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Contents

ORIGINAL RESEARCH

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Original Research

Assessing Gastro-Protective Medication Co-Prescription with NSAIDs, Anticoagulants, and Antiplatelets in Primary Care: An audit

ORIGINAL RESEARCH

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ABSTRACT

Introduction: Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), antiplatelets and anticoagulants, are ulcerogenic drugs associated with gastrointestinal (GI) bleeding, increased hospitalisation risks and straining healthcare resources. Co-prescribing gastroprotective medications (GPMs) can mitigate these effects.

Methodology: Searches were conducted on electronic health record system 'SystmOne' to identify patients in a Northampton primary care setting from 02/01/2023 to 07/07/2023. Eligible patients were identified according to Medicine Safety 01- Medicine Safety 03 under the NHS Investment and Impact Fund Guidance to PCNs 2020/21: Over 65 and on NSAIDs, over 18 on anticoagulants and antiplatelets, over 18 on aspirin and another antiplatelet. Patient medication lists were anonymised and recorded. This data was used to produce descriptive statistics and for analysis against prior audit data from 01/10/2019 to 12/11/2020.

Results: 81 patients were identified, with 66 patients above 65 and on NSAIDs, 4 patients above 18 on anticoagulants and antiplatelets and 11 patients above 18 on aspirin and another antiplatelet. 92.6% (75 out of 81) of patients were prescribed GPMs, a 18.7% relative increase, or a 14.6 percentage point improvement, from the 01/10/2019 to 12/11/2020 period.

Discussion: Rational prescribing requires regular evaluation. Proton pump inhibitors (PPIs) are preferred gastroprotective medications and warrant supervision when co-prescribed with ulcerogenic drugs. GI bleeding has multiple aetiologies, each mandating its own treatments. By involving a multi-disciplinary team, implementing clinical education and conducting systematic auditing, hospitalisation numbers can be reduced.
Conclusion: GPM prescriptions with NSAIDs, anticoagulants and antiplatelets in line with aforementioned guidelines have improved in the primary healthcare setting between the two audited time periods. This serves as a good reflection for healthcare practices, offering actionable insights to enhance appropriate drug use while supporting the development and implementation of effective policies.

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INTRODUCTION

At every healthcare facility, it is of vital importance to uphold the Hippocratic oath of medicine: Primum non nocere (Do no harm). Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), antiplatelets and anticoagulants, while effective in executing their desired actions, are associated with the potential to damage the gastrointestinal tract (GIT), leading to GIT bleeding and other side effects (1). Consequently, patients prescribed the aforementioned medications without gastro-protective cover are at a greater risk of hospitalisation secondary to bleeding. This not only adds a burden to the healthcare system but also adversely affects patients' quality of life and violates the principle of Primum non nocere. Therefore, gastro-protective medications (GPM) should be co-prescribed when needed to reduce hospitalisation numbers.

Audits like this are necessary and crucial as they systematically evaluate the quality of care provided, ensuring that clinical standards are met and identifying areas for improvement. They help enhance patient safety and promote evidence-based practices, and ensure efficient use of resources within the NHS. Additionally, audits support professional accountability and foster continuous learning and development among healthcare staff.

The co-prescription of GPM is recommended by the National Institute for Health and Care Excellence (NICE) with NSAIDs when patients are at an increased risk of gastrointestinal adverse effects, such as those requiring long-term NSAID treatment, and for patients experiencing dyspepsia from standard NSAIDs. (2-3)

GPM in the form of proton pump inhibitors (PPIs) is also recommended by NICE if 'the person has a high risk of GI adverse effects (for example bleeding) and is taking low-dose aspirin alone, or in combination with ticagrelor or prasugrel; or clopidogrel alone, or in combination with low-dose aspirin' (4).

For anticoagulants, there does not seem to be sufficient clear guidance on GPM. The only relevant guidance comes in the form of contraindication to anticoagulants 'people with a significant risk of major bleeding, such as: current or recent gastrointestinal ulcer', found under apixaban, dabigatran, edoxaban, rivaroxaban and warfarin (5-9). Local guidelines, however, do list anticoagulants along with antiplatelet and NSAIDs as high-risk factors, which warrants GPM (10).

