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Pharmacists' and Pharmacy Students' Ability to Identify Drug-related Problems Using TIMER (Tool to Improve Medications in the Elderly via Review)

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RESEARCH ARTICLES

Pharmacists' and Pharmacy Students' Ability to Identify Drug-related Problems Using TIMER (Tool to Improve Medications in the Elderly via Review)

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Objective. Determine the effectiveness of TIMER (Tool to Improve Medications in the Elderly via Review) in helping pharmacists and pharmacy students identify drug-related problems during patient medication reviews.

Methods. In a randomized, controlled study design, geriatric patient cases were sent to 136 pharmacists and 108 third-year pharmacy students who were asked to identify drug related-problems (DRPs) with and without using TIMER.

Results. Pharmacists identified more tool-related DRPs using TIMER ($p = 0.027$). Pharmacy students identified more tool-related DRPs using TIMER in the first case ($p = 0.02$), but not in the second.

Conclusion. TIMER increased the number of DRPs identified by practicing pharmacists and pharmacy students during medication reviews of hypothetical patient cases.

Keywords: medication therapy management, drug-related problems, elderly, community pharmacy

INTRODUCTION

Medicare Part D requires MTM for enrollees who use a high proportion of financial resources in the program.[1] Pharmacists are challenged to find ways to effectively and efficiently provide MTM services, given the high volume of prescriptions that they dispense. While there are MTM plans that assist pharmacists, these services are not always available.[2-3] Community pharmacists, who fill the vast majority of prescriptions, are in a unique position to provide important medication reviews.[4-6] An MTM tool may provide pharmacists with a systematic approach for conducting medication reviews and improve efficiency.

MTM services can be especially valuable to older adults.[7-8] The presence of polypharmacy and age-related physiological changes cause this population to experience more drug-related problems (DRPs).[9] Medication errors consist of overuse, underuse, and misuse, and lead to more than 5% of hospital admissions in older adults.[9-11] Between 14% and 23% of older adults receive a medication that should not have been prescribed for them,[12-14] and 10% to 25% of patients have an adverse drug reaction or adverse drug event.[15,16] However, some medications, such as statins and angiotensin-converting enzyme (ACE) inhibitors, are under prescribed among older adults.[17-21]

In order to simplify medication reviews, screening tools have been developed. Available tools include Beer's list, Assessing Care of Vulnerable Elders guidelines, and the Medication Appropriateness Index.[22-28] These tools can rarely accommodate patients with multiple chronic diseases, multiple drug interactions, and/or organ-system insufficiency that may cause patient-specific medication problems. Medication reviews need to be done in a way that encompasses the whole patient, not just a particular disease, medication, or drug interaction. This complexity makes it nearly impossible to create a tool that is sufficiently specific and sensitive to identify drug therapy problems.[28]

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In addition to practicing pharmacists, pharmacy students are trained to provide MTM,[29,30] but there is currently no standardized approach used to provide MTM services or to identify DRPs.[31,32] A tool may make the task of learning how to provide these services easier for pharmacy students and practicing pharmacists who are new to MTM. Having such a tool may also facilitate and improve the efficiency of identifying DRPs.

The objective of this study was to evaluate the Tool to Improve Medications in Elderly via Review (TIMER), a systematic approach to conducting medication reviews and improving pharmacists' ability to identify important drug-related problems among older adults. The specific aim of this 2-part study was to compare the number and types of drug-related problems identified by practicing pharmacists (part 1) and pharmacy students (part 2) with and without using the TIMER.

METHODS

Development of the TIMER

TIMER is a guide for pharmacists and pharmacy students to follow when conducting medication reviews. TIMER was developed by 2 of the authors (KF and EC), with input from a consensus panel of 4 regional experts who reviewed the tool and provided feedback. Using a scale ranging from strongly agree to strongly disagree, reviewers rated each section of the TIMER on whether the content was evidence-based, important, helpful/useful, and understandable. Feedback from reviewers resulted in several improvements to TIMER, for example, including drug-drug interactions based on both prevalence *and* severity rather than just on severity, and reducing the symptom timeframe to several months.

An important assumption made in developing TIMER was that its users have conducted a patient medication history so that a complete medication list is available. TIMER has 4 sections including cost-effective drug selection, adherence, medication safety, and attaining therapeutic goals, and covers the most common medication issues that affect older adults. Specific reference to the 8 DRPs commonly used in practice-based research studies was not included because TIMER was intended to encourage pharmacists to look beyond those DRPs and consider patients' symptomatology and complications among older adults.

