

ORIGINAL RESEARCH:  
EMPIRICAL RESEARCH - QUANTITATIVE

# Characteristics of prescribing activity within primary care in Scotland 2013–2022 of general practitioners, nurse, pharmacist and allied health prescribers: A retrospective cross-sectional study

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Email: [s.macvicar@napier.ac.uk](mailto:s.macvicar@napier.ac.uk)**Abstract**

**Background:** Independent prescribing by nurses, pharmacists and allied health professionals is diversifying into a variety of healthcare settings as pressures mount on existing resources. Primary care was an early adopter of prescribing by non-medical professionals with resulting improvements in accessibility and flexibility of services but also noted barriers. Exploring existing prescribing activity within primary care can support future initiatives that are cognisant of the needs of this specific population and targeted in the use of finite resources.

**Aim:** To explore the characteristics of prescribing activity of common drugs dispensed by community pharmacies in Scotland by prescribing groups of general practitioners, nurses, pharmacist and allied health professionals. Specifically, to compare overall drug prescribing frequency by prescriber group and identify emergent prescribing patterns of individual drugs.

**Design:** A cross-sectional study.

**Methods:** The data from Public Health Scotland on frequency of the ten most common drugs prescribed and dispensed from community pharmacies between 2013 and 2022 by prescriber group were examined, applying descriptive statistics using secondary data analysis.

**Results:** Prescribing activity in non-medical prescribing groups accounted for 2%–3% of overall prescribing activity in primary care. There is a growing interprofessional approach to prescribing in chronic disease. Proton pump inhibitors were the most commonly prescribed medication overall with a 4-fold increase in nurse prescribing. The decline in prescribing frequency caused by COVID 19 restrictions has since returned to pre-pandemic levels.

**Conclusion:** There is a growing contribution of nurse independent prescriber activity within primary care although still a relatively small proportion compared to medical practitioners. The pattern of increased prescribing of medications for long term and

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chronic conditions such as proton pump inhibitors by all prescribers is suggestive of multi-disciplinary professionals supporting increased patient demand. This study provides a baseline to evaluate current service provision in further research and enable professional, service and policy development.

**KEYWORDS**

analgesia, cross-sectional, non-medical prescribing, nurse, nurse independent prescriber, omeprazole, pharmacist prescriber, primary care, Scotland

## 1 | INTRODUCTION

Changes in patient and workforce demographics have resulted in redesign of traditional healthcare delivery policy to meet the challenges of contemporary practice. Introducing enhanced roles for nurse, pharmacist or allied health professional to prescribe, supply and administer medicines is considered an opportunity to make greater use of the skills and experience of various professional groups within health services. The United Kingdom (UK) has been at the forefront of legislative changes to extend prescribing practice for nurse, pharmacist and allied health professional prescribers. The United Kingdom and Ireland are the least restrictive in terms of the legislative parameters of prescribing practice in relation to the range of healthcare professional who can prescribe medicines as an independent prescriber. Nurse and pharmacist independent prescribers can prescribe any medicine for any medical condition. Regulatory changes in 2012 allowed a full scope of prescribing for nurse and pharmacist independent prescribers inclusive of most controlled drugs. Allied health professional independent prescribers can prescribe any medicine for any medical condition, except optometrist who are restricted to ocular conditions, but there are restrictions applied to controlled drugs, which vary by professional discipline. Therefore, suitably qualified independent prescribers are legally authorized to prescribe a range of medications similar to doctors, including unlicensed and off-label medications (Kroezen et al., 2011).

## 2 | BACKGROUND

In the United Kingdom, the expansion of prescribing authority has facilitated the emergence of the autonomous extended practitioner role across many health professional groups employed within the primary care setting (Scottish Government, 2017). Professionals in this role holistically manage chronic disease and minor illness, polypharmacy reviews and symptom control for end-of-life care. Primary research and systematic reviews suggest that independent and supplementary prescribers are as effective as medical practitioners with regards to medication adherence, adverse events, overall satisfaction, quality of life and resource utilization (Black et al., 2022; Duarte et al., 2017; Noblet et al., 2018).

As pressures mount on existing healthcare resources, independent prescribing by groups other than medical practitioners is

increasingly diversifying the range of allied health professionals with prescribing rights and legislative scope in relation to which medications they can prescribe. Primary care was an early adopter of nurse and pharmacist independent prescribing resulting in comparable outcomes to doctors with regards to health outcomes, patient satisfaction, adverse drug events and medicines optimisation (Weeks et al., 2016).