NICE currently explicitly recommends GPM co-prescription in NSAIDs. There are mentions of GPM (in the form of PPIs) with antiplatelet prescription, in the low-dose aspirin section for antiplatelets and the summary page for oral antiplatelets. Arguably, the recommendation encourages more on GPM co-prescription when multiple ulcerogenic medications are utilised (for example, concurrent use of aspirin with other antiplatelets, NSAIDs, anticoagulants and selective serotonin reuptake inhibitors) rather than GPM prescription when a single antiplatelet was used. Last but not least, NICE does not explicitly mention gastroprotection for anticoagulants, whether it is on the summary page or the specific pages for each medication.

This study addresses the gap in clarity by conducting an audit investigating trends of GPM prescriptions in NSAIDs, antiplatelets and anticoagulants in the primary healthcare setting. This study aims to compare the results of audits from two time periods, collating potential strategies to improve GPM co-prescription rates.

Pharmacological properties of GPM

UK guidelines recommend GPMs to prevent upper GIT bleeding in patients on ulcerogenic drugs like NSAIDs, anticoagulants, and antiplatelets, as well as for managing symptoms of ulcerative GIT diseases. GPM shields the GIT mucosa from damage caused by NSAIDs, which inhibit the enzyme cyclo-oxygenase (COX). COX inhibition disrupts the production of Prostaglandin E2 (PGE2), essential for gastric mucosal protection via bicarbonate and mucus secretion. (12-15)

NSAIDs are categorised into non-selective COX inhibitors (e.g., aspirin), preferential COX-2 inhibitors (e.g., diclofenac), and selective COX-2 inhibitors (e.g., celecoxib). PGE2 and prostacyclin (PGI2), products of COX-2(16)(figure 4), are pivotal in regulating inflammation, angiogenesis, and tumour-related processes like invasion and cell proliferation.

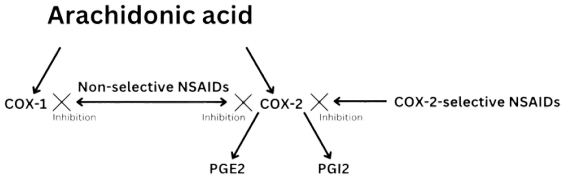


Figure 1: *COX pathways* (Eisa et al., 2021)

Proton pump inhibitors (PPIs) are considered superior to H2 receptor antagonists (H2RAs) and polysaccharides for managing upper GIT conditions. H2RAs, like ranitidine and cimetidine, reduce gastric acid by targeting gastric H2 receptors but are less effective than PPIs in acid inhibition. PPIs, though criticised for not addressing root causes and potential cost issues, outperform H2RAs in acid suppression. (17-18)

Polysaccharides such as alginic acid (e.g., Gaviscon) form a gel-like barrier when exposed to gastric acids, providing relief primarily for gastro-oesophageal reflux disease (GORD) rather than medication-induced GIT

bleeding. (19) Omeprazole, a PPI, has been noted to reduce GORD-related heartburn duration. Thus, PPIs are the preferred choice for co-prescription with ulcerogenic drugs.

Rational drug use and its importance

The rational use of drugs has been defined as "medications appropriate to patients' clinical needs, in doses that meet their own individual requirements, for an adequate period and at the lowest cost to them and their community" (20). PPIs are no exception to rational prescriptions. Patients are generally instructed to take PPIs as a single daily dose, with at least annual medication reviews.

With PPIs, it has been noted, among many other side effects, to cause an increased risk of fractures, increased risk of GIT infections, increased risk of osteoporosis (and subsequently fractures, including hip fractures), predisposition to Clostridium difficile infection and masking effects of gastric cancer (21).

Existing data raises concerns about the clinical appropriateness of PPI prescribing. Despite limited documentation, particularly in primary care, troubling statistics highlight the need for serious attention to the proper use of PPIs. 47% of new PPI prescriptions were written for unapproved indications, according to a BMJ-published study (22). Such data justifies the prompt and detailed documentation (and potential improvement) of PPI prescribing, including information on indications and clinical appropriateness, in England and the UK as a whole.

Complications with chronic NSAID use have emerged as a serious public health issue globally. Digestive haemorrhages and perforations, indigestions, endoscopically confirmable ulcers, precipitation of GIT toxicity and ultimately, death are among the potential complications. With such presentations, patients are therefore exposed to unnecessary and preventable procedures, pressuring the already-saturated healthcare system.

With the reasonable use of medications, not only can cost-effectiveness be promoted by avoiding inappropriate prescriptions, thus reducing costs for individuals and healthcare systems; This also helps improve patient adherence, achieving the objectives of enhancing safety by minimising adverse reactions and fostering a strong culture of evidence-based medicine in the process.

