

Potentially inappropriate medicines and potential prescribing omissions in older people and their association with health care utilization: a retrospective cohort study

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Introduction

Older people are particularly vulnerable to adverse effects of prescribed drugs¹. In response to these concerns, prescribing indicators have been developed addressing: Potentially Inappropriate Medicines (PIMs), medicines prescribed without an indication or with an unfavourable risk-benefit ratio, and Potential Prescribing Omissions (PPOs), omissions of clinically indicated medicines with a clear benefit. Little is known about the impact of PIMs and PPOs on healthcare utilization².

This study aims to determine the prevalence of PIMs and PPOs in a cohort of older people and their association with healthcare utilization.

Methods

Study design

- This was a retrospective cohort study of 2,051 community-dwelling participants in Wave 1 of The Irish Longitudinal Study on Ageing (TILDA) aged ≥65 years with linked medication dispensing history from a national pharmacy claims database.
- TILDA is a representative cohort of over 8,000 people resident in Ireland aged ≥50 years charting their health, social and economic circumstances.
- Medication data, classified by WHO Anatomical Therapeutic Chemical codes, was obtained from the Health Services Executive Primary Care Reimbursement Services (HSE-PCRS) pharmacy claims database, which details monthly medications dispensed to persons eligible for the General Medical Services (GMS) scheme in Ireland.

Exposure

Exposure to PIMs and PPOs was determined in the 12 months preceding each participant's TILDA interview using the Screening Tool for Older Persons' Prescriptions (STOPP³), Beers criteria⁴, Assessing Care Of Vulnerable Elders (ACOVE) indicators⁵ and the Screening Tool to Alert doctors to Right Treatment (START³). Some indicators could not be applied due to lack of participant clinical information – Figure 1 shows the proportion of included criteria from each screening tool.

