

CLINICAL INVESTIGATION

IDENTIFICATION OF INTERVENTION STRATEGIES TO REDUCE PREVENTABLE DRUG-RELATED MORBIDITY IN OLDER ADULTS

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Background: Drug-related morbidity (DRM) results in significant costs and consequences. Although 50% or more of DRM may be preventable (PDRM), strategies to reduce the problem of PDRM have not yet been identified. The purpose of this study was to determine the perceived efficacy of each of 8 strategies for reducing PDRM, as expressed by physicians.

Methods: Three panels of physicians (12 general practitioners [GPs], 6 geriatricians and 6 clinical pharmacologists) who had previously developed and validated clinical indicators of PDRM in older adults, received a follow-up mail survey to identify strategies to reduce PDRM. Each physician was asked to decide how best to reduce PDRM, by choosing from 8 strategies for each clinical indicator as many preventive intervention methods as they felt could be useful.

Results: Overall, monitoring was the most frequently chosen strategy per indicator. The GPs and clinical pharmacologists chose monitoring most frequently per indicator, while the geriatricians chose health-system management most frequently per indicator. For each PDRM indicator, an average of 3.95 intervention strategies were chosen.

Conclusion: Monitoring and health-system management were strategies identified most frequently by physicians to reduce PDRM. Future research should focus on evaluating patient health outcomes associated with strategy implementation.

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Abbreviations: DRM, drug-related morbidity; PDRM, preventable drug-related morbidity; GPs, general practitioners; DRP, drug-related problem; ADEs, adverse drug events

INTRODUCTION

With a constant increase in the number of medications available to treat diseases and symptoms, and a growing literature to support their use, there is also greater potential for morbidity related to the use of medications. Drug-related morbidity (DRM) is the failure of a therapeutic agent to produce the intended therapeutic outcome, either due to treatment failure or the production of a new medical problem.¹ The risk of DRM may be of greater concern in the elderly, because an increased likelihood of co-morbidities and related symptoms in this population can result in the increased use of medications. Campbell argues that the increasing number of older adults and their prominent utilization of health-care services, particularly medications, raise health-system concerns about the appropriate use of medications.² Age itself has not been proven to be an independent risk factor for DRM.^{3,4} However, the number of concurrent medications that a patient receives has been shown to predict DRM,⁵ and this factor is strongly and positively associated with age. Additionally, the negative economic impact of

DRM is staggering. The total annual cost of DRM in the ambulatory setting in the United States was estimated to be \$177 billion US in 2000, more than double the 1995 estimate of \$76 billion US.^{6,7}

While some DRM is a result of idiosyncrasies, data from the literature suggests that at least half of DRM may be preventable.⁸⁻¹¹ As described by Hepler and Strand,¹ preventable drug-related morbidity (PDRM) has four unique characteristics. Given an adverse clinical outcome, a pre-existing drug-related problem (DRP) must have been *recognizable* and the adverse outcome or treatment failure must have been *foreseeable*. In addition, the causes of the DRP and the outcome must have been both *identifiable* and *controllable*. PDRM accounts for more hospital admissions per 1000 patients than either myocardial infarction or asthma.¹² A recent Canadian study of PDRM estimated that the annual cost of PDRM in older adults is \$10.9 billion.¹³

By definition, PDRM is avoidable. Several authors have suggested strategies to reduce PDRM, but there is currently no consensus in the literature on which interventions are the most effective.^{10,11,14-16} The objectives of this study, then, were to: 1) solicit the opinions of physicians on the perceived efficacy of various strategies for reducing PDRM, and 2) determine whether the perception of efficacy of intervention strategies varies according to medical discipline.

METHODS

Survey Respondents

Physicians with a specialty in geriatric medicine, clinical pharmacology or general practice were recruited for participation as part of a larger study on PDRM funded by the Canadian Institutes of Health Research (CIHR). The methodology for this larger study has been described elsewhere.¹⁷ Two panels, one of geriatricians and one of clinical pharmacologists, were each comprised of six members. Eligibility for these panels was based on certification of competency in either geriatric medicine or internal medicine. A study co-investigator conducted recruitment for these panels. The third panel, consisting of 12 general practitioners (GPs), was recruited by the provincial medical society.