METHODOLOGY

To evaluate the rate of GPM co-prescription in primary care, an audit against guidelines was conducted, analysing GPM prescriptions between 02/01/2023 and 07/07/2023. Eligible patients were identified using Electronic Health Records (EHR) searches conducted on SystmOne. Eligible patients were selected according to Medicines Safety (MS) MS01-MS03) under the NHS Investment and Impact Fund Guidance to PCNs 2020/21 (11). The searches identified three cohorts of patients: those over 65 and on NSAIDs (Ibuprofen, Naproxen, Diclofenac, Celecoxib, Mefenamic acid, Etoricoxib), those over 18 on anticoagulants and antiplatelets (Apixaban, Dabigatran, Edoxaban, Rivaroxaban), and those over 18 on aspirin and another antiplatelets (Clopidogrel, Prasugrel, Ticagrelor). . The medical lists of identified patients were reviewed manually to confirm prescriptions and produce descriptive statistics on the GPM prescription rates to be compared to the aforementioned NICE-compliant 80% target.

The findings from this audit were retrospectively compared to unpublished audit data from the of 01/10/2019 to 12/11/2020 period conducted at the same primary care setting, with identical criteria.

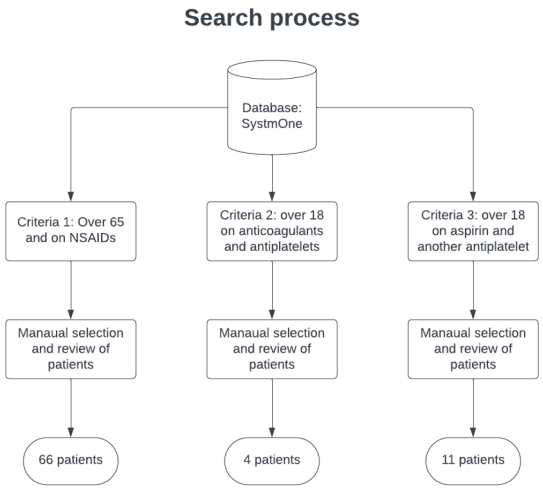


Figure 2: *Patient Identification Search Process*.

Ethical approval

All information used in this research has been obtained ethical approved from the source of information at Danes Camp Medical Centre, Northampton. This research studies public behaviour that are purely observational (non-invasive and non-interactive) and the recorded observations do not identify individuals (names, photographs) which could place them at risk of harm, stigma, or prosecution. The only information acquired are in forms of age, gender and prescribed medications. Ethics correspondence: Danes Camp Medical Centre Rowtree Road, East Hunsbury, Northampton, NN4 0NY. Phone: +44 (01604) 709426. Email: danescamp.k83610@nhs.net

RESULTS

A total of 81 patients fulfilled the search criteria. 66 of these patients were above 65 and on NSAIDs, four patients were above 18 and on anticoagulants and antiplatelets, and 11 patients were above 18 on aspirin and another antiplatelet. Six out of 81 (~7.41%) patients were not on any GPM, and the remaining 75 (~92.6%) are on GPM, as seen in Figure 2.

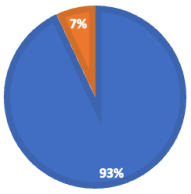


Figure 3: *Prescription rates of Gastro-protective medications in 2022/2023. Percentage of patients prescribed GPMs (Blue) and patients not prescribed GPMs (Orange) in the 2022/2023 period. Source: Author's Own Work*

As seen in Figure 3, the prescription rate of GPMs increased from 78% in 2019/2020 to 92.6% in 2022/2023, and the proportion of patients not prescribed GPMs decreased from 22% to 7%, respectively.

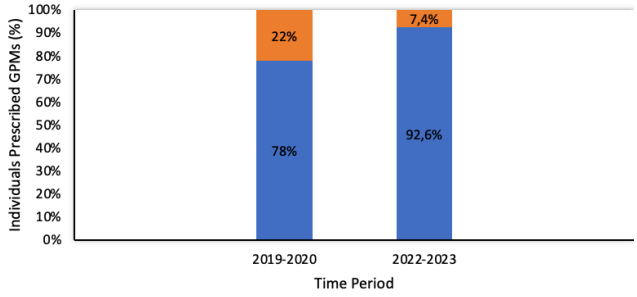


Figure 4: *Comparison of Gastro-protective prescription rates from 2019-2020 and 2022/2023. Percentage of patients prescribed GPMs (Blue) and patients not prescribed GPMs (Orange) in the 2019/2020 period compared to the 2022/2023 period. Source: Author's Own Work*

DISCUSSION

A comparison between 2019/2020 and 2022/2023 data shows a relative increase of 18.7%, or 14.6% increase in absolute change (percentage point improvement) in the proportion of patients prescribed GPMs, rising from 78% in 2019/2020 to 92.6% in 2022/2023, demonstrating a notable improvement in GPMs prescription rates over time.