In Scotland, NHS (National Health Service) primary care is delivered through 31 community health partnerships, which integrate health, social care and criminal justice services. In 2016 the 'realistic medicine' policy was implemented to improve care offered through shared decision-making, person centred care and reducing harmful and wasteful care through more effective use of skills and knowledge across all health professions (Scottish Government, 2016). A key objective of this policy is optimizing medicines through effective management of polypharmacy, and a greater number of skilled prescribing professionals to support service users to reduce medicines related harm and optimize medicines taking may facilitate this. Currently, there are 90,000 UK prescribers, with a growing number working in a primary care setting (Gould & Bain, 2022).

Research has been undertaken investigating the patterns of prescribing practice by nurse prescribers compared to doctors within community palliative care (Ziegler et al., 2018), mental health (Brimblecombe & Dobel-Ober, 2022) and in some of the devolved health services within the United Kingdom (Deslandes et al., 2022). Albeit progress to understanding the impact of this practice in care provision has been made, there appears to be a lack of empirical studies reporting the patterns of routine prescribing practice within primary care in Scotland. Facing the challenges of the post-pandemic recovery and how to provide health services, which are high quality and inclusive for the needs of our specific communities necessitates robust evaluation of current services. Exploring the characteristics of primary care prescribing is pivotal to understanding how independent and supplementary prescribers are using their qualification and inform where future role development, research and resources should be focussed.

Gaining a granular understanding of the characteristics of existing prescribing activity within primary care can support future initiatives to be cognisant of the needs of the specific populations they serve, and targeted in the use of valuable financial and human resources.

## 3 | THE STUDY

### 3.1 | Aims

The aim of this study was to explore the characteristics of prescribing activity of 10 of the most common prescribed drugs in primary care in Scotland by medical and independent nurse, pharmacists and allied health professional prescribers.

Specific objectives we sought to investigate were (a) the prescribing frequency of the ten most common drugs by prescriber group (b) to compare the prescribing patterns of medical and independent nurse, pharmacists and allied health professional prescribers and (c) identify any emergent prescribing patterns of individual drugs by independent nurse, pharmacist and allied health professional prescribers.

## 4 | METHODS

### 4.1 | Study design

The research employed a cross-sectional study design and its presentation follows the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines (von Elm et al., 2008).

### 4.2 | Sample

No individual participants were recruited onto this study as the data used were obtained from an electronic health database. The data were accessed from Public Health Scotland (PHS) via the Information Service Division NHS National Services Scotland (ISD) database. PHS collect and share data and intelligence to provide reliable health statistics to support and inform decisions affecting healthcare strategies. PHS collect and hold data on 100% of NHS Scotland prescriptions dispensed within the community and claimed for payment via its Prescribing Information System. All healthcare practices in Scotland are included in this data when a prescription has been dispensed from a community pharmacy in that primary care area. In addition to this high data completeness the accuracy of the data is evaluated each month with a random sample check of approximately 5% of all prescription payments, which achieves a target accuracy of 98% routinely.

This study undertook secondary data analysis of annual prescriptions, which were issued by medical and independent nurse, pharmacist or allied health professional prescribers in a prescribing location within Scotland, and subsequently dispensed from community pharmacies. Prescribing location is considered as a general practitioner (GP) medical practice, dental practice and community hospitals. The data excludes prescriptions supplied through hospital clinics where there is a direct supply of medicines to patients.

PHS data records the professional qualification of the prescriber for each individual prescription. There are 4 groups of prescribers listed with their total prescriptions data. The prescriber groups are detailed as (1) general practitioner (GP), (2) nurse independent prescriber (NIP), (3) community pharmacist (CP) and (4) pharmacist/allied health professional independent prescriber (P/AHIP). Due to the minimal number of prescriptions dispensed by pharmacist and allied health professional independent prescribers within primary care this data is amalgamated by PHS.

### 4.3 | Data collection

The data were accessed from the Public Health Scotland ISD database. PHS provides monthly data on drugs prescribed within primary care, dispensed by community pharmacies and subsequently submitted for payment. Data were collected from each financial year commencing 2013/14 to 2021/22. The fiscal year is recorded from April 1st to March 31st. The data collection commencement date of 2013 was chosen to reflect the impact of the full scope of nurse and pharmacist independent prescribing authority to include controlled drugs following 2012 prescribing rights legislation.