Each of the 4 sections includes points to discuss with patients and suggested recommendations if a DRP is found. The section on cost-effective drug selection suggests generic and therapeutic substitution to ensure that patients are getting the most cost-effective medications. The section of adherence gives examples of how to question patients about adherence and provides specific recommendations. A section on medication safety addresses adverse drug effects, screening for symptomology, inappropriate medications, drug interactions, and Beer's criteria medications. When determining whether patients are attaining their therapeutic goals, TIMER contains guidance on cardiovascular risk reduction and complication management. The section on cardiovascular risk management outlines the major risk factors for coronary heart disease and evaluates treatment goals. The section on complication management identifies common complications seen in the geriatric population, how to screen for them, and recommendations for each complication (Appendix 1).

Evaluation of TIMER Via Written Cases

To evaluate TIMER, a 2-part randomized, controlled study was designed that involved practicing pharmacists and pharmacy students using the tool to assess hypothetical patient cases.

Patient Case 1 was developed by one of the authors (MA) and based on a case taken from IowaTeach, a University resource for faculty members to use in developing teaching activities. Both clinical and hypothetical patient cases are available in IowaTeach and many contain additional instructional materials such as test questions and teaching notes. Case 1 was an older adult presenting to a community pharmacist for MTM services. Two expert clinicians reviewed Case 1 and identified 13 DRPs, 6 of which were tool-related and 7 that were non-tool-related (Table 1). Tool-related DRPs were those covered in TIMER and non-tool-related DRPs were problems not included in TIMER.The non-tool-related DRPs identified by the experts were not eliminated from the case but were not expected to be affected because TIMER did not contain them.

Cases 2 and 3 were written by 2 of the authors (MC and JR). Both cases involved older adults presenting to pharmacists for MTM services. The authors identified 4 non-tool-related DRPs and 5 tool-related DRPs in their respective case, and this list later served as the key when coding DRPs (Table 1). Case 1 from the pharmacists study served as the basis for cases 2 and 3. The DRPs from case 1 were incorporated into cases 2 and 3, with substitution of medications. For example, warfarin interactions in cases 1 and 2 involved levothryoxin, while warfarin interactions in case 3 were caused by bismuth subsalicylate. Another example of modifications was the wrong drug used in the cases. In cases 1 and 2, the wrong drug was propoxyphene and in case 3 it was diphenhydrame: both are Beer's list drugs.

Table 1. Drug-related Problems (DRPs) in Three Cases Evaluating TIMER

DRPs for Case 1 (Part 1):
- Dose too low: LDL not at goal with current dose of Lipitor (T)
- Wrong drug: propoxyphene in elderly (T)
- Needs additional therapy: pain not controlled (T)
- Inappropriate adherence: Norvasc (T)
- Inappropriate adherence: KCl (T)
- Drug interaction: warfarin and levothyroxine (T)
- Possible drug interaction: calcium and levothyroxine based on administration
- Wrong drug: Prilosec for lactose intolerance
- Wrong drug: calcium carbonate vs calcium citrate when taken with PPI
- Needs additional therapy: obesity
- Wrong drug: Norvasc for diabetic hypertension
- Possible additional therapy needed: TSH levels need to be checked
- Dose too high: calcium 1000mg in one dose

DRPs for Case 2 (Part 2):
- Drug interaction: warfarin and levothyroxine (T)
- Inappropriate adherence: verapamil (T)
- Wrong drug: propoxyphene in elderly (T)
- Wrong drug: verapamil for diabetic hypertension (T)
- Dose too low: LDL not at goal with current dose of Lipitor (T)
- Wrong drug: Prilosec for lactose intolerance
- Dose too high: calcium 1000mg in one dose
- Needs additional therapy: obesity
- Possible wrong drug: metformin with reduced renal clearance

DRPs for Case 3 (Part 2):
- Dose too low: warfarin, IRN not at goal
- Adverse drug reaction: citalopram may be causing gastrointestinal side effects
- Adverse drug reaction: terazosin may be causing orthostatic hypotension
- Wrong drug: diphenhydramine in elderly (T)
- Inappropriate adherence: finesteride (T)
- Needs additional therapy: LDL not at goal with pravastatin (T)
- Drug interaction: warfarin and Pepto-Bismol (T)
- Theraputic conversion: generic less costly than Atacand (T)
- Unnecessary drug therapy: saw palmetto not effective

Abbreviations: TIMER = Tool to Improve Medications in the Elderly via Review; (T) = Tool-related DRP. A Tool-related DRP is one that is included in TIMER.