When compared to the 80% target set by NHS England's Investment and Impact Fund 2020/21 (11), the 2019/2020 prescription rate was 2% below the target, whereas the 2022/2023 rate was 13% above it.

The 13% exceedance of the NHS England target in 2022/2023 suggests that interventions or strategies implemented during this period were successful in promoting appropriate prescribing practices.

Application to Wider Practice

Following the results revealed by the 2019/2020 audit, the primary care facility implemented several strategies such as regular audit implementation, increased clinical education and utilising a multi-disciplinary approach. These strategies may help explain the improvement in GPM co-prescriptions in the primary care setting.

The Swiss cheese model of safety incidents can be fitted to GPM co-prescriptions with ulcerogenic drugs. The model states that every system functions like layers of Swiss cheese. Just as there are multiple layers of sliced Swiss cheese, there are various levels of barriers to prevent errors from occurring. Similar to the air holes in Swiss cheese, each layer of the barrier is imperfect (24). Therefore, an error could only happen if it manages to slip through the frailties of every preventative measure. It stresses that errors occur not due to individuals' fault, but rather flaws in the system (23). Applying the model in all healthcare settings will prove to be advantageous.

Echoing the aforementioned model, a multi-disciplinary team (MDT) was adopted. Aside from clinician education acting as the foundational barrier, additional layers of Swiss cheese barriers were inserted, ranging from nurses, pharmacists, other allied healthcare professionals, and even patients and their carers. Nurses carried out regular medication reviews, whether it was virtual or in-person, and pharmacists were asked to double-check the essential co-prescriptions before giving out medications; Allied healthcare professionals kept track of the pharmaceutical effects of medications holistically, while patients and their carers were also given information about self-monitoring for side or adverse effects and were asked to provide feedback to their responsible clinicians. Everyone involved in the model could raise a concern should any problems arise, thus diminishing potential prescription errors.

Another strategy adopted was the use of regular audits. Evaluation of performance against the standards of the professional standards of evidence-based principles can highlight any potential discrepancies. This can be executed by a clinical audit, which comprises the clinical audit cycle: 1) identification of a specific clinical topic; 2) laying down criteria and standards; 3) data collection; 4) data analysis; 5) implementation of changes; 6) re-audit (25). Not only can clinical audits reduce the divergence between theoretical standards, but they can also increase professionalism in clinical practice. PPIs are drugs with numerous potential interactions and side effects and are therefore a suitable topic to be audited. Individual

healthcare facilities should carry out their respective audits to better identify their specific areas for improvement.

Clinician education has improved in both quantity and quality in the primary care setting as well. Education primarily concerns GPM prescription, and it is crucial in bringing about high-quality patient-centred care. Senior physicians and consultants led by example, hosting and facilitating educational sessions. They varied in modality and duration: online, in-person or hybrid; webinars, talks, workshops, lectures, tutorials and bedside practical teachings. Contents and outlines were suitably amended to allow healthcare professionals to carry out their ordinary career responsibilities, while incentivised to attend the sessions via certification and portfolio-building. Some examples include monthly prescription sessions, spotlight pharmacology talks, and weekly teaching series, which serve as reminders for cautious prescribing and regular revisions of clinical knowledge. Additionally, there was also the placement of important reminders or flowcharts physically in each consultation room or virtually through electronic prescribing systems.

In view of the topic of prescribing, a staggering 961.5 million prescription items were dispensed yearly in England, costing just short of 9 billion pounds to the NHS (26), and putting into perspective the possibilities of potential errors. Regular review of prescribing guidelines would be beneficial: the Yellow Card Scheme records suspected adverse drug reactions and updates about new safety issues (27).