The study aimed to explore the characteristics of prescribing activity in relation to the most commonly prescribed medication in primary care in Scotland by doctors, nurses, community pharmacists and pharmacist/allied health independent prescribers providing a focused exploration of the contribution made by each prescribing group towards meeting medication demands. Therefore, data were collected within the context of the medications, which constituted the greatest number and volume of prescriptions issued. The ten most common drugs prescribed in primary care in Scotland were identified from PHS information services. Data were obtained on the following medications: *Omeprazole*, *Ramipril*, *Amlodipine*, *Aspirin*, *Simvastatin*, *Atorvastatin*, *Salbutamol*, *Co-codamol*, *Levothyroxine* and *Paracetamol* (Table 1).

### 4.4 | Data analysis

Data were obtained from ISD database and transferred to Excel for analysis of descriptive statistics (frequency, percentage) annually and by individual prescriber group. Data quality assessment and preparation was conducted and data anomalies referred back to ISD for clarification. Findings are presented through narrative, reported numerically and displayed in bar and line graphs to visually demonstrate prescribing frequency over time and proportional differences between prescriber groups.

### 4.5 | Validity, reliability and rigour

The validity of the study is supported by the use of high quality health service data, which is regularly and consistently collected and provided through a robust electronic database of a national

TABLE 1 Ten most common prescribed and dispensed drugs in primary care in Scotland by prescriber group.

| Drug                                      | Drug group   | Prescriber group    |                      |                  |
|---|--|---------------------|----------------------|------------------|
|   |  | GP nurse prescriber | Community pharmacist | Pharmacist & AHP |
| <i>Omeprazole</i>                         | Proton pump inhibitor (PPI)                                    | Yes                 | Yes                  | Yes              |
| <i>Co-codamol</i><br><i>Paracetamol</i>   | Analgesia opioids<br>Analgesia non-opioid                      | Yes                 | Yes                  | Yes              |
| <i>Aspirin</i>                            | Anti-platelet,<br>Non-steroidal anti-inflammatory drug (NSAID) | Yes                 | Yes                  | No               |
| <i>Atorvastatin</i><br><i>Simvastatin</i> | Statin-HMG CoA reductase inhibitor                             | Yes                 | No                   | Yes              |
| <i>Levothyroxine Sodium</i>               | Thyroid hormone  | Yes                 | No                   | Yes              |
| <i>Salbutamol</i>                         | Beta <sub>2</sub> agonists                                     | Yes                 | No                   | Yes              |
| <i>Amlodipine</i>                         | Calcium channel blocker  | Yes                 | No                   | Yes              |
| <i>Ramipril</i>                           | Angiotensin-converting enzyme (ACE) inhibitor                  | Yes                 | No                   | Yes              |

organization. The data were processed by the first author, checked for accuracy by both authors and confirmed by a third independent reviewer, which underpins the reliability of the findings. Description of the secondary data analysis supports the rigour of the study and allows replication in future studies.

#### 4.6 | Ethical considerations

Ethical approval was not required due to the study using anonymised data, which is publicly available from the PHS. This research did not include patient and public involvement, either in the study design, interpretation of results or review of the final document. Public involvement was not considered appropriate as the study aims did not address direct patient interaction with healthcare professionals.

## 5 | RESULTS

Data were extracted on the total number of prescriptions and compared by prescribing group. There was marked variability noted between the respective prescribing groups on the individual drugs they prescribed, whether they prescribed certain drugs at all and the number of prescriptions issued (Table 1). Community pharmacists prescribed Omeprazole, Co-codamol, Paracetamol and Aspirin only. Pharmacist and allied health prescribers issued prescriptions for all drugs except Aspirin; however, there was minimal prescriptions issued in comparison to the other three prescribing groups. Their prescription numbers ranged with some drugs having less than 100 prescriptions issued per annum (Levothyroxine) and the most frequently prescribed drugs still less than 1500 prescriptions issued per annum (Ramipril and Salbutamol). To give due representation to this group within the total prescriptions issued the data for community pharmacist and pharmacists/allied health professionals (P&AHIP) are amalgamated within the visual graphs to aid presentation. The detail of actual prescription numbers issued is given within the narrative.

The characteristics of the prescribing pattern of the ten most common drugs prescribed were explored to identify trends or anomalies which may warrant further investigation and possible areas of future research.