Survey of Clinical Indicators of PDRM

A written survey of clinical scenarios that represented possible PDRMs was compiled from previous research,¹⁸ revised for Canadian relevance, and given to the geriatrician and clinical pharmacologist expert panels concurrently. Each panel member was asked to independently evaluate whether each scenario fit the characteristics of a PDRM, as defined by Hepler and Strand.¹ The panel members were also given the opportunity to propose additional clinical scenarios that they felt represented a PDRM in the elderly. Consensus was reached with each panel independent of the other, using the Delphi technique. To add an element of triangulation, the consensus-approved clinical indicators of PDRM from each panel (including any additional scenarios proposed by the panel members for which consensus had been reached) were compiled into a new written survey that was given to the 12 GPs. Through the survey and the nominal group technique, this third panel also reached agreement on which scenarios met the characteristics of a PDRM.

Strategies to Reduce PDRM Survey

All participants received a follow-up written survey containing the PDRM indicators that their panel had agreed upon, as well as a list of 8 potential strategies to reduce PDRM listed under each. These possible strategies were based on the eight essential elements of a safe and effective medication use system, as described by Grainger-Rousseau and colleagues (**Table 1**)¹⁹ and were described in detail to the participants in an accompanying cover letter. All

Table 1. The 8 Essential Elements of a Safe and Effective Medication Use System¹⁹

1. Prompt and accurate recognition of drug indications and other signs and symptoms relevant to drug use.
2. Safe, accessible, and cost-effective medicines must be legally and financially available.
3. Appropriate prescribing for explicit (clear, measurable, and communicable) objectives.
4. Drug product distribution, dispensing, and administration that is correct with appropriate patient advice.
5. Active patient / caregiver cooperation (intelligent adherence).
6. Monitoring (detection and resolution of drug-related problems).
7. Documentation and communication of drug-related information and decisions.
8. Drug product and medication use system performance evaluation and improvement.

panelists were asked to select from among eight possible strategies to reduce PDRM. Participants could choose as many, or as few, of the 8 strategies as they felt could be useful as a preventative intervention. As the panels had reached independent consensus of which clinical scenarios were PDRM indicators, the survey for each panel was modified accordingly. The geriatrician and clinical pharmacologist surveys contained, respectively, 52 and 38 indicators. The GP survey contained the 52 PDRM indicators that their panel had approved, based on their review of the consensus-approved PDRM indicators derived from the other two panels.

Survey Data and Analysis

The average number and percent of participants choosing each strategy was calculated, per indicator, by dividing the number of times each strategy was chosen by the total number of times it could have been chosen. This calculation of frequency was done for each of the eight strategies to determine a ranking of the strategy preference. Similarly, this calculation was performed to determine the rank order of strategies for each physician panel.

RESULTS

The demographic information of the 24 physicians who participated is given in **Table 2**. The majority

of panelists were male (75%) and had more than 15 years of practice (71%). Data from all 24 completed surveys were included in the analysis.

Table 3 shows the average frequency with which each of the strategies was chosen, for each of the PDRM indicators. Combining the results from all three panels, the most commonly chosen strategy per PDRM indicator was monitoring (72.5%), with health-system management (54.6%) and patient / caregiver cooperation (51.7%) second and third, respectively. Monitoring was the most commonly chosen strategy per indicator by the GPs (81.4%) and the clinical pharmacologists (64.5%). The geriatricians chose health-system management most commonly as a strategy per indicator (72.5%). Overall, an average of 3.95 of a possible 8 intervention strategies was chosen per clinical indicator of PDRM.

DISCUSSION

This study sought to identify strategies that could be useful in reducing the incidence of PDRM via survey of physician opinion. Those asked to complete the survey regarding these possible strategies were clinicians familiar with the use of medications and their consequences in the elderly. From this vantage, these are individuals who would be well-suited to identify strategies to improve the medication use process and its associated outcomes. A consideration of the frequency with which each strategy was chosen by these experts, can provide an indication of the perceived potential of each strategy to reduce the problem of PDRM as a whole. In addition, the frequencies are reported in **Table 3** by physician group, to enable comparative analysis of perceptions between those groups.

Monitoring was the strategy most commonly chosen by the respondents as a whole and by the clinical pharmacologist and GP panels. This involves both surveillance for potential morbidity associated with drug therapy and assessment of progress towards therapeutic objectives.¹⁹

Monitoring is a strategy that applies to all drugs and anyone using medications. Given what is known about potential toxicities of medications, monitoring would seem to be an implicit part of the therapeutic process. The fact that it was chosen so frequently may indicate a system-wide lack of monitoring. This was highlighted in a recent editorial, which suggested the establishment of an indepen-

