University of Massachusetts Medical School
eScholarship@UMMS

Family Medicine and Community Health Publications and Presentations

Family Medicine and Community Health

2-3-2009

Lesson in a pill box: teaching about the challenges of medication adherence

Darlene M. O'Connor
University of Massachusetts Medical School

Judith A. Savageau
University of Massachusetts Medical School, judith.savageau@umassmed.edu

David B. Centerbar
University of Massachusetts Medical School

See next page for additional authors

Follow this and additional works at: http://escholarship.umassmed.edu/fmch_articles

Part of the Community Health Commons, Other Medical Specialties Commons, and the Preventive Medicine Commons

Repository Citation

O'Connor, Darlene M.; Savageau, Judith A.; Centerbar, David B.; Wamback, Kimberly N.; Ingle, Jennifer S.; and Lomerson, Nicole J., "Lesson in a pill box: teaching about the challenges of medication adherence" (2009). *Family Medicine and Community Health Publications and Presentations.* Paper 126.
http://escholarship.umassmed.edu/fmch_articles/126

This material is brought to you by eScholarship@UMMS. It has been accepted for inclusion in Family Medicine and Community Health Publications and Presentations by an authorized administrator of eScholarship@UMMS. For more information, please contact Lisa.Palmer@umassmed.edu.

Lesson in a pill box: teaching about the challenges of medication adherence

Authors
Darlene M. O'Connor, Judith A. Savageau, David B. Centerbar, Kimberly N. Wamback, Jennifer S. Ingle, and Nicole J. Lomerson

Rights and Permissions
Citation: Fam Med. 2009 Feb;41(2):99-104.

This article is available at eScholarship@UMMS: http://escholarship.umassmed.edu/fmch_articles/126

Lesson in a Pill Box: Teaching About the Challenges of Medication Adherence

Darlene M. O'Connor, PhD; Judith A. Savageau, MPH; David B. Centerbar, PhD; Kimberly N. Wamback; Jennifer S. Ingle, MS; Nicole J. Lomerson, MPH

Background and Objectives: *Medication mismanagement is a serious health issue affecting elders and people with disabilities, who often manage multiple medications. This project's goal was to educate medical and nursing students about the challenges patients face when managing complex medication regimens.* Methods: *A total of 104 first-year medical students and 40 second-year nursing students were randomly assigned to participate in a 1-week regimen of mock prescriptions or to read a description of the regimen and make predictions about what the experience would be like had they participated.* Results: *Quantitative results in combination with qualitative information suggest that the students taking the mock prescriptions gained important insights into the difficulty of managing a complicated medication regimen.* Discussion: *This mock prescription exercise, well accepted by students and faculty, was easily incorporated into the curriculum and provided an experiential opportunity for students to learn of the difficulties of medication adherence.*

(Fam Med 2009;41(2):99-104.)

Failure to adhere to a prescribed medication regimen is a well-documented problem among elders and others with multiple chronic conditions.[1-4] A meta-analysis of research on medication compliance noted that successful adherence ranged from 58% for persons taking antipsychotic medications to 76% for persons taking medications for physical disorders.[5]

Nonadherence to medication regimens can cause adverse drug events (ADEs), sometimes leading to hospitalization, nursing home admission, and death.[6-8] In a study of ADEs in community-dwelling elders, researchers found that 28% of ADEs were preventable; of those, 21% were related to patient errors in medication management, including taking the wrong dose, taking the medication after being instructed to stop, and refusing to take a medication.[9] Even clinicians and other health professionals report difficulty adhering to their own medication regimens.[10] In recent years, clinicians have been encouraged to shift from using judgmental terms like "noncompliance" and to recognize the difficulty of medication "adherence" and the need for establishing therapeutic alliances and collaboration between clinicians and patients in managing medications.[10-12]

From the Center for Health Policy and Research, University of Massachusetts Medical School.