### 5.1 | Total prescriptions dispensed Scotland 2013 to 2022

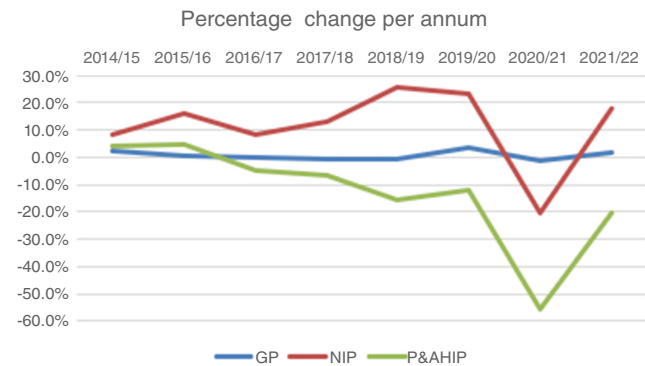
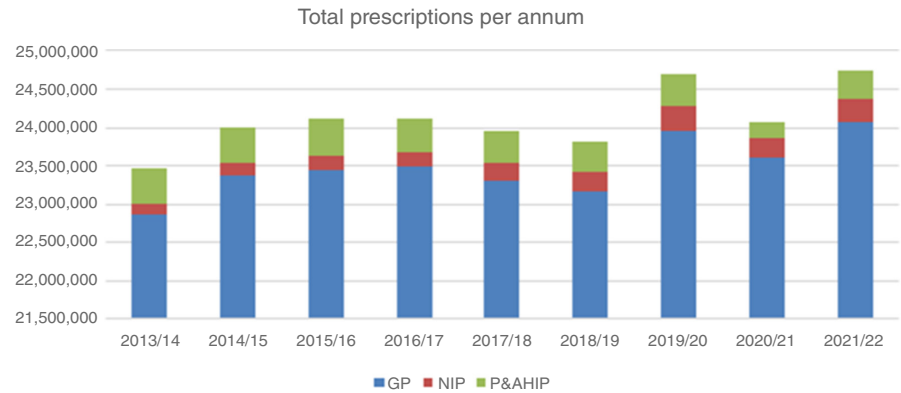
Within the context of prescriptions dispensed by community pharmacies in Scotland as a whole, inclusive of GP and independent prescribing by nurse, community pharmacist and pharmacist/ allied health professional, in the initial study year 2013/14 the total number of prescriptions dispensed was 23,464,033 and in the final study year total of 24,739,911. Across the 9 years study period the total number of prescriptions dispensed fluctuated annually within a figure of approximately 1.15 million.

The overall total prescriptions dispensed demonstrate variability per annum between 2013/14 and 2018/19. There is an annual increase up to 2016/17 but the trend then becomes downwards. Cumulatively, over the 6 year period there is an increase of 1.5% (349,517) of total prescriptions. This is followed by a noted increase of 3.7% (877,408) total prescriptions dispensed in a single year of 2019/20. All prescribing frequency decreased in 2020/21, with a reduction of 2.5% (621,007), which coincides with the global COVID 19 pandemic and the height of public enforced restrictions. The following fiscal year the prescribing frequency is similar to the pre-pandemic levels (Figure 1).

### 5.2 | Total prescriptions percentage change annually by prescriber group

In 2013/14, a total of 97.5% (22,866,721) of all prescriptions were attributed to GPs with NIP contributing 0.6% (140,253) and P&AHIP 1.9% (457,059) of the annual total.

**FIGURE 1** Total prescription of ten most common drugs dispensed in community pharmacies in Scotland 2013/14 to 2021/22.



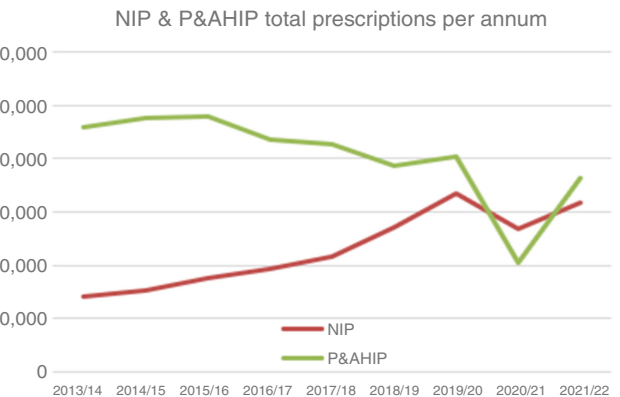
**FIGURE 2** Total prescription percentage change from preceding year per prescriber group 2013/14 to 2021/22.

