issuing guidance in England. However, this is in the context of much higher baseline rates of use in Ireland compared to England.

KEYWORDS
clinical pharmacology, drug regulation, health policy, prescribing

1 | INTRODUCTION

Due to limited resources compared with demand, all healthcare systems are required to employ mechanisms to prioritize finite resources in order to maximize health benefits.[1] One integral part of healthcare delivery is the provision of medicines, which accounts for a significant proportion of overall health expenditure in most countries. In 2019, spending on retail pharmaceuticals (excluding those used during hospital treatment) accounted for one-sixth of overall healthcare expenditure in Organisation for Economic Co-operation and Development (OECD) countries and represented the third largest component of health spending after inpatient and outpatient care.[2]

Rational use of medicines may be defined as "patients receiving medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community".[3] In contrast, irrational use of medicines is a problem worldwide, with the World Health Organization (WHO) estimating that more than half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take them correctly.[4] Low-value care—the use of health services whose harms or costs exceed their benefits—is also a significant issue that contributes to wasted healthcare resources.[5] Various strategies exist to promote rational prescribing, aimed at both patients and prescribers, and ensure safe, effective, and cost-effective medicines use. These strategies can be grouped broadly as targeted or system-oriented approaches, with targeted approaches comprising educational and managerial interventions and system-oriented strategies including regulatory and economic interventions.[6]

Both the National Health Service (NHS) in England and the Health Service Executive (HSE) in Ireland identified prescribing of lidocaine 5% medicated plasters (Versatis®) as a target for prescribing reduction measures. This medicinal product's licensed indication is for the treatment of post-herpetic neuralgia (PHN) only. However, it had been prescribed and dispensed in volumes exceeding the likely prevalence of PHN, indicating off-label use. In Ireland, the Medicines Management Programme (MMP) was established in 2013, with the aim to provide sustained national leadership relating to issues such as the quality of the medicines management process, access to medicines and overall expenditure on medicines.[7] In March 2017, the MMP published a Prescribing and Cost Guidance document on lidocaine 5% medicated plasters.[8] Following publication of these guidelines, the HSE introduced changes to the reimbursement of lidocaine plasters, introduced in two stages. From 1 September 2017 prescribers were required to apply through an online reimbursement applications system for all new patients, indicating the antiviral that was prescribed for the herpes zoster infection, and the date it was prescribed. From 1 December 2017 this was extended to pre-existing patients in receipt of the medication prior to September 2017. These guidelines additionally outlined suggested alternatives to lidocaine plasters, including capsaicin for PHN and diabetic neuropathic pain and topical non-steroidal anti-inflammatory drugs (NSAIDs) for muscular and rheumatic pain.

What is already known about this subject

- Prescribing reduction measures targeting lidocaine medicated plasters were introduced in both Ireland and England in 2017.
- In Ireland, restrictions on reimbursement were introduced, with the annual expenditure on lidocaine plasters decreasing from €27 million in 2016 to just over €2 million in 2018.
- In England, guidance was introduced on items which should not routinely be prescribed in primary care.

What this study adds

- There were vastly different effects of the introduction of reimbursement restrictions in Ireland and guidelines in England.
- Following the change to reimbursement in Ireland, a 97.3% reduction in the dispensing rate occurred.
- However, this was in the context of a much higher baseline rate of use in Ireland compared to England, which remained higher even after the substantial reduction in dispensing.

Similarly, in March 2017, NHS England announced a programme to tackle "low value medicines",[9] which subsequently became guidance on *items which should not routinely be prescribed in primary care*. This included lidocaine plasters, which were classified as "an item of low clinical effectiveness, where there is a lack of robust evidence of clinical effectiveness or there are significant safety concerns".[10] This guidance advised that prescribers in primary care should not initiate lidocaine plasters for any new patients (unless patients have been treated in line with National Institute for Health and Care Excellence [NICE] CG173 "Neuropathic pain in adults: pharmacological management in non-specialist settings", but are still experiencing PHN), that prescribers should be supported in deprescribing lidocaine plasters in all patients, and that if there is a clinical need for lidocaine plasters to be prescribed in primary care, this should be undertaken in a cooperation arrangement with a multi-disciplinary team.[10]

This study aims to describe and compare how the policy and guidance changes have impacted prescribing of lidocaine plasters in the two countries.