Part 1: Pharmacists' Use of the TIMER

A randomized controlled study of practicing pharmacists who were members of a regional MTM network (Iowa, Minnesota, Nebraska, North Dakota, South Dakota, Wyoming and Montana) was conducted and half of the pharmacists were randomly selected to receive TIMER. All pharmacists received a printed copy of case 1 and a response form with instructions to identify DRPs in the patient case and write SOAP notes including recommendations. A document of consent to participate was also included in the packet. Participants were asked to return all materials to the investigators and by doing so indicated their informed consent. IRB approval for this study was obtained.

The packet of materials was mailed to 136 pharmacists in mid-April 2007 and a follow-up postcard was sent to non-responders 2 weeks later. A second packet with the same materials was mailed again in mid-June to nonresponders and a follow-up postcard was sent 1 month later. Responses obtained by mid-August 2007 were included in the analysis. Demographic information obtained when the MTM network was formed was linked to the responses in this study. These data included age, practice years, gender, average hours spent in pharmacy per week, and state in which they practiced.

An investigator (AS) coded the pharmacists' responses as either correctly identifying each of the 13 DRPs or not, using a pre-established set of coding rules. Only the DRPs were considered when coding the responses, and not the actions the pharmacist recommended. If a DRP was unclear, the study team reviewed it and consensus was reached. The data were entered into

a spreadsheet and analyzed using SPSS. The 2 groups of pharmacists (those who received the TIMER and those who did not) were compared for age, years in practice, and hours worked per week using *t* tests, and for gender using the chi-square test. The numbers of tool-related and non-tool-related DRPs were summed for each respondent. The total number of tool-related and non-tool-related DRPs identified per study group were compared, controlling for gender and practice years. A chi-square test also was used to compare each tool-related DRP identified with whether the pharmacist had received the TIMER.

Part 2: Pharmacy Students' Use of the TIMER

In the second part of the study, third-year pharmacy students enrolled in the Pharmacy Practice Laboratory course at University of Iowa College of Pharmacy were asked to identify DRPs in 2 cases, 1 using and 1 not using TIMER. IRB approval for this study was obtained. As seating was randomly assigned at the start of the course, students were already assigned to 54 groups of 2. Students were informed that their answers would not affect their grade for the course. Students reviewed a study information sheet containing all elements of informed consent. Their submission of answers indicated informed consent. For the first 30 minutes of class time, each group of 2 students was assigned 1 of 2 patient cases and asked to identify drug-related problems. For the next 30 minutes, each group was given a second case along with the TIMER and again asked to identify DRPs. Groups of 2 were randomly assigned to receipt of TIMER for 1 of the 2 cases.

The students were asked to provide their age, pharmacy grade point average (GPA), gender, laboratory section, and a unique identifier, which allowed for statistical comparisons to be made later without compromising students' anonymity. Groups of 2 students were asked to list all DRPS that they could find in 30 minutes and state the action that would be taken for each DRP. As the objective was to determine whether TIMER improved students' ability to identify DRPs, only the DRPs were considered during coding and not students' proposed solutions.

Coding of responses was done by an investigator (SL) trained to examine the SOAP notes and identify the presence or absence of the DRPs. Each DRP was coded as either correctly identified or not correctly identified for each group. A set of coding rules for each case was developed by the investigator and reviewed by other investigators before coding was completed. The classification of a correct versus incorrect DRP was based on their written identification of a DRP, not necessarily how the student described it. For example, for the presence of nonadherence to verapamil in case 2, any mention of poor compliance with verapamil was coded as a ''yes, the DRP was identified'' whether the cause of noncompliance was attributed to side effect, inability to swallow, or patient thinking the drug did not work. Also, if poor compliance with another drug besides verapamil was identified, subjects were not given credit for identifying noncompliance with verapamil. Simply identifying the ADR of verapamil and constipation was not sufficient if compliance or patient education was not mentioned. Proposed actions or recommendations were not used to determine DRPs—the DRP had to be stated. If a DRP was unclear, the study team reviewed it and consensus was reached.

Results were entered into a spreadsheet and analyzed using SPSS. Subjects were divided into 2 study groups: those who received case 2 first and those who received case 3 first. Age, gender, and GPA of the student pharmacists in the 2 study groups were analyzed using chi-square and *t* tests. The number of tool and non-tool related DRPs identified by student groups were summed across both cases and used as dependent variables. Tool-related DRPs were those that were included in TIMER. The independent variables used in analyses were laboratory section of the student, whether TIMER was used, and patient case. A one-way ANOVA was used to calculate the difference in dependent variables between the 3 Pharmacy Practice Laboratory sections. Then the effect of TIMER and case on total tool-related and total non-tool-related DRPs identified was examined using 2-way ANOVA. We also analyzed the cases separately for significance of TIMER using 2-tailed *t* tests, as case was significant in the primary analysis. A p value <0.05 was considered significant.