GP prescribing proportion displayed little variability from 2013 to 2018 with an increase in 2019/20 and drop and rebound during the period 2020 to 2022. NIP proportion of prescriptions increased incrementally each year to 2019. Conversely from 2016 the proportion of P&AHIP prescribing activity began to decrease with a noted 55.6% drop in 2020/21 before recovery in 2020/22.

In 2021/22, a total of 97.3% (24,060,989) of all prescriptions were attributed to GP with NIP increased contribution 1.3% (315,546) and P&AHIP decreased to 1.5% (363,376) of annual total (Figure 2).

### 5.3 | Nurse independent and community pharmacist & allied health independent prescriber comparison

Significant disparity appears between the independent non-medical prescribers, NIP and P&AHIP prescribing frequency across the study period. In 2013/14 P&AHIP dispensed 316,806 more prescriptions than nurse independent prescribers. NIP show sustained growth in contrast to a gradual decline in prescribing frequency for P&AHIP from 2015/16. NIP prescribing activity increases 125% (140,253–315,546) between 2013 to 2022 while P&AHIP total prescribing activity decreases by 20.5% (457,059–363,376) over the same period (Figure 3).



**FIGURE 3** NIP and P&AHIP total prescribing of ten most common drugs, dispensed in community pharmacy, Scotland 2013/14 to 2021/22.

### 5.4 | Prescribing pattern of individual drugs 2013–2022

The study data demonstrated that of the ten most prescribed drugs eight increased in frequency while two, *Simvastatin* and *Aspirin*, both decreased in the number of prescriptions dispensed (Figure 4).

*Omeprazole* was the only drug to show a sustained increase per annum with GP total prescriptions up by 24.4% (3,299,432–4,103,146) and NIP prescribing increased 439.6% (11,751–63,404). Community pharmacist did not prescribe *Omeprazole* and pharmacist/ allied health independent prescribers were responsible for minimal annual prescription of *Omeprazole* ranging from 198 to 478. (Figures 4 and 5).

Collectively, there was a pattern of gradually increased frequency of both GP and nurse independent prescribing of *Levothyroxine*, *Ramipril*, *Amlodipine* and *Salbutamol* up to 2018/19 with a peak increase in 2019/20 followed by significant decrease and rebound in 2020–2022 period. Pharmacist and allied health independent professionals issued minimal prescriptions of these drugs.

*Simvastatin* prescriptions decreased with GP activity reduced 38.3% (2,920,846–1,803,334) over study period and nurse independent prescribing activity by 51.3% (10,641–5181). In contrast

Individual drug prescribing from 2013/14 to 2021/22

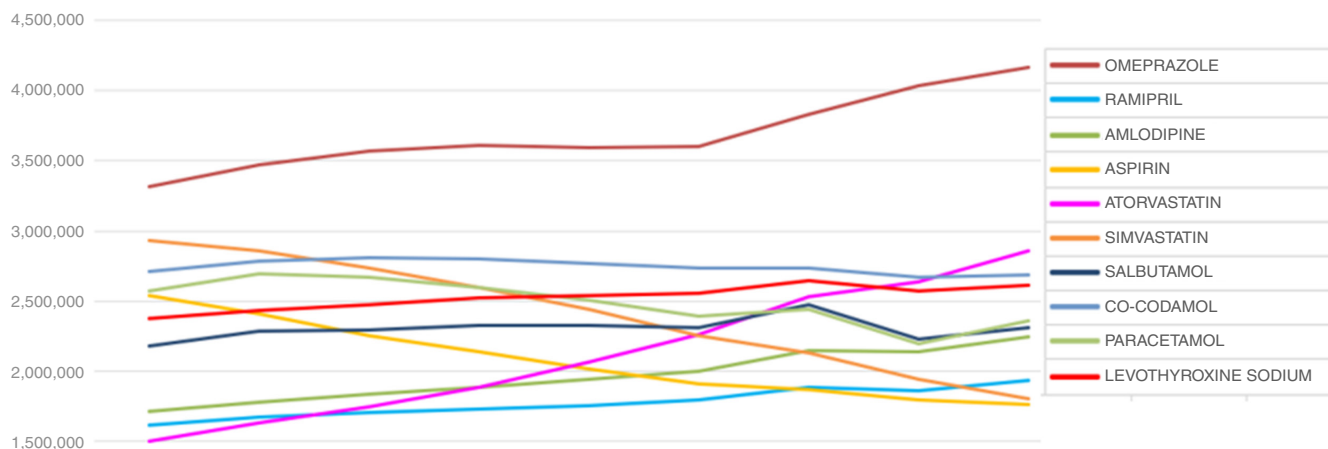


FIGURE 4 Individual drug prescribing all prescribers from 2013/14 to 2021/22.

