Prevalence of potentially inappropriate medicines and potential prescribing omissions over time in a cohort of community-dwelling older people

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Introduction

Older people are particularly vulnerable to adverse effects of prescribed drugs[1]. 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.

This study aims to compare the prevalence of PIMs and PPOs using several screening tools in an Irish community-dwelling older cohort, to assess if the prevalence changes over time and to determine factors associated with any change.

Methods

Study design

- This is a prospective cohort study of 2,051 community-dwelling participants in Waves 1 and 2 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 study of over 8,000 people resident in Ireland aged ≥50 years charting their health, social and economic circumstances every two years for a ten year period.
- Medication data, classified by WHO Anatomical Therapeutic Chemical codes, were 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.

Potentially inappropriate prescribing criteria

- Prevalence of PIMs and PPOs was determined in the year preceding participants' baseline TILDA interviews and in the year preceding their follow-up interviews.
- PIMs were assessed using the Screening Tool for Older Persons' Prescriptions (STOPP[2]), Assessing Care Of Vulnerable Elders (ACOVE) indicators[3], and Beers 2012 criteria[4] and PPOs using the Screening Tool to Alert doctors to Right Treatment (START[2]) and ACOVE indicators.
- 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.

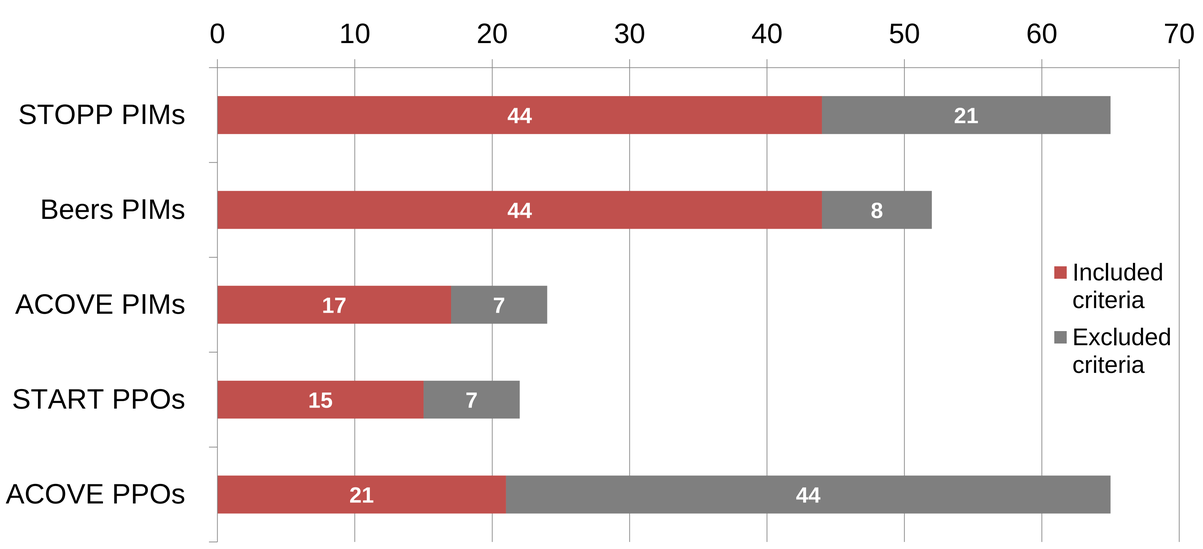

Figure 1. *Number of included criteria from PIM and PPO screening tools*

Data analysis

Prevalence was calculated for each screening tool and for individual criteria for both time periods. McNemar's test assessed whether the prevalence of criteria changed significantly over time.

Generalised estimating equations (GEE) with exchangeable correlations were used to investigate determinants of the change in overall prevalence of PIMs and PPOs[5]. Multivariate GEE models adjusted for sex, age, numbers of regular medicines and diagnosed chronic conditions (reported at TILDA interview) at baseline and follow-up.

Results

Overall prevalence

- The percentage of participants with a PIM during the baseline period was 19.8-52.7% depending on screening tool used while PPO prevalence varied from 43.6-44.8% (Table 1).
- Prevalence increased at follow-up for all screening tools, ranging from 22.0-56.1% for PIMs and 40.5-49.3% for PPOs.
- At baseline, 36.7% of participants had both a PIM and PPO and at follow-up 41.1% had both.

Table 1. *Prevalence of PIMs and PPOs by screening tool*

Screening tools	Participants with PIP n (%)	
	Baseline	Follow-up
STOPP criteria	1,081 (52.7)	1,151 (56.1)
Beers criteria	625 (30.5)	678 (33.1)
ACOVE indicators	407 (19.8)	451 (22.0)
Any above PIM	1,260 (61.4)	1,330 (64.8)
START criteria	783 (38.2)	831 (40.5)
ACOVE indicators	918 (44.8)	1,011 (49.3)
Any above PPO	1,094 (53.3)	1,161 (56.6)

Prevalence of individual PIM and PPO criteria

The criteria with the highest prevalence at baseline are shown in Figure 2.