RESULTS

Eighty-seven of the 136 practicing pharmacists participated in the study. Of these, 41 had been given the TIMER and 46 had not. The average age of participants was 37.0 $\pm$ 10.6 years; average time in practice was 13.0 $\pm$ 11.2 years; hours worked per week were 36.3 $\pm$ 11.2 hours, and 63.2% were female. There were no significant demographic differences between the 2 groups of pharmacists. Practice years and age were correlated (0.965), so age was not included in any further analyses.

The average tool-related DRPs identified by the respondents was 3.4 $\pm$ 1.0 by those using the TIMER and 3.0 $\pm$ 1.0 for those not using the TIMER ($t = -2.26$, $p = 0.027$). The overall model predicting tool-related DRPs using practice years, gender, and TIMER use was significant ($F = 6.53$, $p = 0.001$). Gender and TIMER use were significant ($p = 0.007$ for both), while number of practice years was not significant ($p = 0.44$). There was no significant difference in the number of DRPs identified

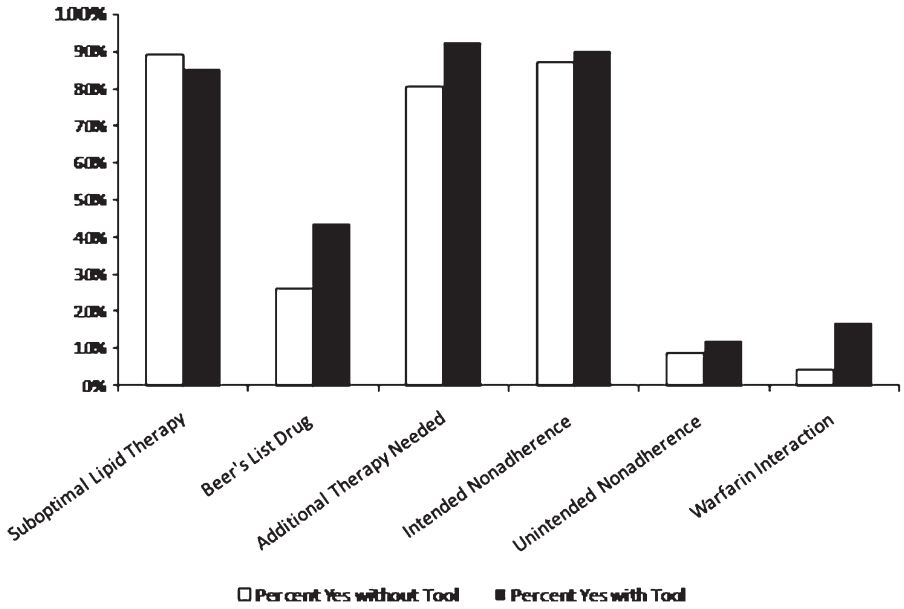

Figure 1. Pharmacists' Identification of Individual Tool-Related DRPs by Use of TIMER (Tool to Improve Medications in the Elderly via Review)

by pharmacists in Iowa compared to those in other states ($p = 0.23$). Both use of TIMER and practice years were associated with the number of non-tool-related DRPs identified ($p = 0.027$ and $p = 0.030$, respectively). When individual tool-related DRPs were analyzed according to use of TIMER, none showed a significant difference (Figure 1).

In part 2 of the study, the average age of the pharmacy students was 25 ± 4.2 years; average GPA was 3.3 ± 0.4; and 57.5% were female. There were no significant differences in demographics between the 2 groups of students.

The average number of tool-related DRPs identified by the pharmacy students was 3.30 ± 1.05 using TIMER and 2.96 ± 1.13 not using TIMER ($p = 0.11$). There was no significant difference in the number of DRPs identified by laboratory section ($p = 0.31$). The overall 2-way ANOVA model predicting tool-related DRPs using TIMER and case was significant ($p < 0.001$). Case was significant ($p < 0.001$), but use of TIMER ($p = 0.07$) and the interaction were not significant ($p = 0.12$). When the effect of TIMER for each case was examined separately, the number of tool-related DRPs identified was significantly different for case 2 ($p < 0.001$, Table 2). Finally, the effect of TIMER on each tool-related DRP was examined. Only the DRP involving Beers' list medications in case 2 showed a significant difference with use of TIMER (Figure 2).