Percentage change 2013/14 - 2021/22

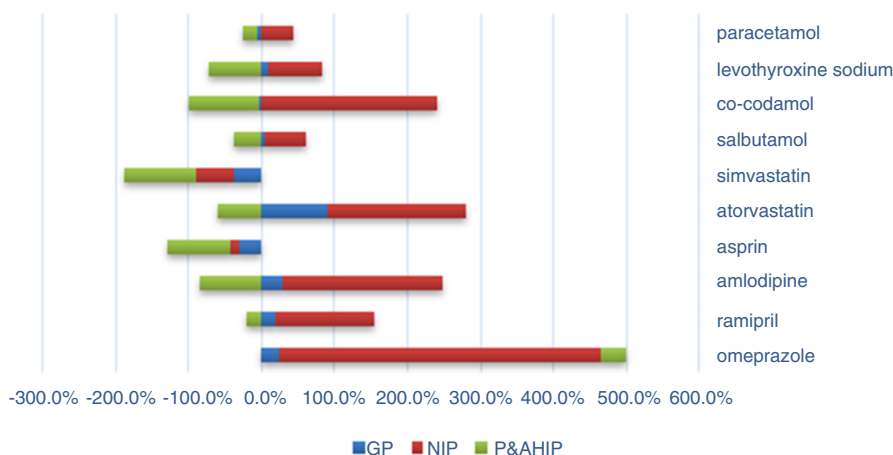


FIGURE 5 Individual drug dispensed from community pharmacies in Scotland percentage change per prescriber group 2013/14 to 2021/22.

Atorvastatin prescriptions rose by 1.3 million total over the review period with GP prescriptions increased 89.6% (1,495,752–2,835,637) and nurse independent prescriptions rising by 190.3% (6200–18,001). Pharmacist and allied health independent professionals issued minimal number of prescriptions of these drugs ranging from <20 to <350 per annum.

Total Aspirin prescribing decreased year on year with a reduction in GP total of 30.6% (2,532,680–1,758,582) and despite variability in nurse independent prescribing a cumulative decrease of 12.3% (7793–4816) overall from 2013/14 to 2021/22.

All prescriber groups contributed to the overall number of Co-codamol prescriptions. GP prescribing of Co-codamol decreased incrementally from 99.2% of all prescriptions to 97.3% over the 9 years reviewed. P&AHIP frequency declined by 96% from 11,029 to less than 475 prescriptions from 2013 to 2022. Nurse independent prescribing increased by 241.8% (21,313–72,840) corresponding to 2.7% proportional share of the total of all prescribing of Co-codamol by 2022.

GP prescribing of Paracetamol decreased by 6.4% (2,835,637–1,975,549) in comparison to nurse independent prescribing, which

increased by 43.5% (16,242–26,652) during the study period. While Paracetamol remained the drug prescribed most frequently by P&AHIP there was an incremental decline from 2013/14 to 2020/21 (464,624–199,967) and despite increase in 2021/22 (361,418) there was an overall reduction of 18.4% over the study period.

## 6 | DISCUSSION

The principal findings from the data demonstrate an overall but minimal increase in the total number of prescriptions dispensed by community pharmacies over the review period 2013 to 2022, which is cumulative for all prescriber groups. This is in keeping with the stable and slow population growth within Scotland. As the largest prescribing group GP activity drives the volume of medications prescribed. Despite the increase in the number of prescriptions issued by nurse independent prescribers their proportion remains relatively small in comparison with GP's. However, the total number of items prescribed annually by nurse independent prescribers in Scotland increased over the 9-year study period. In the final study year 2022

the total prescribing activity was 125% greater than in 2013. As a prescribing group this displays their increasingly expanding role in primary care prescribing. Although nurse prescribing has a long history within the primary care setting specifically district nurses and specialist public health nurse prescribers, these groups are limited to medications from the Nurse Prescribers' Formulary only. The reported data reflects a wider scope of nurse prescribing (V300 qualification) for those with the authority to prescribe any medicine for any medical condition. In comparison community pharmacist and pharmacist/allied health professional prescribers demonstrate diminishing responsibility for primary care prescribing with a consistent annual reduction in prescribing frequency from 2016. The reasons for this are unclear and may warrant further exploration to establish a more granular understanding for the decline in prescribing frequency by this group.