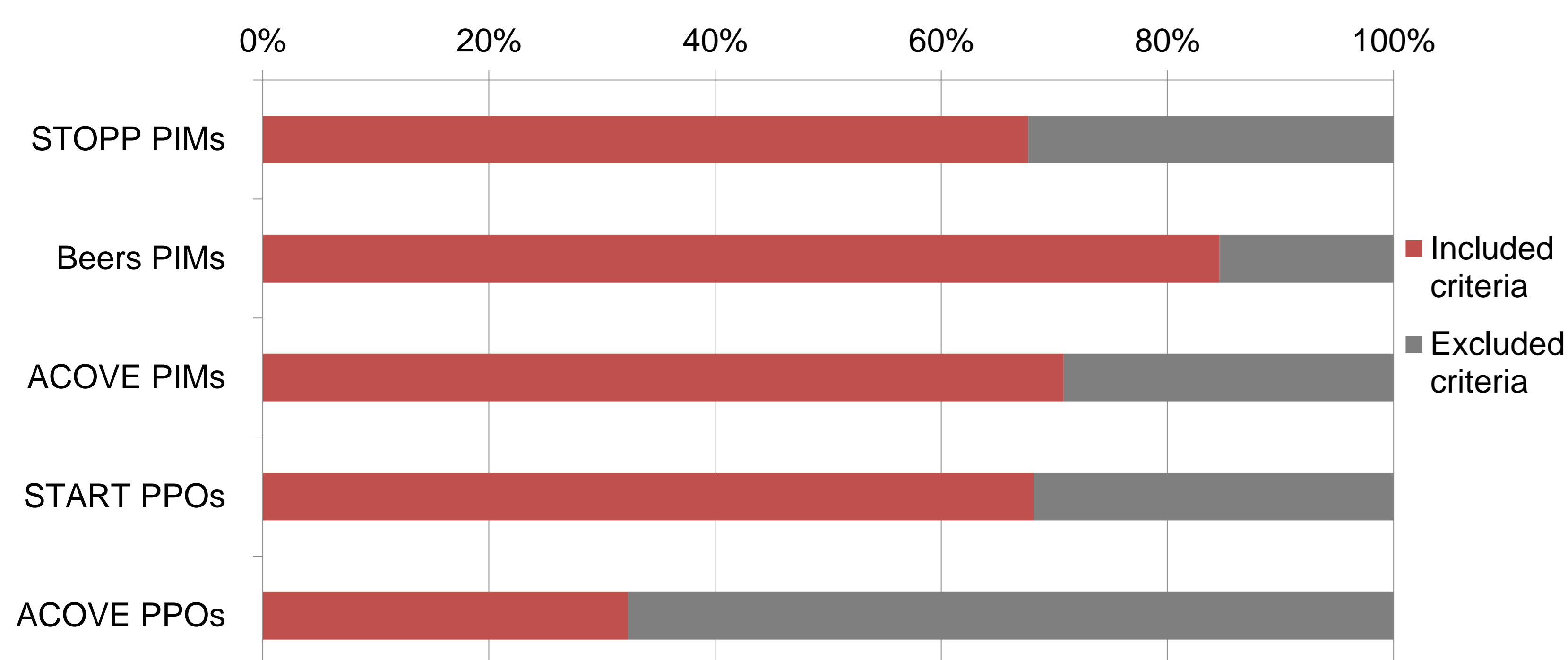


Figure 1. Percentage of included criteria from PIM and PPO screening tools

Outcome

As part of the TILDA interview, participants were asked about their healthcare utilization for a range of primary care and secondary care services in the previous 12 months. The outcome measures used for this study were self-reported number of hospital visits (emergency department of inpatient admissions) and number of general practitioner (GP) visits.

Data analysis

Poisson regression was used to determine the association between exposure to PIMs and exposure to PPOs and the rate of hospital and GP visits, adjusting for age, sex, education level, number of regular medications and chronic conditions and health insurance status. Separate models were fitted for each PIM and PPO screening tool and each of the two outcomes. Number of medications and chronic conditions were reported by participants during their TILDA interview. Analysis was performed using STATA version 12.

Results

Overall prevalence

- The percentage of participants with a PIM during the study period was 19.8-52.7% depending on screening tool used while PPO prevalence varied from 43.6-44.8% (Table 1).
- The number of PIMs and PPOs identified were 2,963 and 2,515 respectively.
- In total, 803 participants (39.2%) had both a PIM and PPO.

Table 1. Prevalence of PIMs and PPOs by screening tool

Screening tools	Participants with PIP	
	n	%
STOPP criteria	1,081	52.7
Beers criteria	625	30.5
ACOVE indicators	407	19.8
Any above PIM	1,260	61.4
START criteria	895	43.6
ACOVE indicators	918	44.8
Any above PPO	1,167	56.9