DISCUSSION

In this randomized study, practicing pharmacists who used TIMER were able to identify more DRPs than practicing pharmacists given the same patient case but not TIMER. TIMER may be helpful to pharmacists because it provides a structured way of reviewing patients' profile and medications. Importantly, it may identify

Table 2. Average Number of Tool-related and Non-tool-related Drug-Related Problems (DRPs) Identified by Pharmacy Students by Case

	TIMER Used?	No.	DRPs Identified, No. (SD)	*P*
Case 2 Tool-related DRPs	No	26	3.7 (0.8)	0.85
	Yes	27	3.8 (0.9)	
Case 2 non-Tool-related DRPs	No	26	1.8 (0.9)	0.37
	Yes	27	2.1 (1.2)	
Case 3 Tool-related DRPs	No	27	2.2 (0.0)	0.02
	Yes	26	2.8 (0.9)	
Case 3 non-Tool-related DRPs	No	27	2.5 (0.8)	0.12
	Yes	26	2.9 (0.9)	

Abbreviations: TIMER = Tool to Improve Medication in Elderly via Review

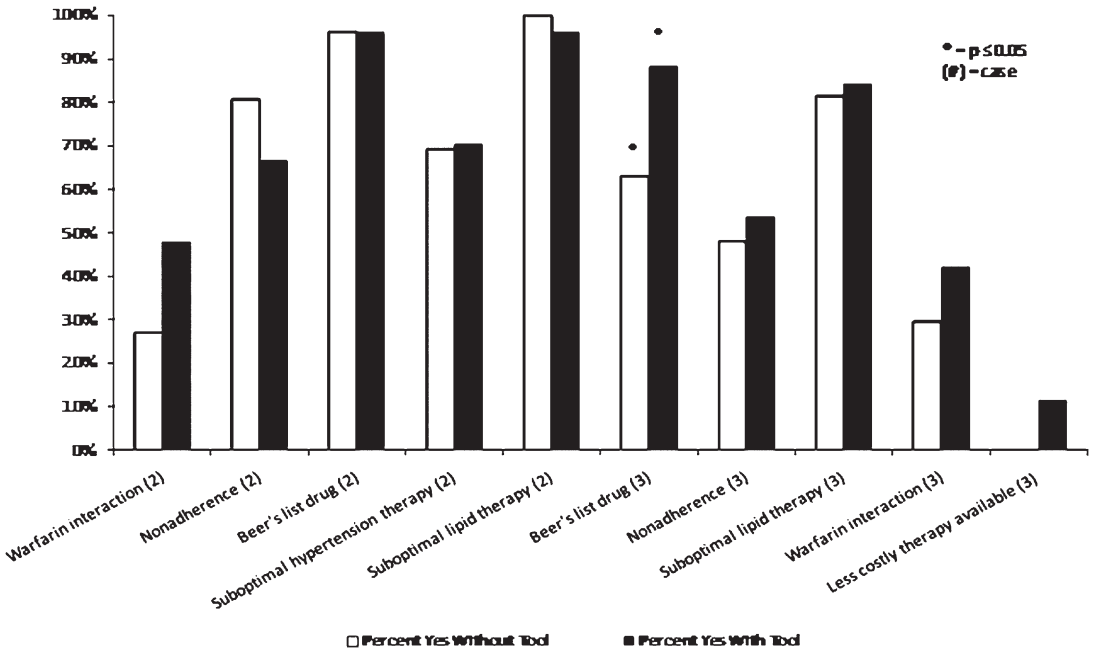

Figure 2. Student Pharmacists' Identification of Individual Tool-Related DRPs by Use of TIMER (Tool to Improve Medications in the Elderly via Review)

DRPs that pharmacists otherwise would not have considered, such as Beer's List medications or new symptoms attributable to adverse drug events. TIMER also increased the number of non-tool-related DRPs identified by pharmacists. TIMER appeared to increase DRPs where pharmacists were less likely to identify problems, namely unintended adherence, warfarin interactions, and Beer's list drugs – although these were identified by less than 50% of pharmacists.

In part 2 of the study, pharmacy students identified nearly half of the tool-related DRPs in the patient cases without using TIMER. This may have occurred because students were given the case to complete at their laboratory workstations where they had a vast number of reference texts and online resources available to them. Students also had uninterrupted time in class to complete the cases. However, pharmacy students appeared less likely to identify warfarin interactions, nonadherence, and less costly therapy when TIMER was not used.