2 | METHODS

We conducted an interrupted time-series study using segmented regression analysis to assess the change in prescribing rate following the introduction of guidance and policy changes. Interrupted time-series studies of policy interventions can be analysed using segmented regression, allowing for the change in level and trend of an outcome following an intervention to be evaluated.[11] The Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines are used in reporting this study.[12] This study was approved by the RCSI University of Medicine and Health Sciences Human Research Ethics Committee (REC202201015).

2.1 | Health Service Executive data (Ireland)

The Primary Care Reimbursement Service (PCRS) is the section within the HSE which administers community drug schemes in Ireland, including the GMS scheme. Eligibility for the GMS scheme is means tested and covers approximately 32% of the population, and therefore eligible persons tend to be more socioeconomically deprived than the general population.[13,14] For adults aged ≥70 years, the scheme covers the vast majority of individuals. Pharmacies transmit claims for prescribed medications which were dispensed to individuals eligible for community drug schemes to the PCRS at the end of each month for reimbursement, and the data therefore provides complete information on prescribed medications that are dispensed to eligible people. As data are not publicly available, a request was submitted to the PCRS in line with their information requests policy, to obtain data aggregated at local health office (LHO) level. The data contains drug information (WHO Anatomical Therapeutic Chemical [ATC] code, strength, defined daily dosage [DDD], and product information), quantity dispensed, month of dispensing and cost.

2.2 | National Health Service data (England)

The NHS openly publishes GP prescribing data every month, which is available on the OpenPrescribing.net platform, which provides monthly statistics of prescribing aggregated at the level of GP practices for all practices in England.[15] The data relate to NHS prescriptions issued by general practices in England (by any practice prescribing staff) and dispensed in any community pharmacy in the UK. Prescribed products are coded based on their British National Formulary (BNF) classification. The monthly prescribing datasets contain one row for each different medication and dose in each prescribing organization in NHS primary care in England, describing the number of items and the total cost. The items variable within the data corresponds to the number of items of each prescribed product that was dispensed in the specified month. This provides comparable rates to the "number of prescription dispensings" indicator as defined in the PCRS data. The data is available at practice level and was aggregated to clinical commissioning group (CCG) level, an NHS administrative region, to allow for equivalent analysis to the PCRS data.

2.3 | Analysis

Firstly, descriptive statistics were used to summarize dispensings, quantity and costs of lidocaine plasters on a monthly basis in the two countries. We also summarized dispensings of alternatives recommended by the HSE MMP using HSE data.[8] These were plotted to allow visual inspection of trends in outcomes in relation to the policy and guideline changes. A segmented regression model was fitted separately on the HSE and NHS data to assess the change in prescribing rates following the intervention affecting lidocaine plasters in each country (i.e., introduction of reimbursement changes/guidelines).

We parameterized each segmented regression model to estimate four elements:

(i) the rate at the beginning of the study period (i.e., the model intercept),
(ii) the trend prior to the intervention,
(iii) immediate change in rate from pre to post intervention, and
(iv) change in trend over time from pre to post intervention.

The analysis included monthly data from 2015 to 2019, allowing for well in excess of the recommended 12 time points before and after an interruption. As Ireland introduced the intervention in stages, with the reimbursement application initially required for only patients newly initiating lidocaine plasters (1 September 2017, intervention 1) before being extended to all patients (1 December 2017, intervention 2), the effects of both interventions were included. For England, August 2017 was considered the first post-intervention month, as the guidance was first published in July 2017 as part of a consultation. Analyses were conducted using Stata version 17, and statistical significance was assumed at $P < .05$. For the time-series analysis, the XTITSA command was used, which allows for analysis of panel data at LHO/CCG level.[16]