A variety of educational and intervention efforts relating to medication adherence have been developed and reviewed, including both didactic and experiential approaches.[13, 14] For example, several in-depth teaching and training modules on medication adherence have been developed for practitioners and students in the health professions, including a structured teaching module for final-year medical students,[15] a 3-day training workshop for mental health workers,[16] and a multicomponent curriculum for psychiatry students.[17]

Experiential training approaches with medical students, using mock prescriptions, have also been developed as useful teaching exercises. Singla et al[18] developed a 4-week project with the goal of demonstrating to pharmacy and medical students the value of interdisciplinary education on medication adherence. Among their findings, they noted a significant increase in empathy toward patients among medical students taking the mock prescriptions. Interventions of shorter duration intended to teach students about the difficulty of medication adherence have also been conducted. Both Kastrissios et al[19] and Sutton et al[20] had medical students participate in 2-week regimens of taking mock medicines and documented students' appreciation for the difficulties of adherence. We reinforced these earlier findings with an even simpler (1-week) mock-prescription exercise for use with both medical and nursing students to enhance education

about challenges for patients managing multiple medications. The intervention (comparing students taking a mock prescription regimen to those forecasting their expected challenges and successes without the actual experience) was designed to be easily incorporated into the medical education curriculum with minimal use of class time, while still having an effect on the students' appreciation for the difficulties of adherence.

Methods

Subjects and Setting

The study population included first-year medical students (Class of 2011) at the University of Massachusetts Medical School (UMMS) and second-year graduate nursing students at the university's Graduate School of Nursing who were enrolled in an interdisciplinary Community Health course during the fall semester of 2007.

Research Design

We used both quantitative and qualitative measures to evaluate our curriculum intervention. In earlier piloting of the experience, medical students (Class of 2010) had reflected surprise at the difficulty of adhering to a regimen of mock prescriptions. To assess this quantitatively, we incorporated a forecaster-experiencer design in an attempt to capture this unanticipated difficulty in adherence and the value of actually participating in the mock exercise. With this experimental design, used by Gilbert et al,[21,22] the actual experiences of subjects undergoing a treatment or condition were compared to the predictions of subjects who were not in the treatment group about their expectations of what the experience would be like. In keeping with this methodology, we randomly assigned students to either an "experiencer" intervention group that received the mock prescription or a "forecaster" control group that did not.

Procedure and Data Collection

Intervention Group (Experiencers). Students in the intervention group received five prescription bottles containing "pills" (different colors of breath mints). The bottles were labeled with mock names, dosages, and contraindications with instructions to follow directions for 1 week. These proxy medications were "prescribed" to address issues of high cholesterol, hypertension, diabetes, osteoporosis, and heart disease. To mimic routine dosage changes of medications, proxy regimens included medications to be taken once/day, twice/day, with and without food, and one to be taken with dosages increasing gradually over 7 days. Students were advised to avoid alcohol and to discontinue the pills if they had a condition potentially exacerbated by high sugar intake; no students reported dropping out based on these conditions. A brief description of the project's goals and methodology was presented to students in the intervention group in a cover note included with their packets.

After the 1-week experience of taking the mock prescriptions, students were sent a self-administered survey via a Web-based tool (Snap software, V.8 Snap, Mercator, 2004) to solicit responses to questions about the experience. Four questions were asked, assessing (1) how difficult it had been to follow the regimen, (2) how successful they considered themselves to have been in adhering to the medical regimen, (3) the number of days they had missed doses, and (4) how memorable they expected this experience to be in the future. Also asked were three open-ended questions about (1) whether they used any tools (eg, aids to help them remember to take the "prescriptions") to help them complete the exercise, (2) whether anything made the exercise difficult, and (3) what, if any, lessons they had learned from the exercise. Demographic data were also collected.

Control Group (Forecasters). Students in the control group were sent a survey at the beginning of the intervention using a parallel survey tool along with a complete summary describing the mock exercise. They were asked to imagine that they had been assigned to actually experience the exercise. In this context, they made predictions about the experience, responding to four items paralleling the questions asked of experiencers at the end of the exercise.