In the analysis for pharmacy students, the use of TIMER was not significant, but analysis by case indicated that TIMER increased the number of DRPs identified in case 2. The differences in the effects of TIMER on the 2 cases were probably due to the differences in the authors of the cases. Although the authors of each case reviewed both cases to ensure they contained similar numbers and types of DRPs, the author of case 1 has been an instructor for 12 years and had written cases for examinations as well as laboratory activities, while the author of case 2 had been an instructor for 1 year. The author having less experience writing cases may have made the DRPs in the first case ''easier'' for students to find, and having 2 different authors write the cases may be a limitation of this study. Yet, given that each case had a randomized control group for comparison strengthens the findings.

In 2 of the 3 patient cases used in this study, the number of DRPs identified by subjects increased. The fact that 3 different cases were used in this study increases the generalizability of the findings because findings are not limited to 1 set of drug-related problems or 1 type of patient care. TIMER may be more useful in some patients' cases than others, as indicated by the results from pharmacy students. There was no single DRP that seemed more easily identifiable using TIMER.

The content validity of TIMER was established by experts who practice in geriatrics or family medicine. TIMER could be improved by including other DRPs typically identified by pharmacists such as high/low dose, ensuring an existing indication for all medications, and considering whether all indications are treated. However, we sought to include DRPs beyond those traditionally used by pharmacists. There are a number of companies that have created MTM plans or systems that prompt pharmacists when a DRP or problem is detected. These programs prompt pharmacists when an MTM service needs to be performed for a specific reason.[1,2] Typically, these prompts are generated from prescription claims analyses,

and we assert that pharmacists need to look at the entire patient when performing MTM. This reasoning was critical to the inclusion of a symptomology assessment in TIMER. It guides pharmacists through a broader review of patients and may serve as an added tool to any of these programs.

In order to use TIMER in practice, pharmacists may require training. We did not provide any training to participants in this study. Training could consist of how to read TIMER, how to apply it to individual patients, and how to examine each patient differently while using it. This might consist of a 30-minute session with an investigator, or a training program in print or online. TIMER also requires regular updates to reflect new guidelines, medications, and evidence.

Limitations

There are limitations to this study. Although the cases used were representative of typical cases seen in practice, TIMER has not been tested with actual patients. Recommendations made by pharmacists or pharmacy students were not included, and these are important in resolving DRPs. Also, how TIMER may affect the efficiency of providing an MTM service was not tested. Additionally, 3 different case writers were used, but cases 2 and 3 were based on case 1 and the latter 2 cases were each reviewed by 2 of the investigators. Finally, this study involved pharmacy students from one University and innovative community pharmacists from the upper Midwest and West, thereby limiting its generalizability.

CONCLUSION

TIMER was effective in increasing the number of tool-related DRPs found by pharmacists and by pharmacy students in hypothetical patient cases. TIMER may help pharmacists provide required MTM services for older adults.

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At the time of this study, Drs. Lee and Schwemm were fourth- and third-year pharmacy students, respectively, at the University of Iowa College of Pharmacy.

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TIMER©: Tool to Improve Medications in the Elderly via Review

Confirm all current medications, including Prescription, Herbal remedies, Vitamins and OTCs, and how patients are taking them.

A. COST AND COVERAGE *(generic and therapeutic substitution)*

Determine if patient has Rx insurance and consider formulary considerations. Upon review, determine if a lower-cost product would be appropriate.

B. ADHERENCE *(Determine adherence by asking screening questions and reviewing dispensing records)*

1. **SCREENING** Select from: Never; Rarely; Sometimes; Often; Very often
   1. "Everyone forgets to take their medicines. How often does this happen to you?"
   2. "Everyone says that they miss out a dose of their medication or adjust it to suit their own needs. "How often do you do this?" "Why?"
   3. "Has your physician told you to change how you take any of your medications?"
   4. "Has your physician told you to stop taking any of your medications?"
2. **RECOMMENDATIONS**
   1. If forgetful, consider adherence aids (medication boxes).
   2. If intentional nonadherence, or noncompliance, determine cause and promote patient education.
   3. Confirm whether the patient has stopped taking any medications without the knowledge of the physician.

References: Horne R, Weinman J. J Psychosom Res. 1999 Dec; 47(6):555-67. Morisky EE, Green LW, Levine DM. Med. Care 1986:24:67-74.

C. SAFETY *(Determine if there are any adverse effects or potentially inappropriate medications)*

1. **ADVERSE DRUG EVENTS**

   "Describe what side effects, unwanted reactions, or other problems you may have experienced from medications taken in the last six months."