3 | RESULTS

3.1 | Lidocaine plasters

In Ireland, there were 193 486 individual dispensings for lidocaine plasters in 2015, reducing to 21 886 in 2019. The GMS expenditure similarly decreased during the study period, peaking at €27.4 million in 2016 compared to €2.7 million in 2019. In England, a slight reduction in dispensings was noted during the study period, with dispensings peaking at 258574 in 2017, and decreasing to 219 177 in 2019. Costs decreased from £19 428 950 in 2017 to £16 211 567 in 2019. Table 1 outlines the year-by-year dispensings, quantity and costs for lidocaine plasters for Ireland and England.

Ireland had higher rates of dispensings compared to England throughout the study period. In Ireland, the rate per 1000 eligible GMS population was 8.15 dispensings in January 2015, 15.22 in August 2017, and 1.15 in December 2019. In England, the mean rate per 1000 NHS population was 0.28 dispensings in January 2015, 0.36 in July 2017, and 0.30 in December 2019. See Table 2 and Figure 1 for dispensing rates per 1000 eligible population for Ireland and England.

3.2 | Impact of policy and guidance changes

Interrupted time-series regression results for Ireland and England are outlined in Table 3. For Ireland, the dispensing rate per 1000 GMS eligible population was estimated at 8.59 in January 2015, and appeared to increase monthly prior to September 2017, by 0.23 on average. In the first month post intervention 1, there appeared to be a statistically significant decrease in the level of 5.54 (i.e., change in rate from August 2017 to September 2017), followed by a statistically significant average decrease in the monthly trend, relative to the pre-intervention trend, of 1.93 per month. At the second intervention point (December 2017) there was an immediate significant decrease in rate of dispensings of 4.48 (i.e., November 2017 to December 2017). After intervention 1 there was a decreasing monthly trend of 1.7; however, from December 2017, after intervention 2, there was evidence of a 0.02 monthly increase in trend. Overall, there was a decrease of 15.14 (95% confidence interval [CI] 14.76–15.53) in the rate per 1000 GMS eligible population between August (month prior to first intervention) and December 2017 (month following the second intervention), with the trend from December 2017 (post interventions) 0.2 (95% CI 0.18–0.23) lower than that prior to any interventions. This equates to a 97.3% (95% CI 94.8–99.8) reduction in the dispensing rate post relative to pre intervention.

In England, the dispensings rate per 1000 NHS population was estimated at 0.36 in January 2015 and appeared to increase every month prior to August 2017 by 0.0032. In the first month post intervention (August 2017), there was a statistically significant decrease in the level of 0.0251, equating to a 5.8% (95% CI 3.3–8.4) reduction in the dispensing rate post- relative to pre-intervention. This was followed by a statistically significant decrease in the monthly trend relative to the pre-intervention trend of 0.0057 per month. The estimated trend after the intervention decreased monthly at a rate of 0.0026. Figure 2 provides a visual representation of the time-series analysis.

For the quantity of lidocaine plasters, similar results as for the dispensings were found for both Ireland and England (Tables S1 and S2). In Ireland, an overall decrease of 472.45 (95% CI 459.31–485.58) in

TABLE 1 Year-by-year dispensings, quantity and costs for lidocaine plasters by country.

Lidocaine 5% medicated plasters						
	Ireland			England		
	Dispensings	Quantity	Cost (€)	Dispensings	Quantity	Cost (£)
2015	193 486	6 033 805	24 262 047	223 541	6 873 093	17 289 944
2016	249 075	7 795 933	27 321 197	254 205	7 834 000	18 909 296
2017	235 437	7 497 794	25 138 152	258 574	8 085 800	19 428 950
2018	16 332	602 345	2 004 115	239 556	7 586 363	17 850 706
2019	21 886	826 653	2 746 972	219 177	7 007 670	16 211 567

TABLE 2 Year-by-year rates of lidocaine plaster dispensings by country.