We sought to investigate whether there were any unusual, or unexpected, patterns of prescribing. There was a steep increase in the volume of prescribing for all prescribers 2019/20 following a steady upward trajectory in previous years. This may be associated with the implementation of the Scottish General Medical Services (GMS) contract (Scottish Government, 2017). The role of the primary care team was redefined to focus on complex care in the community impacting on the range and number of medications prescribed and required an enhanced skill mix within a multi-disciplinary team. This promoted expansion and task redistribution within the healthcare professional team working in primary care including the nurse practitioner with independent prescribing authority. This is reflected in Groenewegen et al. (2020) survey of health provision in 34 countries, which considers the variables impacting task shifting between medical practitioners and other health professional disciplines. This highlights the United Kingdom as having one of the highest levels of task shifting with the redistribution of tasks most prevalent when nurses have prescriber rights and a high level of professionalization, such as those in advanced practitioner or enhanced roles.

In contrast, 2020/21 saw a decline in all prescribing from the preceding year, with a decrease of 621,007 prescriptions dispensed, which coincides with the imposition of restriction in response to the global COVID-19 pandemic. There was a rapid restructuring of primary care services, which included reduced physical access to health professionals. Telephone triage was introduced from mid-March 2020 with telephone/video consultations rather than in-person attendance. Malcolm et al. (Malcolm et al., 2020) reported an initial sharp rise in March 2020 in the number of prescriptions requested just as lockdown was announced. It has been hypothesised that this increase was a precautionary reaction to perceived lack of access to primary healthcare services or the result of stockpiling of prescriptions, particularly for those with chronic conditions (Antunes et al., 2020; Currie et al., 2021). Global research demonstrates this initial rise was not sustained with overall annual reduction attributed to improved medicines adherence particularly amongst those with pre-existing respiratory conditions and vulnerable groups (Kaye et al., 2020); decline in new patients accessing healthcare and imposed limiting of unhealthy lifestyle behaviours (Currie et al., 2021;

Li et al., 2020). The resulting rebound of prescribing frequency to pre-pandemic levels, whilst healthcare services continued a telephone triage system and limited in-person consultation, suggests a degree of acceptance of the service and the ability to maintain medication provision by health providers.

This study explored the prescribing frequency of the ten most common drugs by prescriber group. Community pharmacists had the most limited formulary with their primary focus on analgesia (Aspirin, Co-codamol, Paracetamol) with minimal prescriptions of Omeprazole (less than 500 per annum). Their pattern of Paracetamol prescribing was marked with a consistent decline to 2020/21 leading to more than 50% reduction of their total prescribing frequency. This was overturned in 2021/22 with a noted increase but whether this recovery is sustained remains to be seen. Likewise, Aspirin displayed a similar, but less marked, reduction. Previous studies have described the trend towards greater public self-medication with over-the-counter analgesia for long-standing pain complaints (Perrot et al., 2019). In contrast, Co-codamol was the second most prescribed medication by nurse independent prescribers whereas GP annual totals decreased. As an opioid analgesic, certain Co-codamol preparations require a prescription and cannot be purchased as over-the-counter medication. These findings support previous evaluations of primary care initiatives where the aim is to promote independent prescriber consultations for those seeking treatment for long-standing pain or common ailments that previously would require a GP appointment to obtain a prescription (Stewart et al., 2018).

A comparison of the pattern of GP prescribing in relation to independent nurse, pharmacist and allied health professional prescribers was made to evaluate similar or diverging responsibilities. The data demonstrate a comparable pattern of increased prescribing of medications used for long term and chronic conditions such as anti-hypertensives, thyroid replacement therapy and proton pump inhibitors. A complementary prescribing pattern emerged of reducing Simvastatin prescriptions in tandem with greater and sustained Atorvastatin prescribing. This prescribing pattern adheres to the pharmacological strategy proposed by current guidelines in the therapeutic management of lipid control (NICE, 2016).