2. **NEW OR PROBLEMATIC SCREENING FOR SYMPTOMOLOGY**

   Determine if any symptom is possibly attributable to allergy, side effect or adverse drug events:

   a. "Tell me about any symptoms that you may have been experiencing in the past few months."

   b. "In the past few months have you experienced any of the following?"

   Choose from 10 common symptoms due to adverse effects:

   - Headache/pain
   - Hives/rash
   - Problems with sleep
   - Dizziness/balance problems
   - Incontinence/urinating problems
   - Muscle aches
   - Fatigue
   - Change in mood
   - Stomach or gastrointestinal problems
   - Sexual problems

   If symptoms are present, evaluate if any may be related to medications the patient is taking.

   Reference: Weingart SN, et al. Arch Intern Med. 2005 Jan 24; 165(2):234-40.

3. **SCREENING FOR POTENTIALLY INAPPROPRIATE MEDICATION OR COMBINATIONS**

   DRUG INTERACTION

   Review the patient's medications for potential drug interactions, including these top drug interactions based on prevalence or risk of adverse event .

Object drug	Precipitant Drug	Prevalence[1] (1-10 scale) 1 is most prevalent
Warfarin	NSAIDs	1
Warfarin	Sulfa drugs	2
Warfarin	Macrolides	3
Warfarin	Quinolones	4
Warfarin	Phenytoin	5
ACE inhibitors	Potassium supplements	6
ACE inhibitors	Spironolactone	7
Digoxin	Amiodarone	8
Digoxin	Verapamil	9
Theophylline	Quinolones	10

Reference: [1]M3 Project (Multidisciplinary Medication Management Project), Lesher, BA, "Clinically Important Drug Reactions", Prescriber's Letter 2004 Jun, 11: Detail-Document #: 200601

Object drug	Precipitant Drug	Risk of Adverse Event[2] (1-10 scale) 10 is greatest risk
Carbamazepine	Propoxyphene	8.4
Thiopurines	Allopurinol	8.0
Warfarin	Sulfinpyrazone	7.2
Benzodiazepines	Azole antifungal agents	7.0
Pimozide	Macrolide antibiotics	6.0
Nitrates	Sildenafil	6.0
Warfarin	Fibric acids	6.0
Warfarin	Cimetidine	6.0
Ergot alkaloids	Macrolide antibiotics	5.8
Pimozide	Azole antifungal agents	5.6
Anticoagulants	Salicylates	4.8
Anticoagulants	Thyroid hormones	5.6

Reference: [2]Malone DC, et al. J Am Pharm Assoc (Wash DC). 2004 Mar-Apr; 44(2):142-51.

DRUGS TO BE AVOIDED IN THE ELDERLY

Review the list "Drugs to be Avoided in the Elderly" (AVAILABLE UPON REQUEST FROM AUTHORS)

DUPLICATION SCREENING

Review the patient's medications, including OTCs to confirm there is no inappropriate therapeutic duplication, paying particular attention to multiple narcotics, multiple NSAIDS and combination products with analgesics. Ensure that duplicate usage is consistent with practice.

Reference: PCM and PSC data

RECOMMENDATION

If any safety indicator is present,

(especially important if it is a change within the last 6 months) action is required.

Potential Course of Action

1. Discontinue drug and recommend alternate drug therapy to physician.
2. Educate patient about what to watch for and what action to take

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TIMER©: Tool to Improve Medications in the Elderly via Review

Confirm all current medications, including Prescription, Herbal remedies, Vitamins and OTCs, and how patients are taking them.

D. ATTAINING THERAPEUTIC GOALS

1. CARDIOVASCULAR RISK MANAGEMENT

MAJOR RISK FACTORS FOR CORONARY HEART DISEASE (CHD)(Exclusive of LDL Cholesterol) **THAT MODIFY LDL GOALS**

PREDETERMINED: Increasing age (men >45 years; women >55 years) , Male sex (gender), Family history of premature CHD (CHD in male first degree relative <55 years; CHD in female first degree relative <65 years),

MODIFIABLE: Tobacco smoke/cigarette smoking, high blood cholesterol, hypertension (BP >140/90 mmHg or on antihypertensive medication), physical inactivity, obesity, diabetes mellitus, Low HDL cholesterol (<40 mg/dL)*,

* HDL cholesterol >60 mg/dL counts as a "negative" risk factor; its presence removes one risk factor from the total count.

