



Effects of a clinical pharmacist on inappropriate prescribing in patients hospitalized on a geriatric inpatient unit

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ABSTRACT

Purpose: To determine if involvement of a clinical pharmacist in a geriatric evaluation and management (GEM) team reduces inappropriate prescribing in older inpatients.

Methods: The study was a randomized controlled trial. Subjects were patients hospitalized on an acute GEM unit between November 2003 and May 2004. Control patients received normal GEM care (no pharmacist involvement), and intervention patients received GEM care plus pharmaceutical care by a clinical pharmacist. Outcome measures included prescribing appropriateness which was evaluated using a subset of the Beers criteria, and seven explicit indicators of drug underuse. These evaluations were performed by two independent blinded pharmacists. Appropriateness was compared on admission and at discharge in both groups, and it was reassessed one and three months post-discharge through patient telephone calls.

Results: In total 196 patients were included (mean age SD: 82.1 6.5 years; mean number of regularly prescribed drugs SD: 7.6 3.4). From admission to discharge, the proportion of patients taking at least one drug of the Beers sublist decreased by 87% in both groups. The percentage of patients with a previous fall and taking a benzodiazepine decreased by 7.4% and 23.5% in the control and intervention groups respectively. For indicators of underuse, the percentage of patients with inappropriate prescribing decreased by 58-100% (depending on the indicator) in the intervention group while it decreased by 0-50% in the control group. Improvements were overall maintained up to three months post-discharge in both groups. Comparison with a historical control group (patients hospitalized on the same unit before the study period) shows that there might have been an educational bias for patients in the control group.

Conclusions: Using explicit criteria of prescribing appropriateness, involvement of a clinical pharmacist in the multidisciplinary GEM team reduced suboptimal prescribing more than when no pharmacist was involved in patient care. This effect was overall sustained after discharge.

INTRODUCTION

- Inappropriate medicines use in older patients is frequent and can lead to adverse outcomes [1]. Specific measures of prescribing appropriateness in the elderly include explicit criteria of overuse, misuse, and underuse [2-5].
- The impact of geriatric evaluation and management (GEM) programs on prescribing appropriateness has been little studied; one study reported improvement from admission to discharge, in frail elderly inpatients [6].
- No published study has compared the appropriateness of prescribing on GEM units with versus without pharmaceutical care input.

AIM OF THE STUDY

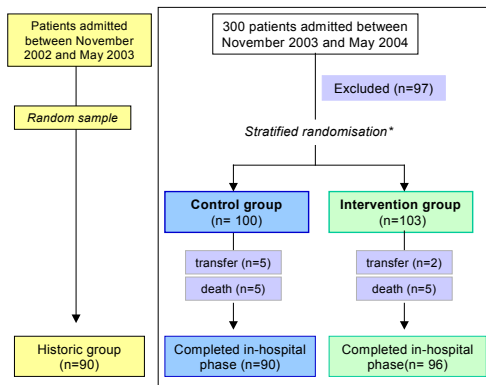
- To determine if involvement of a clinical pharmacist in a GEM team reduces inappropriate prescribing in older inpatients.

METHODS

- Design:** Randomized controlled trial.
- Patients admitted between November 2003 and May 2004 were randomized to usual care or to usual care + pharmaceutical care.
- Setting:** Acute GEM unit, Mont-Godinne Teaching Hospital (Belgium).
- Intervention:** Pharmaceutical care provided by a clinical pharmacist present on the unit 4 days a week: drug history on admission, analysis of prescribing appropriateness and intervention if problem identified; discharge counseling to patient/caregiver, and to general practitioner.
- Outcome measures:**
 - Explicit criteria of prescribing appropriateness (see box);
 - Assessments realized by two blinded pharmacists;
 - Comparison of appropriateness on admission, at discharge, and after discharge (through follow-up calls with patients/caregivers one and three months post-discharge; performed by two blinded pharmacists).

- Comparison with a historical control group to assess educational bias (sample of patients hospitalized on the unit before the intervention).
- Study protocol approved by the local Ethics Committee; informed written consent obtained from each patient/caregiver.

RESULTS



* Stratified according to age (≤ 84 , ≥ 85), nb of regularly prescribed drugs (≤ 4 , ≥ 5), and hospital doctor - **Exclusion criteria:** poor prognosis at 3 months, previous inclusion, inability to perform abstracted chart within 3 days, length of stay < 2 days.