Lidocaine 5% medicated plasters				
	Ireland		England	
	Rate of dispensings	95% CI	Rate of dispensings	95% CI
2015	9.58	8.97–10.18	0.31	0.30–0.33
2016	12.33	11.85–12.80	0.35	0.35–0.36
2017	11.65	9.05–14.26	0.36	0.35–0.37
2018	0.81	0.71–0.90	0.33	0.33–0.34
2019	1.08	1.05–1.12	0.31	0.30–0.31

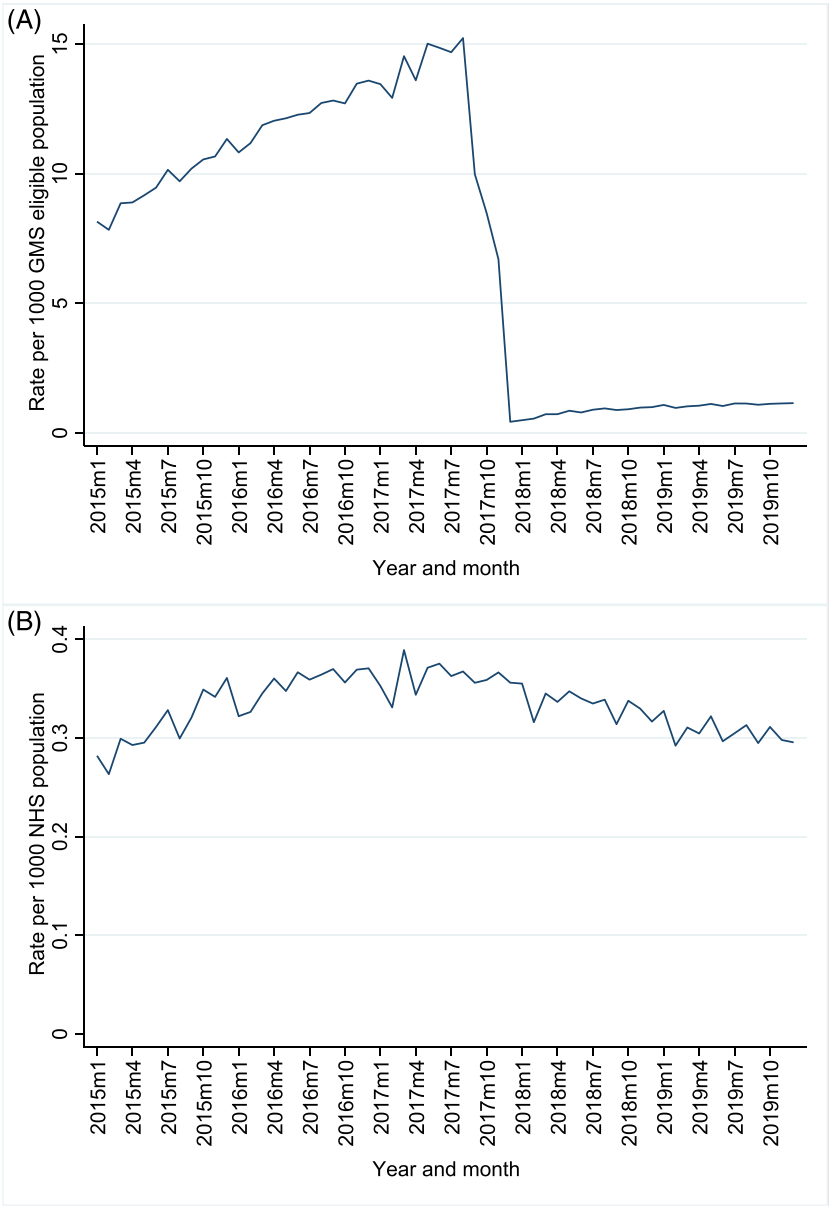

FIGURE 1 Lidocaine plaster dispensings per 1000 eligible population for Ireland (A) and England (B).

the rate per 1000 GMS eligible population was seen between September and December 2017, with the trend from December 6.15 (95% CI 5.31–6.98) lower than that pre-September. In England, August 2017 saw a level change of −0.62 (95% CI −0.94 to −0.3), followed by a trend change of −0.17 (95% CI −0.19 to −0.15) compared to the pre-intervention trend. Similar changes in the cost of lidocaine plaster dispensing were found (Tables S3 and S4).