Pre- and Post-intervention Measures. To assess change in attitudes about medication adherence over time, students in both groups each completed two pre- and post-intervention questions incorporated into the routine course evaluation. The first item was adapted from the Leeds Attitude Toward Concordance Scale:[23] "Individuals in my profession should try to learn about the beliefs their patients hold about their medications." This item had shown significant change in assessing medical students' attitudes about concordance between doctors and patients in relation to medicine taking.[12] The item was scored on a 5-point Likert Scale, with a response range from "strongly disagree" to "strongly agree." A second item, developed for this study, asked students to indicate the number of medications they believed "many patients with chronic conditions have difficulty managing." The ordinal response categories ranged from one or two medications to 10 or more medications.

Data Analysis

Frequencies, percentiles, and measures of central tendency were used to profile the demographic characteristics of the study population and responses to individual outcome measures. Statistical analyses were then performed using SPSS V15.0 (SPSS Inc, Chicago,

2006) with a criterion of alpha=.05. Pre- and post-test responses were analyzed using a repeated measures analysis of variance (ANOVA), with group differences (forecaster/control versus experiencer/intervention) and student affiliation (medical or nursing student) as fixed factors. Mean differences between control and intervention groups on three of four items were analyzed using independent samples *t* tests. Response formats differed somewhat on the item intended to capture how successful students expected to be (forecasters), or had been (experiencers), and we therefore rescored responses into a dichotomized variable to categorize each student as responding "successful" or "unsuccessful." These frequencies were analyzed by a chi-square test.

Qualitative responses (drawn from the three open-ended questions at the end of the survey for experiencers) were organized into themes for reporting. After identifying major themes within each question, all coauthors independently classified student responses among the identified themes, and differences were resolved by consensus.

Participation in the study was voluntary. The study was approved by our university's Committee for the Protection of Human Subjects.

Results

Demographics

Of the 104 medical students and 40 nursing students in the forecaster group (n=72) and the experiencer group (n=72), 95 medical students (91.3%) and 36 nursing students (90.0%) completed both the pretests and posttests. Table 1 provides the aggregate demographic characteristics of the medical and nursing students, along with the characteristics of the 51 students in the intervention group. Although these descriptive statistics were not captured for those in the control group, we would expect their distribution to be similar due to random assignment to groups.

Forecaster/Experiencer Measures

Table 2 details the results obtained on the four measures comparing the control group with those in the intervention group. No differences were found between the two groups when assessing the difficulty of following the regimen. However, experiencers reported having missed doses on significantly more days than forecasters expected to miss ($t_{(93)}$= 2.05, P=.04). Three-quarters (72.3%) of forecasters in the control group predicted they would be successful in completing the mock prescription exercise; this was significantly

Table 1

Baseline Characteristics of Medical and Nursing Students

	Medical Students (n=106) n (%)*	*Nursing Students (n=40) n (%)*	*Combined Students (n=146) n (%)*	*Experiencers (n=51)** n (%)*
Gender				
Male	47 (44.3)	4 (10.0)	51 (34.9)	20 (40.0)
Female	59 (55.7)	36 (90.0)	95 (65.1)	30 (60.0)
Race				
Asian	13 (12.3)	2 (5.0)	15 (10.3)	3 (6.1)
African American	11 (10.4)	1 (2.5)	12 (8.2)	3 (6.1)
Caucasian	80 (75.5)	35 (87.5)	115 (78.8)	40 (81.6)
Hispanic	2 (1.9)	0 (0.0)	2 (1.4)	1 (2.0)
Other	0 (0.0)	2 (5.0)	2 (1.4)	2 (4.1)
Ethnicity				
Hispanic	2 (1.9)	0 (0.0)	2 (1.4)	1 (2.0)
Non-Hispanic	104 (98.1)	40 (100.0)	144 (98.6)	48 (98.0)
Age				
18–24	75 (70.8)	0 (0.0)	75 (51.4)	24 (48.0)
25–29	22 (20.8)	22 (55.0)	44 (30.1)	14 (28.0)
30–34	5 (4.7)	5 (12.5)	10 (6.8)	5 (10.0)
35-39	4 (3.8)	5 (12.5)	9 (6.2)	5 (10.0)
40+	0 (0.0)	8 (20.0)	8 (5.5)	2 (4.0)

* Includes two students not taking the class recruited for the study.