Characteristics of patients at baseline

Characteristics	Control (n=95)	Intervention (n=101)
Age, mean \pm SD (years)	82.0 \pm 6.2	82.2 \pm 6.9
Male : Female (%)	34 : 66	27 : 73
Community-dwelling	67.4%	72.3%
Living alone	24.5%	26.7%
Support for ≥ 1 ADL	56.7%	59.6%
Previous fall (6 months)	73.0%	69.3%
Cognitive impairment	45.3%	42.6%
Previous hospitalization < 6 months	30.9%	35.6%
Charlson comorbidity score	2.02 \pm 1.564	2.07 \pm 1.633
Perceived health status:		
- (Very) good	32.3%	44.3%
- Fair	58.1%	47.5%
- Poor	9.7%	8.2%
Prescription drugs (mean \pm SD)	7.5 \pm 3.4	7.8 \pm 3.5
Daily doses (mean \pm SD)	9.9 \pm 4.8	9.8 \pm 4.7

Abbreviations: ADL: activity of daily living; NA: not available. No significant differences between groups (χ^2 , Mann-Whitney, and t-tests).

Criteria of prescribing appropriateness

- Inappropriate drugs** (subset of Beers' criteria [2] : drugs available in Belgium, and on the hospital formulary)
 - dipyrindamole - propoxyphene
 - amitriptyline - long-acting benzodiazepines*
 - indomethacin - anticholinergic anti-histamines*
 - ergot mesyloid - oxybutinil
- * drugs marketed in Belgium but not in the United States were added to the original list.
- Drug-disease interaction**
Benzodiazepine in patients with previous fall [3]
- Underuse** [4-5]
IF the patient has a certain condition, THEN he should receive a certain drug, UNLESS contra-indicated

Condition	Drug
Ischemic cardiomyopathy	Antiplatelet
Diabetes	Antiplatelet
Atrial fibrillation	Antiplatelet/anticoagulant
Fracture/Osteoporosis	Bisphosphonate, calcium, vitamin D
Heart failure	ACE-inhibitor
Heart failure	β -blocker
Myocardial infarction	β -blocker

Effect on prescribing appropriateness during the inpatient period

Criteria of appropriateness	% patients with inappropriate rating on admission	Relative reduction in inappropriateness from admission to discharge			
		Historic (n=90)	Control (n=90)	Intervention (n=96)	
Inappropriate drugs (Beers' sublist)	31.5%	65.6%	> 87.1%	87.5%	
Drug-disease interaction: benzodiazepine - previous fall (n=121)	60.3%	NA	> 7.4%	> 23.5%	
Underuse					
- Fracture/osteoporosis (n=125)	Ca, vit. D / bisphosphonate	72.0%	32.0%	48.7%	> 86.0%
- Atrial fibrillation (n=84)	Anticoagulant/ antiplatelet	39.2%	9.0%	20.5%	> 62.7%
- Ischemic heart disease (n=80)	Antiplatelet	42.5%	40.0%	39.6%	> 77.7%
- Diabetes (n=57)	Antiplatelet	40.4%	16.4%	50.0%	> 77.7%
- Heart failure (n=26)	ACE-inhibitor	42.3%	50.0%	- [†]	> 66.7%
- Heart failure (n=26)	β -blocker	69.2%	- [†]	0%	> 57.5%
- Myocardial infarction (n=26)	β -blocker	61.5%	0%	- [†]	> 100%

Abbreviations: ACE: Angiotensin-Converting Enzyme; Ca: calcium. NA: not applicable because data on previous fall and benzodiazepine intake was not systematically recorded in the medical record. [†]Relative increase in inappropriateness from admission to discharge: 200%, 33.3%, and 14.1% (note: low number of patients concerned).

Follow-up after discharge

	Improvement maintained *	
	Control group	Intervention group
Inappropriate drug (Beers' sublist)	85.7%	94.1%
Benzodiazepine and previous fall	55.6%	85.7%
Underuse criteria	87.1%	87.0%

* Nb of cases with improvement maintained 1 and 3 months post-discharge divided by the total nb of cases with improvement from admission to discharge. Missing data for 34 cases out of 165 (20.6%).

CONCLUSIONS

- ✓ Involvement of a clinical pharmacist in the GEM team reduced suboptimal prescribing more than when no pharmacist was involved.
- ✓ Improvements were overall maintained after discharge.
- ✓ Comparison with a historical control group shows that there might have been an educational bias for patients in the control group.

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