3.3 | Topical alternatives in Ireland

For the topical alternatives recommended as part of the intervention in Ireland, the overall level change in the rate of capsaicin dispensings per 1000 GMS eligible population between September and December 2017 was 0.40 (95% CI 0.37 to 0.44), with the trend from December −0.02 (95% CI −0.022 to −0.018) lower than that pre-September. For topical NSAIDs, the overall level change in the rate per 1000 GMS eligible population between September and December 2017 was 0.61 (95% CI 0.24–0.98), with the trend from December 0.03 (95% CI 0.01–0.06) higher than that pre-September. No significant change in level or trend was observed for topical diclofenac specifically following the intervention. Figures S1–S3 provide a visual representation of the time-series analysis.

4 | DISCUSSION

The findings of this study highlight the vastly different effects of the introduction of reimbursement restrictions in Ireland and guidelines in England. However, this is in the context of a much higher baseline

TABLE 3 Dispensings time-series results for Ireland (GMS scheme) and England (NHS).

Rate of lidocaine dispensings per 1000 population	Coefficient	95% CI	*P*-value
Ireland			
Pre-Sep 2017 monthly trend	0.23	0.21 to 0.24	<.001
Sep 2017 immediate post-intervention change	−5.54	−6.26 to −4.83	<.001
Sep 2017–Nov 2017 trend change (*vs*. pre-Sep 2017)	−1.93	−2.44 to −1.42	<.001
Dec 2017 immediate post-intervention change	−4.48	−5.63 to −3.34	<.001
Dec 2017–Dec 2019 trend change (*vs*. pre-Sep 2017)	1.73	1.22 to 2.24	<.001
Jan 2015 dispensing rate (baseline)	8.59	7.7 to 9.48	<.001
Post-intervention linear trends			
Sep 2017–Nov 2017	−1.70	−2.22 to −1.19	<.001
Dec 2017–Dec 2019	0.02	0.005 to 0.04	.016
England			
Pre-Aug 2017 monthly trend	0.0032	0.0027 to 0.0036	<.001
Aug 2017 immediate post-intervention change	−0.0251	−0.036 to −0.0142	<.001
Aug 2017–Dec 2019 trend change	−0.0057	−0.0064 to −0.0051	<.001
Jan 2015 dispensing rate (baseline)	0.3566	0.2764 to 0.4367	<.001
Post-intervention linear trends			
Aug 2017–Dec 2019	−0.0026	−0.0031 to −0.0021	<.001

rate of use in Ireland compared to England. In Ireland, the dispensing rate prior to the intervention was over 15 per 1000 GMS population. The change to reimbursement had a dramatic effect on lidocaine use, with a 97.3% reduction in the dispensing rate of lidocaine medicated plasters post-intervention compared to before. In England, only a small decrease of 5.8% was seen after the guidance changes; however, the dispensing rate prior to the intervention never went above 0.5 per 1000 population. In terms of the recommended alternatives, advice accompanying the reimbursement change in Ireland may have influenced topical capsaicin use in the immediate term; however, this quickly reduced.