** Numbers may not total to 51 due to sporadic missing data.

Table 2

Predicted and Actual Experience of Medication Adherence Exercise

Variable (Ordinal/Interval Data)	*Number of Students*	*Mean*	*SD*	P *Value*
How difficult to follow medication regimen?				.49
Forecaster	47	3.49	1.27	
Experiencer	51	3.31	1.13	
Number of days of missed doses?				< .05
Forecaster	47	1.81	1.01	
Experiencer	48	2.40	1.69	
How memorable will the experience be in the future?				< .04
Forecaster	47	3.47	1.30	
Experiencer	49	2.84	1.56	

Variable (dichotomous data)	*Number of Students*	*Number Successful*	*Number Unsuccessful*	P *Value*
How successful following the regimen?				< .01
Forecaster	47	34	13	
Experiencer	49	20	30	

higher than the 40.0% of experiencers reporting success ($X^2_{(1)}$ = 10.27, P=.001). Forecasters predicted that the mock exercise would be significantly more memorable than experiencers expected it to be ($t_{(94)}$=2.15, P=.03).

Pre-Post Measures

There were no significant differences in the mean ratings for the Leeds attitude item across time, group, or affiliation (ie, medical or nursing students). These null results appeared to be due to a ceiling effect at pretest. On the second item indicating the reported number of medications "many patients with chronic conditions have difficulty managing," we likewise found no significant differences across time, group, or affiliation on the minimum level of difficulty identified by students.

Qualitative Analysis

From the responses of the 49 students in the intervention group, several common themes emerged (Table 3): tools or resources used to help with adherence, challenges to adherence, and key lessons learned.

More than half of the students (n=28) indicated using at least one type of tool or resource. Commonly cited tools included keeping a list or schedule (n=21) and keeping the pills visible (n=8). Challenges to adherence were reported by most of the students (n=43). The most frequently reported challenges included the students' schedules (n=18), the complexity of the regimen (n=15), difficulty remembering (n=13), and not having the medications on hand (n=11). Finally, lessons learned about medication adherence were reported by more than half of the students (n=29). The most common lesson noted was that adherence was difficult (n=20).

Discussion

Today's medical school curriculum is extensive, making it difficult to add new content without taking away something of equal importance. Yet, medication management is a critical issue for all patient populations. The mock prescription assignment took only 5–10 minutes of class time to describe, and performance of the assignment was an out-of-class activity.

Responses to open-ended questions indicated that this experiential exercise made an important impression on the students. Our findings suggest that merely hearing about the exercise (imagining this experience, as forecasters did) may leave students believing adherence is less difficult than those experiencing it found it to be. Even those students who only took the medications for a few days reported a greater appreciation for the challenges of managing a complex medication regimen. Taking the proxy medications thus had a positive effect on the students' understanding of the challenges of medication adherence.

One would logically expect that actually having the experience with the exercise should be more memorable for experiencers than for forecasters who only imagined experiencing the event. One previous mock-prescription study found evidence of strong recall of the experience 2 years later.[24] In developing this exercise, we had previously tested it with small groups of medical students in classes from 2003 through 2005. To gather feedback about the potential long-term effects of the educational intervention, we had queried students through e-mail during their clinical years to ask about their recollections and any lessons learned from the mock prescription experience. One student's reflection was particularly encouraging:

Table 3

Qualitative Feedback From Experiencers/ Intervention Student Group (n=49)