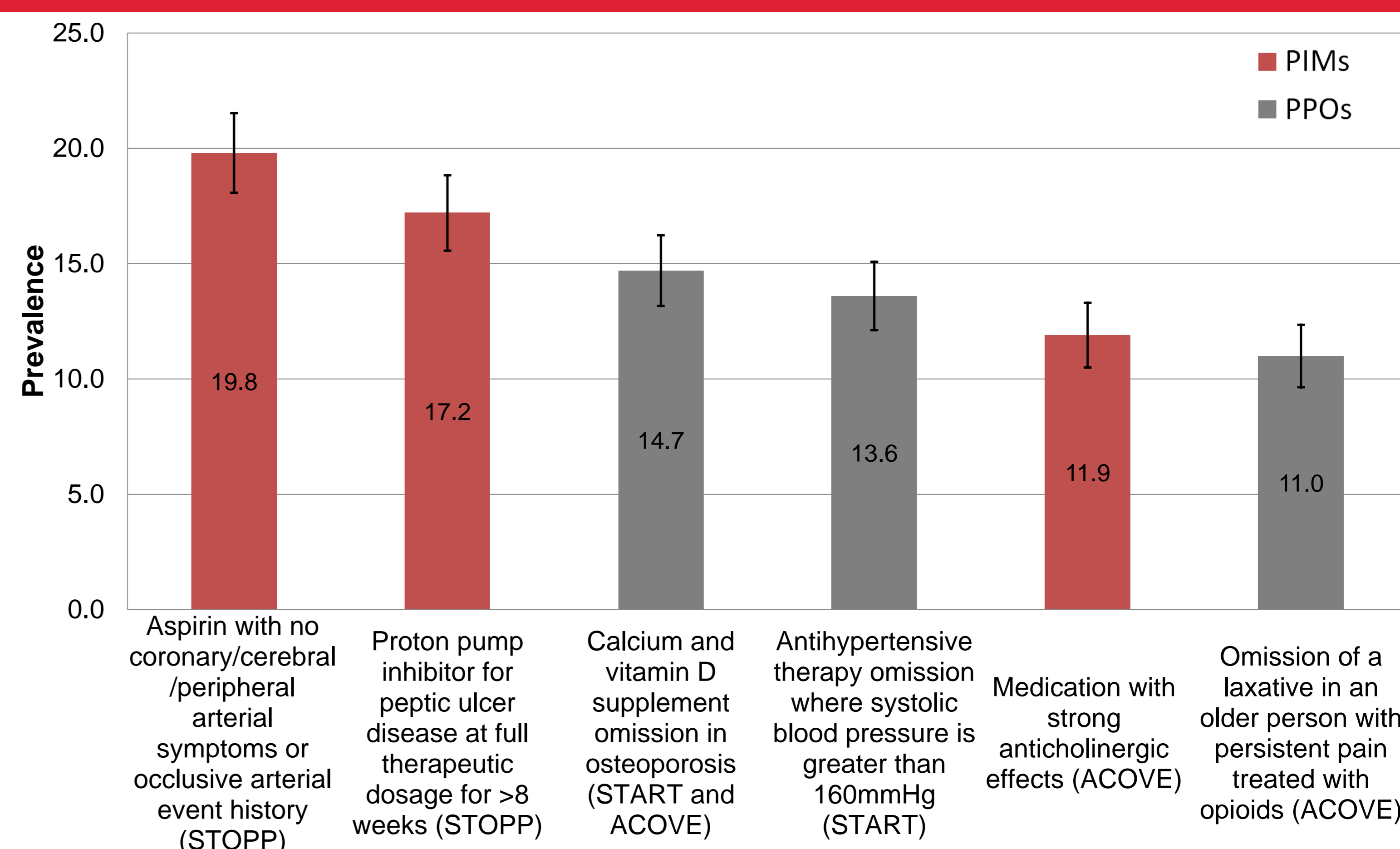


Figure 2. Prevalence with 95% confidence intervals of most common PIM and PPO indicators

Prevalence per PIM and PPO indicator

The indicators with the highest prevalence are shown in Figure 2.

- Aspirin prescribed with no cardiovascular symptoms/history (indicating primary prevention) occurred in almost 1 in 5 participants.
- Evidence on the inappropriateness of aspirin for primary prevention is mixed.
- Although untreated hypertension appears to be common, this is based on blood pressure measurement at one occasion, so may not fully reflect clinical reality of hypertension diagnosis.

Healthcare utilization

- Two hundred and sixty participants (26%) reported having a hospital visit (A&E visit or inpatient admission in previous 12 months).
- One visit reported by 12.5%, two visits by 7.4%, three visits by 2.3%, four or more by 3.8%.
- At least one GP visit reported by 96.2% (median 4, IQR 2-6 visits)

Poisson regression

- Regardless of screening tool used, PIM and PPO exposure was associated with hospital visits.
- Except for START PPOs, PIM and PPO exposure was also associated with GP visits.
- The multivariable analysis for STOPP PIMs is displayed below (Table 2) and shows number of STOPP PIMs is independently associated with rate of hospital visits and GP visits, after adjusting for confounders.

Table 2. Multivariable (adjusted) poisson regression predicting rate of hospital visits and GP visits

	Adjusted Incident Rate Ratio (95% CI)	
	Hospital visits	GP visits
Number of STOPP PIMs	1.24 (1.15-1.35)**	1.08 (1.04-1.12)**
Sex (female)	0.78 (0.61-0.99)*	0.90 (0.82-0.99)*
Age (in years)	0.99 (0.96-1.01)	1.0 (0.99-1.01)
Level of education	1.08 (0.91-1.28)	0.96 (0.90-1.03)
Number of medicines	1.05 (0.99-1.13)	1.05 (1.02-1.08)*
Number of chronic conditions	1.12 (0.99-1.27)	1.07 (1.0-1.15)*
Private health insurance	0.89 (0.68-1.16)	0.87 (0.79-0.95)*

** p < 0.001 * p < 0.05

Conclusion

Exposure to PIMs and PPOs is independently associated with increased rate of hospital visits and GP visits after controlling for measured confounders. PIM/PPO indicators may be useful as markers of healthcare quality and patient safety. Review of prescribed medicines in patients with PIMs/PPOs may help to optimise care and improve outcomes in older people. Further prospective research is needed to explore causality in this relationship.

References

- Cahir, C. et al. Potentially inappropriate prescribing and cost outcomes for older people: a national population study. *British Journal of Clinical Pharmacology* 69.5 (2010): 543-552.
- Hill-Taylor, B. et al. Application of the STOPP/START criteria: a systematic review of the prevalence of PIP in older adults, and evidence of clinical, humanistic and economic impact. *Journal of Clinical Pharmacy and Therapeutics* (2013).
- Gallagher, P. et al. STOPP (Screening Tool of Older Person's Prescriptions) and START (Screening Tool to Alert Doctors to Right Treatment). Consensus validation. *International Journal of Clinical Pharmacology and Therapeutics* 46.2 (2008): 72-83.
- Resnick, B. et al. 2012 Beers Criteria. *Journal of the American Geriatrics Society* 60.4 (2012): 612-613.
- Amin, A. et al. Assessing Care of Vulnerable Elders-3 Quality Indicators. *Journal of the American Geriatrics Society* 55.S2 (2007): S464-S487.

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