A 4-fold increase in PPI prescribing over the study period from medical and independent nurse, pharmacist or allied health professional prescribers is notable. This pattern reflects a global demand in prescribing in this area and may be attributed to the effectiveness of the medication in managing gastro-oesophageal reflux disease, withdrawal of H2 receptor antagonists, an increasingly aging population, near patient testing for *Helicobacter pylori* and concomitant use of PPIs when prescribing drugs with gastrointestinal side effects. Conversely studies suggest that there is a mismatch between current PPI prescribing guidance and practice (Plehhova et al., 2022), indications for prescribing are poorly or not documented in up to 60% of cases (Patterson Burdsall et al., 2013) and clinicians and service users may be reluctant to stop treatment once initiated (Moriarty et al., 2016). Adverse events associated with inappropriate prescribing of PPIs such as

antimicrobial resistance, electrolyte imbalance and increase risk of falls (Islama et al., 2018) suggest interventions to reduce inappropriate or unnecessary prescribing activity by prescribers in this area is a priority.

## 6.1 | Strengthens and limitations

A key strength of the study is utilizing national data from a robust electronic system over an extended period. This is the first national study to report objective prescribing data of independent prescribers in primary care in context of the most common prescribed medication and prescribing burden rather than focus on specific conditions. The data projects the pattern of prescribing activity during an unprecedented time of global challenge to reflect the impact on, and response by, primary care services in Scotland.

To strengthen the transparency of reporting the STROBE statement guidelines were followed to enhance the quality of the presentation and give a comprehensive review of the study methods (Von Elm et al., 2008).

ISD records all dispensed community prescriptions, to allow financial reimbursement, and it is acknowledged that dispensing may not accurately reflect prescribing if patients do not collect their prescription. We consider the impact of this to be marginal as there are no prescription charges in Scotland removing the financial burden, which can result in non-collection. This data captures dispensed medication giving an indication of trend of prescribing activity but it cannot provide a comprehensive view of prescribing decision-making in respect of medicine reconciliation, deprescribing, health promotion and non-pharmacological measures.

The number of items for pharmacists and nurses independent prescribers may be an underestimate of the true number. This is due to occasions where prescriptions have been prescribed via a GP10 form, which gets attributed to GP prescriber group.

Whilst this study used robust data collected nationwide it remains specific to primary care services in Scotland. It is a small country with high levels of deprivation and its own unique healthcare challenges. The findings may not be generalisable to other countries with different healthcare systems or population demographics.

## 7 | CONCLUSION

This study highlights that although independent and supplementary prescribing is well recognized in the United Kingdom, health professionals with an independent prescribing qualification contribute a relatively small proportion of primary care prescribing in relation to medical practitioners. However, a contribution of 2–3% of annual prescribing activity is now realized by nurse, pharmacist and allied health independent prescribers. While this impact may be minimal currently, the potential to support the ever increasing demand on health services should be achievable as prescribing rights are extended to existing or more allied health professional groups. This

includes the recent introduction in pharmacist pre-registration training to include independent prescribing giving them the ability and legislative authority to prescribe on joining their professional register. In addition, ongoing discussions on the preparation of undergraduate nursing students to be 'prescribing ready' at the point of registration also points towards a future healthcare workforce practising at a level beyond current proficiencies (Seston et al., 2020).

While characterizing the trajectory of individual medications can highlight areas of commonality the pattern of independent prescribers practice requires wider exploration to give a more comprehensive review of the influencing factors driving this pattern. Unanswered questions for future research include the large increases in PPI prescribing. The significant cost this incurs and drive towards rational and realistic use of medicines, deprescribing and non-pharmacological interventions to optimize health outcomes suggests that further exploration of medicines optimisation in people prescribed PPIs in Scotland is warranted. As this is a global trend, with evidence of PPI prescribing increasing within the international literature, there is a need to focus on the wider influencing factors driving this prescribing decision.

A driving aim of realistic medicine is to make more effective use of multi-professional knowledge and skills to provide sustainable and equitable healthcare provision. The study findings demonstrate there has been an overall increase in nurse independent prescribing and greater contribution to provision and maintenance of services across primary care settings by this professional group. Sustained growth of medicines optimisation by independent prescribers groups will support the rational use of medicines, meet the goals of realistic medicine and advance nursing, pharmacy and allied health professional potential.

### AUTHOR CONTRIBUTIONS

Sonya MacVicar made substantial contributions to conception and design or acquisition of data or analysis and interpretation of data; Sonya MacVicar and Ruth E. Paterson involved in drafting the manuscript or revising it critically for important intellectual content, given final approval of the version to be published, agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content.

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### CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to report.



## PEER REVIEW

The peer review history for this article is available at <https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/jan.15658>.

## DATA AVAILABILITY STATEMENT

The data can be accessed from the NHS Scotland's Information Services Division.

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