The substantial difference in effect may be attributable to the difference in baseline rates, which may indicate that in England, lidocaine prescribing was already at a largely appropriate level prior to the introduction of the guidelines, whereas in Ireland lidocaine may have been overprescribed. Secondly, this could be attributable to the different types of intervention, i.e., a restriction on reimbursement requiring an individual application for a patient to continue to be covered for it (or alternatively paying out-of-pocket which for many patients is likely unaffordable), versus guidance on low-value care without any stringent restrictions, penalties or incentives. A previous systematic review on the effect of formulary restrictions on drug and healthcare resource utilization and economic outcomes, as well as patient outcomes, found that more than 90% of the included studies showed lower drug utilization after introduction of reimbursement changes. However, when considering all outcomes, around half were negative in direction or unfavourable, compared to around 40% that were positive in direction or favourable, which shows that these types of interventions may have unintended consequences despite lower drug utilization and medication cost savings.[17] In this case, the restrictive policy in Ireland may have delayed or prevented patients in pain accessing lidocaine plasters, potentially resulting in initiation or intensification of other alternative treatments, such as gabapentinoids, opioids or NSAIDs. As only aggregate data were analysed for this study, it was not possible to assess the impact of the interventions on individual patients, including switching behaviours and utilization of other types of analgesia. While lidocaine patches are expensive and the evidence for efficacy beyond specific uses is limited, this is based on average treatment effects and so some patients may have experienced a benefit from them.[18] Furthermore, they are a low-risk option compared to alternatives. As we have not been able to examine the clinical impact of either policy on patient outcomes, we consequently make no comment on the appropriateness of either English or Irish policy, and believe that further research is warranted. The authors will investigate these issues further in a separate study.[19]

Low-value care and treatments have been receiving increased attention in recent years, and there has been a rapid growth in studies of interventions that target low-value care. A systematic review of measures used to assess the impact of interventions to reduce low-value care found that most published studies (68%) focused on reductions in utilization rather than on potentially more clinically meaningful measures, such as improvements in appropriateness or patient outcomes.[20] In England, research on the trends and variation in prescribing of these low-priority treatments prior to the introduction of the guidelines found that prescribing was extensive but varied widely by treatment, geographic area and