Highly significant (McNemar's test, p<0.0001) increases in prevalence were observed for:

- Prescription of PPIs at full therapeutic dosage for >8 weeks (STOPP, 17.2% to 21.9%).
- Anticholinergics, benzodiazepines, H2 antagonists or antipsychotics with dementia (Beers, 0.3% to 1.3%).
- Omission of treatment for females in osteoporosis (ACOVE, 9.1% to 12.1%).
- Warfarin omission with atrial fibrillation/abnormal heart rhythm (START, 7.5% to 9.3%).

Only two criteria significantly (p<0.05) decreased in prevalence:

- Long-term (>1 month) long-acting benzodiazepines (STOPP/ACOVE, 3.9% to 3.1%).
- Omission of antihypertensives with elevated blood pressure (START, 5.5% to 3.5%).

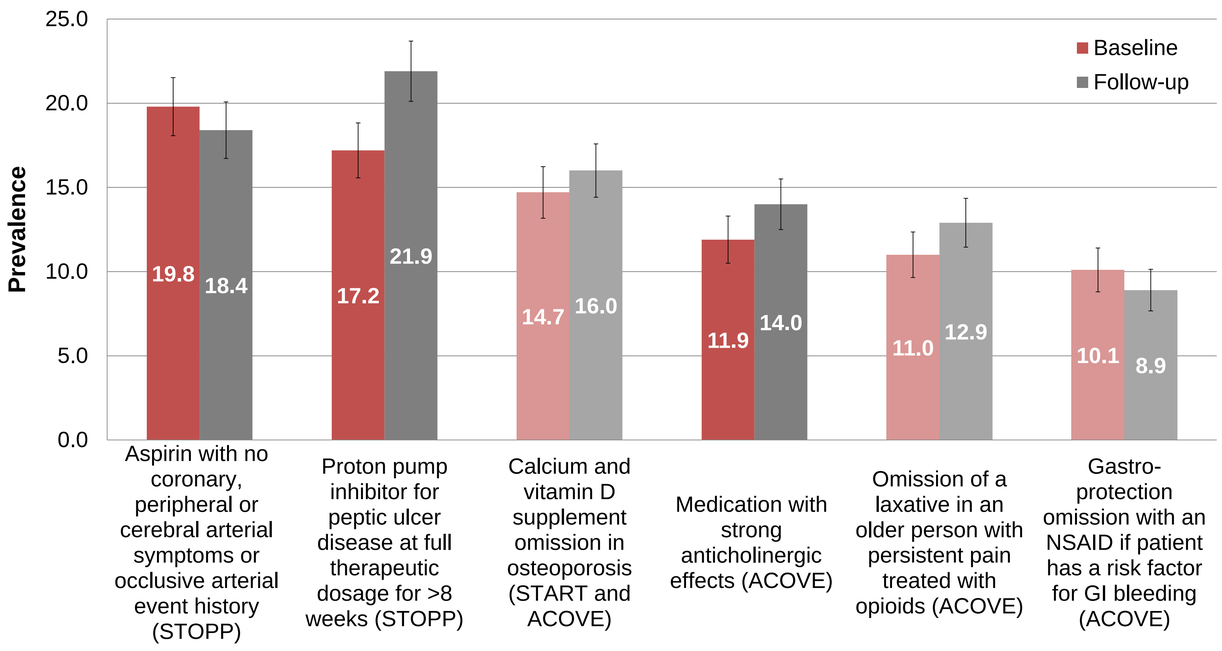

Figure 2*. Prevalence with 95% confidence intervals of most common PIM and PPO criteria*

GEE analysis

- The overall prevalence of PIMs increased significantly between baseline and follow-up (from 61.4% to 64.8%).
- After adjusting for participants characteristics at baseline and follow-up (Table 2), time period no longer explained this increase (odds ratio 1.00, 95% CI 0.95, 1.06). Age, female gender and higher number of medicines were significantly associated with increasing PIM prevalence.
- A significant increase in PPO prevalence over time also occurred (from 53.3% to 56.6%).
- Similarly in the adjusted GEE analysis for PPOs (Table 2), increased prevalence was not found to be a function of time (odds ratio 0.97, 95% CI 0.92, 1.02) and was significantly associated with age, higher number of medicines and high number of chronic conditions.

Table 2. *Multivariable (adjusted) GEE models*

	Adjusted Odds Ratio (95% CI)	
	Any PIM	Any PPO
Follow-up time period (vs baseline)	1.00 (0.95, 1.06)	0.97 (0.92, 1.02)
Age (years)	1.03 (1.02, 1.04)*	1.03 (1.02, 1.04)*
Female gender (vs male)	1.27 (1.07, 1.5)*	0.86 (0.72, 1.01)
Number of medicines	1.20 (1.17, 1.24)*	1.04 (1.01, 1.07)*
Number of chronic conditions	1.05 (0.99, 1.11)	1.47 (1.39, 1.56)*

* z score p < 0.05

Conclusions

Sub-optimal prescribing was common in this older cohort and the prevalence of PIMs and PPOs increased over time. Ongoing prescribing review is important, particularly as patients get older, receive more medicines or develop more illnesses. The application of screening tools for PIMs and PPOs by pharmacists as well as prescribers may help to optimise pharmaceutical care of older people and improve health outcomes.

References

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