Table 2. Demographics of Physician Participants

Physician Characteristics	Geriatrician Panel n=6	Clinical Pharmacologist Panel n=6	GP Panel n=12	Total n=24
Male n (%)	4(67)	4(67)	10(83)	18(75)
Age n (%)				
≤34 years	1	0	0	1(4)
35-44 years	4	1	3	8(33)
45-54 years	0	2	8	10(42)
55-64 years	1	3	1	5(21)
≥65 years	0	0	0	0
Yrs of Practice n (%)				
≤11 years	2	0	0	2(8)
12-15 years	2	1	2	5(21)
16-20 years	1	0	1	2(8)
≥21 years	1	5	9	15(63)
% Elderly in Practice [range]	99-100	70-90*	25-60	25-100

*where information available

Table 3. Average Frequency with which each of the Strategies was Chosen by the Respondents for each of the PDRM Indicators

Strategies to reduce PDRM	Average n (%) of respondents who selected this as an intervention strategy per indicator			
	Geriatrician Panel n=6	Clinical Pharmacologist Panel n=6	General Practitioner Panel n=12	Total n=24
1. Prompt and accurate response to signs and symptoms	2.10 (35.0)	1.21 (20.2)	5.42 (45.2)	8.7 (36.3)
2. Safe and efficacious medicines	2.83 (47.2)	1.71 (28.5)	7.63 (63.6)	12.2 (50.8)
3. Prescribing for definite objectives	2.56 (42.7)	1.95 (32.5)	6.81 (56.8)	11.3 (47.1)
4. Dispensing and tailored patient advice	1.61 (26.8)	1.97 (32.8)	7.88 (65.7)	11.5 (47.9)
5. Active patient / caregiver cooperation	1.87 (31.2)	2.08 (34.7)	8.46 (70.5)	12.4 (51.7)
6. Monitoring	3.71 (61.8)	3.87 (64.5)	9.77 (81.4)	17.4 (72.5)
7. Documentation and communication	1.48 (24.7)	2.29 (38.2)	4.44 (37.0)	8.2 (34.2)
8. Health system management	4.35 (72.5)	3.58 (59.7)	5.19 (43.3)	13.1 (54.6)

dent agency to perform post-marketing surveillance.²⁰ Several authors have recommended monitoring as a means to reduce adverse events associated with drug therapy in the elderly. Gurwitz et al¹¹ studied the incidence and preventability of adverse drug reactions in nursing homes and concluded that prevention strategies should focus on the ordering and monitoring stages. Field et al,¹⁵ in their assessment of risk factors for adverse drug events (ADEs) in nursing home residents, recommended monitoring high-risk residents and those taking antibiotics, opioids, anti-epileptic drugs or psychoactive medications as a strategy to prevent ADEs. The recommendations of Beers et al¹⁶ for improving prescribing include following up on chronic prescription medications for both efficacy and toxicity. Hepler and Grainger-Rousseau²¹ have concluded that monitoring drug therapy “may be the most promising way to improve medication use”.

Although monitoring was selected most often among the 8 possible strategies, clearly the panelists felt that, for a majority of PDRM indicators, a combination of methods is best. In fact, for 89% of the PDRM indicators, 7 or 8 strategies were chosen. Furthermore, although the strategies were chosen as separate items on the survey, in reality they cannot be implemented independently of each other, since

employment of one strategy can result in the simultaneous use of others. For example, in order to be able to monitor effectively, it is imperative to prescribe for definite objectives and involve patients / caregivers to ensure more prompt recognition of signs and symptoms relevant to drug use. Effective health-system management, the strategy most often chosen by the geriatrician panel, will produce consequent improvements to the medication use system, which will enable access to safe and cost-effective medications as well as documentation and communication of drug therapy information. The GPs, on the other hand, put less emphasis on overall health-system management and more on managing patient encounters through strategies such as active cooperation between caregiver and patient, tailored patient advice, and dispensing safe and effective medicines.

This is the first study to evaluate the perceived efficacy of strategies to reduce PDRM. The focus of future research should be to implement strategies and evaluate the effect of these strategies on patient health outcomes. This study used the 8 essential elements of a safe and effective medication use system to reduce PDRM; this may have limited the possibilities for respondents to consider other strategies, and therefore limits the results of this

study. Also, this survey did not attempt to determine who should be responsible for performing or implementing these strategies (eg. physicians, pharmacists, nurses, provincial departments of health). In future studies, it may be useful to include a patient panel to evaluate a consumer's perspective on PDRM reduction strategies.

CONCLUSION

A survey of a group of clinicians revealed that monitoring is perceived to be the most important strategy to reduce PDRM out of 8 interventions considered. Still, it appears that a combination of intervention strategies is needed to optimally reduce PDRM. These findings should serve to guide future research efforts and health policy aimed at minimizing PDRM in older adults.

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