A. EVALUATE TREATMENT GOAL BY RISK CATEGORY. Obtain the following medical history and test results, reviewing accepted clinical values and cardiovascular risk.. Note: The Framingham risk equation, attempts to determine percent risk of a heart attack or stroke over 10 years. The Framingham Risk Calculator is available through NCEP at: http://hin.nhlbi.nih.gov/atpiii/calculator.asp?usertype=prof

CHD Risk Equivalent:: Clinical CHD, Symptomatic carotid artery disease, Peripheral arterial disease, Abdominal aortic aneurysm

Diagnosis	Cardiovascular Risk Category	Treatment Goal			
		Lipids: LDL	Lipids: Non-HDL (Total – HDL)	Blood Pressure	HbAlc
Diabetic	Diabetes is considered a CHD risk equivalent	<100 mg/dl		<130/80 mmHg	<7.0 %
Non-Diabetic	Coronary Heart Disease (CHD) and CHD Risk Equivalent (10-year risk for CHD >20%)	<100 mg/dl	<130 mg/dl	<140/90 mmHg	
	Multiple (2+) Risk Factors (10-year risk ≤20%)	<130 mg/dl	<160 mg/dl		
	0-1 Risk Factor (10-year Risk Factor <10%)	<160 mg/dl	<190 mg/dl		

Reference: American Diabetes Association. ATPIII Guideline. National Cholesterol Education Program (NCEP). INC-7. American Heart Association.

B. RECOMMENDATION

If the patient has not achieved the recommended goal, action is required.

Potential Course of Action

1. Consider non- adherence to current therapy and/or under-treatment.
2. Consider need for additional or alternative therapy, and recommend therapy to physician.

2. COMPLICATION MANAGEMENT *(review potential complications)*

A. Determine the presence or absence of geriatric syndromes by asking, "Describe how you have been feeling lately?"

B. Review common geriatric syndromes and rule out drug-induced causality.

Common Geriatric Syndromes		Drug -Induced Causes	Potential Course of Action
Pain* **0-10 Numeric Pain Intensity Scale**	Mild 1-3/10		1.Clarify the type of pain the patient is experiencing. 2.Recommend acetaminophen. 3.Nonopioid analgesic, fixed dose***
	Moderate 4-6/10		Opioid (consider adjunct analgesic)
	Severe 7-10/10		Refer to guideline for 24hr and breakthrough pain management ***
Constipation Determine frequency of combinations with drugs producing anti-cholinergic effects.		Opioids, Acetaminophen-NSAID combinations*** Anticholinergics	1.Reduce drug-induced causes 2.Recommend bowel regiment utilizing osmotic laxatives and/or stool softeners, lower dose bulk-forming agents with adequate liquid intake. **
		Calcium supplementation**	
Muscular soreness and stiffness		Statins.	1.Recommend acetaminophen for musculoskeletal pain. 2. Avoid multiple NSAIDs.
Osteoporosis		Corticosteroids.	1. Recommend measure bone density scan and treat accordingly (use supplements to prevent bone loss and rebuild bone). >age 50 need 1200 mg Calcium daily and daily vitamin D at age 51-70 400 IU and >age 70 600 IU. 2. Refer patient to physician.
Falls		Analgesics, antipsychotics, benzodiazepines, anticonvulsants, antiparkinson agents, antidepressants, cardiovascular agents (including diuretics, anti-arrhythmics***), oral hypoglycemics**	1. Identify individuals likely to fall, based upon review of inappropriate medication or combination screening. 2. Discontinue or modify drug regimen. 3. Utilize assistive devices, fall prevention programs, exercise to improve strength.

C. RECOMMENDATION

If drug-induced causes, action must be taken.

Potential Course of Action

1. Discontinue drug and recommend alternate drug therapy to physician.
2. Educate patient about what to watch for and what action to take.

Reference: Core competencies for the care of older patients: recommendations of the American Geriatrics Society. The Education Committee Writing Group of the American Geriatrics Society. Acad Med. 2000 Mar;75(3):252-5. *Koda-Kimble, Mary Anne, Yee Young, Lloyd, Kradjan , Wayne A., Guglielmo, B. Joseph, Alldredge ,Brian K., Corelli, Robin L., 2005, *Applied Therapeutics: The Clinical Use of Drugs*, 8th Edition, Lippincott Williams & Wilkins, Philadelphia. ** Delafuente JC, Stewart RB, eds. Therapeutics in the elderly. 3rd ed. Cincinnati:Harvey Whitney Books Co., 2001. *** J Am Geriatr Soc. 1998 May;46(5):635-51. The management of chronic pain in older persons: AGS Panel on Chronic Pain in Older Persons. American Geriatrics Society.