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Did a physician-targeted intervention that reduced potentially inappropriate prescribing to elderly patients also reduce related hospitalizations?

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INTRODUCTION

A potentially inappropriate medication (PIM) is a drug that may be inappropriate because the risks outweigh the potential benefits. 1,2 PIM use in the elderly can be harmful due to less effective clearance systems, frail bodybuild and polypharmacy. 1,3 Maio and colleagues estimated that approximately 20% of elderly Emilia-Romagna residents were prescribed a PIM in 2006. 4 A retrospective, longitudinal analysis of over 1.4 million elderly, Emilia-Romagna residents (2003–2010) demonstrated that individuals exposed to a PIM were 16%, more likely to be hospitalized than persons unexposed to PIM. 5 Evidence of the clinical effectiveness of interventions aimed at reducing PIM prescribing in the elderly is limited and has yielded mixed results.6,7

OBJECTIVES

To determine whether a general practitioner focused intervention aimed at decreasing PIM prescribing in the elderly can decrease the risk of PIM-related hospitalizations.

METHODS

This study was reviewed by the Thomas Jefferson University IRB and determined not to constitute human subjects research.

Intervention


• Saving residents of the Local Health Authority (LHA) of Parma, Emilia-Romagna region (RER), Italy, one of the 11 regional LHAs.

• Aiming to engage 303 general practitioners (GPs) on PIM awareness in the elderly population.

• Implemented over a 2 year time period: 2008–2009.

• When the intervention was introduced in 2008, there were 906,810 residents under the care of a general practitioner (GP) in Parma LHA during and after intervention (post-intervention). 1/1/2008 - 9/30/2011) to residents under the care of a GP in the rest of the RER (Non-Parma).

Study Population

• Study period: 01/01/2005 – 09/30/2011.

• Elderly individuals (≥65 years old) who were residents of RER for at least one year were included in the cohort.

• Individuals exited the cohort at the earliest time they met one of the following criteria: death, moved out of the region, or hospitalization for more than 30 consecutive days.

Modeling

• We developed a time-dependent covariate, repeated-events, Cox Proportional Hazard Model using fully-linked longitudinal administrative data from the RER database.

• Event of interest: PIM-related hospitalizations, defined as an unplanned, inpatient hospitalization occurring during PIM exposure.

• Defined PIM groups that were “always avoided”, according to the 2007 Maio Criteria.6

• To estimate PIM exposure we computed the number of days supplied for each medication of interest (using Defined Daily Doses) and added 30 days to capture any residual effects of a PIM. An individual was considered exposed to PIM from the date the prescription was filled until 30 days after the prescription was expected to end based on DDD.

• Adjustments for the outcome included: age, gender, number of non-PIM hospitalizations (in the previous four quarters), number of chronic conditions drug groups (CCDGs) (in the previous four quarters).

Calculations

• Demographics were summarized for Parma and Non-Parma at the start of the intervention (01/01/2008).

• Unadjusted PIM exposure and PIM-related hospitalizations were estimated for Parma vs. Non-Parma residents.

• We used Cox modeling to estimate adjusted hazard ratios (HRs) of PIM-related hospitalizations for Parma post vs. pre-intervention.

• We calculated the number of PIM-related hospitalizations avoided in Parma post-intervention vs. pre-intervention (Figure 1).

RESULTS

Demographics

• When the intervention was introduced in 2008, there were 906,810 elderly residents in the Emilia-Romagna region and approximately 1:1/8 were under the care of a Parma GP.

• The exposure to PIM, PIM-related hospitalizations, and comorbid status, gender, and age strata of residents in Parma and Non-Parma were similar.

Table 1. Demographics, 2008

<table>
<thead>
<tr>
<th>Age</th>
<th>Parma</th>
<th>Parma</th>
<th>Non-Parma</th>
<th>Non-Parma</th>
</tr>
</thead>
<tbody>
<tr>
<td>65–69</td>
<td>353,036</td>
<td>353,036</td>
<td>715,783</td>
<td>715,783</td>
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<tr>
<td>70–74</td>
<td>287,438</td>
<td>287,438</td>
<td>434,930</td>
<td>434,930</td>
</tr>
<tr>
<td>75–79</td>
<td>233,142</td>
<td>233,142</td>
<td>308,823</td>
<td>308,823</td>
</tr>
<tr>
<td>≥80</td>
<td>203,204</td>
<td>203,204</td>
<td>114,062</td>
<td>114,062</td>
</tr>
</tbody>
</table>

Table 2. Cox Model Results

<table>
<thead>
<tr>
<th>HR (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.98 (0.97, 0.99)</td>
<td>0.001</td>
</tr>
<tr>
<td>0.99 (0.98, 0.99)</td>
<td>0.001</td>
</tr>
<tr>
<td>1.00 (0.99, 1.00)</td>
<td>0.347</td>
</tr>
<tr>
<td>1.00 (0.99, 1.00)</td>
<td>0.347</td>
</tr>
<tr>
<td>0.99 (0.98, 1.00)</td>
<td>0.375</td>
</tr>
</tbody>
</table>

Hazard Ratios

• Compared with others in the RER during the same periods, Parma residents post-intervention were 7% less likely to have a PIM-related hospitalization than pre-intervention (Table 2). We estimated that approximately 411 PIM-related hospitalizations were avoided due to the intervention.

CONCLUSIONS

• Approximately 411 PIM-related hospitalizations were avoided in Parma LHA and elderly residents during post-intervention were at significantly lower risk of PIM-related hospitalizations than pre-intervention.

• We believe that the observed decline in PIM hospitalizations within Parma LHA was attributable to the decreased exposure to PIMs.

• To our knowledge this is the first study to evaluate the effectiveness of a multi-year PIM awareness program with respect to incident hospitalizations.

• We believe that the observed decreased risk of PIM-related hospitalizations in Parma LHA post-intervention was due to changes in physician behavior.

• We urge researchers to continue to evaluate the effectiveness of interventions targeted at increasing awareness of the potential harms of PIM in the elderly.

REFERENCES

1. A potentially inappropriate medication (PIM) is any drug that may be inappropriate because the risks outweigh the potential benefits. 1,2


3. The E. Richardson, J. Thomas Jefferson University.


2. Division of Biostatistics, Department of Pharmacology and Experimental Therapeutics, Thomas Jefferson University, Philadelphia PA

3. Parma Local Health Authority, Parma Italy.