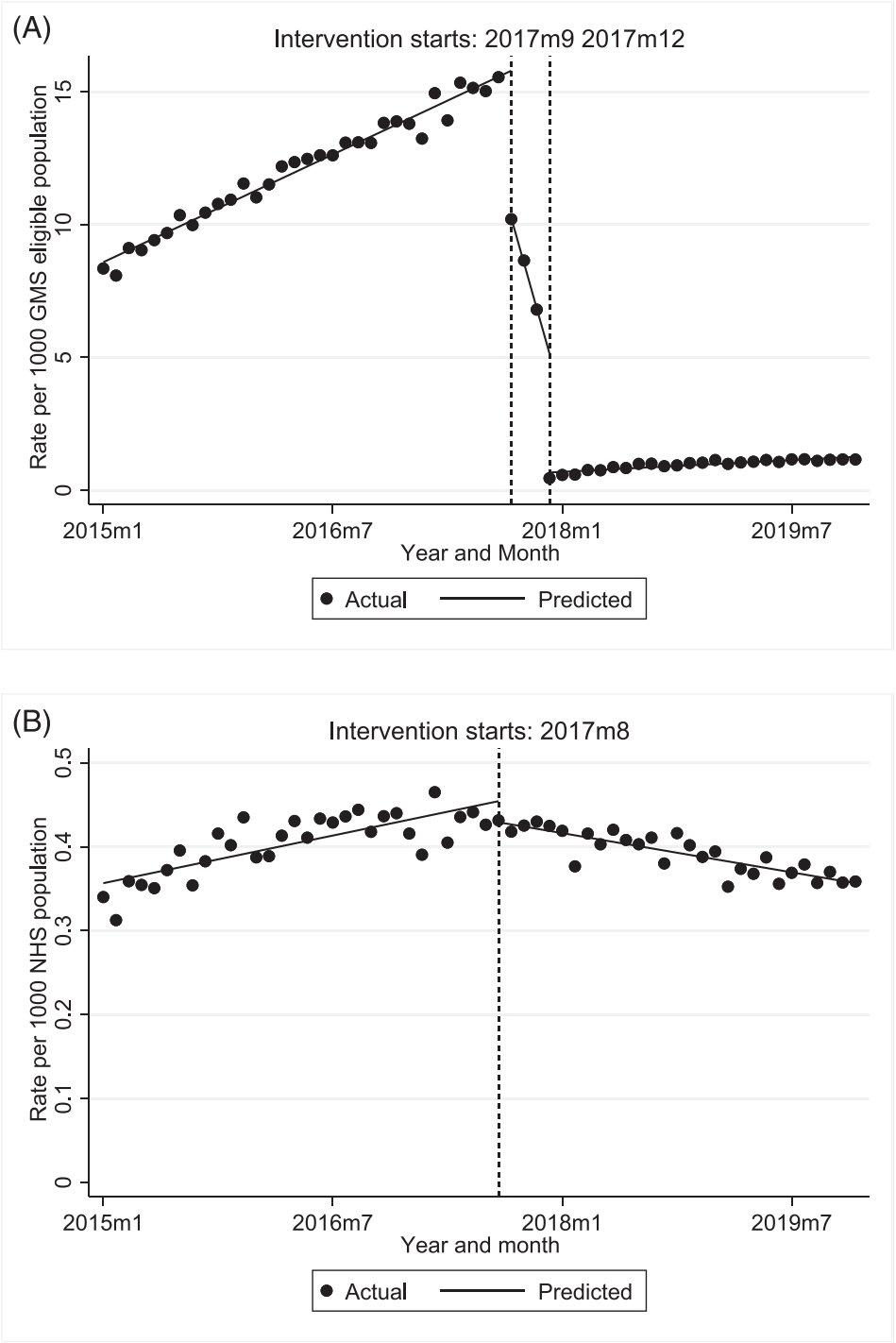

FIGURE 2 Time-series of dispensing rate of lidocaine plasters per 1000 for Ireland (A) and England (B).

individual practice, with the proportion of patients aged ≥65 year at practice level, as well as CCG, strongly associated with low-value prescribing.[21]

An evaluation of the NHS guidance on items which should not routinely be prescribed in primary care has shown that although there was a reduction in overall use of the targeted medications, that reduction was in line with the existing downward trend, with no change either after the announcement of the consultation on the scheme (July 2017) or publication of the subsequent consultation report (November 2017).[22] Previous research on the implementation of new antibiotic prescribing guidelines for urinary tract infection in NHS England primary care suggests that the variation between CCG may be substantial, and that there is strong evidence suggesting that CCGs with minimal prescribing change following the introduction of new guidance did less to implement changes compared to CCGs that saw positive change.[23] In Ireland, recent research has shown that subsequent to the change in reimbursement, the prescribing of lidocaine plasters significantly decreased, with the annual GMS expenditure on lidocaine plasters decreasing from €27 million in 2016 to just over €2 million in 2018.[24]

Considering implementation of guidance as an intervention, a systematic review of the evidence to practice gap for complex interventions in primary care found that success is influenced by factors related to the external context (e.g. policies and infrastructure), organization (e.g. culture and resources), individual (e.g. competency) and intervention (e.g. evidence of benefit and ease of use).[25] A recent scoping review of strategies for de-implementation of low-value care found that with a few exceptions similar strategies are used for de-implementation and implementation.[26]

One explanation for the substantial difference in prescribing rates between the two countries may be the difference in study populations and access to healthcare. While the NHS data include all prescriptions dispensed nationally, the HSE data are restricted to individuals eligible for the means-tested GMS scheme, where there is an over-representation of older adults, and people of lower socioeconomic status, both of which groups experience higher prevalence of chronic pain. Prevalence of pain in older adults has been widely estimated at between 25% and 75%.[27,28] Similarly, multiple population studies have shown that the prevalence of chronic pain is inversely related to socioeconomic status, and that those who are socioeconomically deprived are also more likely to experience more severe pain and a greater level of pain-related disability.[29,30] It is likely given the scale of use that lidocaine was prescribed off licence in Ireland for GMS patients with other types of pain, including muscular and rheumatic, as well as different types of neuropathic pain, rather than the limited indication of PHN. GMS patients are less likely to have private health insurance and are largely dependent on the public healthcare system, and consequently the long waiting lists for these patients in accessing non-pharmacological therapies, such as physical and psychological therapies as well as specialist pain clinics and surgery clinics, may influence prescribing practices. The large difference in baseline rates may also have impacted on the implementation of the interventions. Although the appropriate rate of prescribing is unknown, it is likely that the scale of off-label or inappropriate use in Ireland was far greater than in England, with a much greater scope for reductions in prescribing. It is possible that had the scale of off-label lidocaine prescribing been similar in England, the introduction of the guidance may have had a more substantial effect.