An increased importance was also placed on medication reviews, especially for chronically ill patients. A high-quality medication review should involve taking a comprehensive, accurate and up-to-date medication history from the patient, taking into consideration patient values and preferences, with collateral information input and appraisal processes, ultimately influencing final decision-making and implementation (28)(Appendix 1). History-taking should include prescribed medications, over-the-counter (OTC) drugs, herbal medications, and supplements, while documenting any known or suspected allergies and adverse reactions to any substances. The review can formulate part of a routine consultation, followed by a clinical assessment to determine the appropriateness of the patient's current regimen, keeping an eye out for identical concurrent therapies, and unjustified and conflicting drug prescriptions. With every encounter, document findings, including starting and/or stopping medications, switching medications, and dose adjustments, alongside patient understanding and adherence.

Building on the medication review model, shared decision-making was also promoted and reinforced. It entails actively involving the patient in clinical decisions. Patients' autonomy is being respected and fulfilling the role of a service user instead of passive conformity. This helped establish feedback loops between primary care patients, their carers, general practitioners, nurses, allied healthcare professionals and other stakeholders to promote reciprocal communication and shared learning.

LIMITATIONS

This study is limited by its sample size as it was only conducted in one primary care setting, and may not be representative of other regions, primary care settings or other health care settings. Additionally, demographics have not been included as an area of analysis, and thus, insights into the demographic differences in GPM prescription rates are not accounted for. Conducting such analysis could provide a deeper understanding of health inequalities in this area. Furthermore, a larger-scale audit encompassing multiple primary care settings, other healthcare environments, or broader regional coverage would be beneficial in producing more representative and generalisable data.

CONCLUSION

The study showed a substantial improvement in GPM prescriptions, rising from 78% in 2019/2020 to 92.6% in 2022/2023, surpassing NHS targets. This improvement was driven by strategic interventions such as multidisciplinary teamwork, clinician education, and regular audits. Nurses, pharmacists, and allied professionals played critical roles in reviewing medications and addressing potential errors, while patients contributed through self-monitoring and feedback to ensure rational drug use, thus enhancing safety, reducing adverse effects, and fostering cost-effectiveness. Ongoing audits, education, and shared decision-making can further optimise prescribing practices and ensure patient-centred care, strengthening the healthcare system and improving patient outcomes.

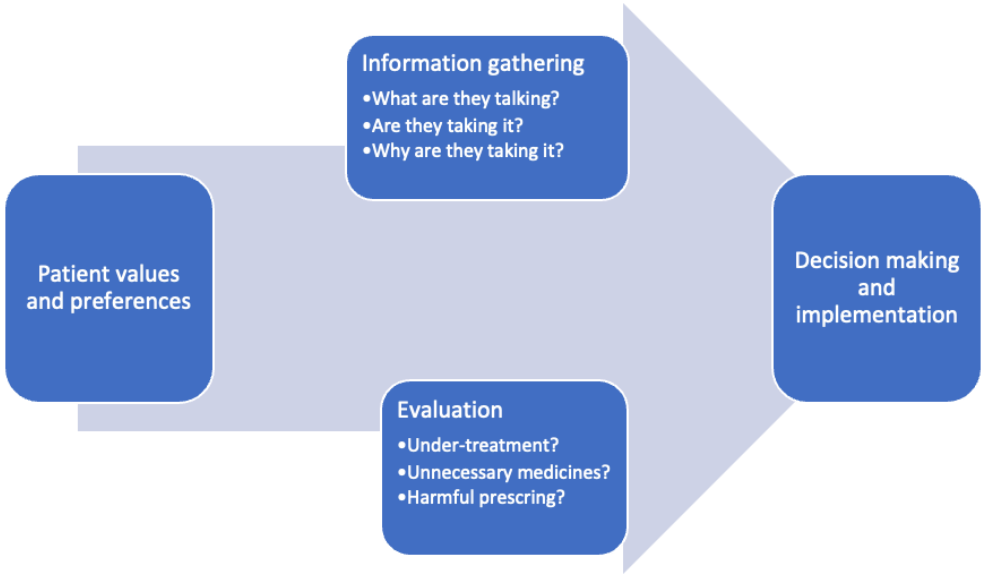
A broader application of these strategies is recommended to increase GPM prescription across UK primary care settings. Further research, including regional studies and demographic analyses, may be beneficial.

DECLARATIONS

This study and the work to which it refers are the results of my own efforts. Any ideas, data, images or text resulting from the work of others (whether published or unpublished) are fully identified as such within the work and attributed to their originator in the text, bibliography or in footnotes. This study has not been submitted in whole or in part for any other academic degree or professional qualification. I agree that the journal has the right to submit my work to the plagiarism detection services for originality checks.

APPENDICES

1) The Bristol Medication Review Model (Perneger, 2005)



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