A strength of this study is the use of robust pharmacy dispensing data, as the data in both countries reflect dispensed prescriptions, rather than data on prescriptions which may not be dispensed. The use of real prescribing and dispensing data sourced from pharmacy claims minimizes the potential for obtaining a biased sample, and additionally eliminates the possibility of recall bias. The study does, however, have some limitations. While the English NHS data include prescriptions issued to the whole population, the GMS scheme in Ireland is means tested and therefore represents an older and lower socioeconomic subset of the Irish population. Additionally, the use of aggregate-level data means that we were not able to examine whether increases in recommended alternatives (i.e., capsaicin) was actually among people who switched from lidocaine plasters. It also limits the ability to examine unintended consequences of the interventions, i.e., switching of patients to potentially riskier therapies, such as opioids.

More broadly, this study highlights the importance of open data. The NHS has published publicly available GP prescribing data every month since 2011 for anyone to interrogate. This has supported a rich ecosystem of teams both inside and outside the NHS using differing tools and approaches to monitor data and give feedback to GPs to improve prescribing. Analysis conducted on this NHS open data has also supported original research on a substantial range of prescribing topics,[21,23,31–34] and data feedback to GPs has been shown to improve prescribing.[35–38] We strongly recommend that the HSE advances plans to publish similar data for GP prescribing in Ireland in line with national open data polices.[39] This can support a similarly rich ecosystem of feedback to clinicians in Ireland and additionally our paper has demonstrated that by harnessing data from multiple countries we can do innovative research into real-world healthcare policy programmes.

5 | CONCLUSION

Our study has shown the effects of two different interventions aiming to decrease low-value prescribing and has demonstrated a more substantial reduction in prescribing in a high prescribing setting in Ireland where a patient approval system was introduced, compared to issuing guidance in England in a lower prescribing setting. More research on the effects of these interventions beyond prescribing rates and expenditure, including impact on patient outcomes, is warranted.

AUTHOR CONTRIBUTIONS

Brian MacKenna and Frank Moriarty conceived the study. Molly Mattsson, Fiona Boland, Ciara Kirke, Michelle Flood, Emma Wallace, Mary E. Walsh, Derek Corrigan, Tom Fahey, Brian MacKenna and Frank Moriarty designed the study. Molly Mattsson, Richard Croker, Sebastian C.J. Bacon, Peter Inglesby, David Evans, Ben Goldacre, Brian MacKenna and Frank Moriarty collected and curated the data. Molly Mattsson analysed the data, and Frank Moriarty validated the data analysis. All authors were involved the interpretation of the analysis results. Molly Mattsson drafted the manuscript, and all the authors critically revised the manuscript. Frank Moriarty acquired funding for the study.

CONFLICT OF INTEREST STATEMENT

The authors declare no competing interests in relation to this study. All authors have completed the ICMJE (International Committee of Medical Journal Editors) uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare the following: M.F. and F.M. have received research funding from the Health Research Board in Ireland (HRB). B.G. has received research funding from the Laura and John Arnold Foundation, the NHS National Institute for Health Research (NIHR), the NIHR School of Primary Care Research, the NIHR Oxford Biomedical Research Centre, the Mohn-Westlake Foundation, NIHR Applied Research Collaboration Oxford and Thames Valley, Wellcome

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DATA AVAILABILITY STATEMENT

Code and data for the analysis of NHS data is available from https://github.com/ebmdatalab/lidocaine-eng-ire. Code for the analysis of GMS data is available from https://zenodo.org/record/7287510#.Y-48eXbP02x. GMS data in aggregated form can be requested from the HSE PCRS at https://www.hse.ie/eng/staff/pcrs/pcrs-publications/.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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