	*Number Reporting**
Resources Used	28
Keeping a list or schedule	21
Keeping pills visible as a reminder	8
Using a pill box	1
Having a friend help	1
Challenges to Adherence	43
Busy schedule	18
Complexity of the regimen	15
Difficulty remembering	13
Medication not on hand	11
Mock exercise; no clinical consequences	8
Food restrictions	2
Taste of pills	1
Key Lessons Learned	29
Adherence is difficult	20
Important to develop a general awareness about adherence	6
Using a pill box could be helpful	4
Doctors should:	
Discuss medication schedules with their patients	5
Monitor their patients' medication use	1
Simplify prescription regimens for their patients	1

* Note: Subtotals exceed the total for each category because students may have written more than one response to each item.

> I often reflect on that experience when "prescribing" medication regimens, particularly for the elderly … I think it's VERY important to simplify the medication regimen where possible. I also think that experience (as a first-year student) is reflected in my communication to patients about their discharge medications and the importance of sticking to a schedule, using reminder systems and telling their physicians when it has just been impossible to keep on the regimen.

We predict that forecasters memories of this experience may be less vivid. Research on affective forecasting theory[21] suggests that people often expect that both pleasant and unpleasant feelings associated with an event will last longer than they do. Follow-up studies when our study students are in their third and fourth years are needed to assess whether the experiencers do remember the exercise and apply it in practice during their clinical years of training.

Limitations

There are several potential limitations to our study results. First, the intervention was completed with one student cohort from one medical/nursing school and, therefore, may not be generalizable to other health professions populations. Also, findings are based on student self-reports and may be prone to bias in over-reporting successes and lessons learned due to social desirability. Despite these limitations, we feel this intervention shows the effect an experiential learning exercise can have on medical and nursing students' feelings about medication adherence and the inherent difficulty in taking complex medication regimens.

Conclusions

Participation in the mock prescription exercise did not result in substantive changes in skills among medical/nursing students but did reveal differences in expectations versus experience about the difficulty of adherence. That difference, combined with the qualitative feedback, suggests that having the experience may influence these students in the future. By walking in the shoes of their patients, medical and nursing students are able to experience the difficulty of medication adherence; we expect that this will increase their commitment to those managing complex medication regimens.

We have gained the support of the medical school to use the intervention as an adjunct to the curriculum related to medication issues in a manner that minimizes the use of class time. Given the therapeutic importance of medications and the challenges faced by many patients taking multiple medications, the effect of this experience on students' appreciation for the difficulties of adherence can be a valuable addition to clinical training.

Acknowledgments: This project was funded by an Innovations in Medical Education Grant from the University of Massachusetts Medical School's Office of Medical Education. We thank our funders and also faculty members Lois Green, MPA, and Linda Long-Bellil, MA, JD, PhD, who helped administer the early pilots; Lucie Lajeunesse, RPh, who developed the prescription instructions; and the faculty who enabled us to administer the study within their classes. We also thank all of the medical and nursing students who voluntarily participated in the study and gave their feedback.

Corresponding Author: Address correspondence to Dr O'Connor, Long Term Care Policy Unit, Center for Health Policy and Research, University of Massachusetts Medical School, 333 South Street, Shrewsbury, MA 01545. 508-856-8148. Fax: 508-856-8543. darlene.oconnor@umassmed.edu.

References

1. Peterson AM, Takiya L, Finley R. Meta-analysis of trials of interventions to improve medication adherence. Am J Health Syst Pharm 2003;60:657-65.
2. Logham-Adham M. Medication noncompliance in patients with chronic disease: issues in dialysis and renal transplantation. Am J Manag Care 2003;9(2):155-71.
3. Aziz AM, Ibrahim IM. Medication noncompliance—a thriving problem. Med J Malaysia 1999;54(2):192-9.
4. Raffoul PR. Drug misuse among older people: focus for interdisciplinary efforts. Health Soc Work 1986;11(3):197-203.
5. Cramer JA, Rosenheck R. Compliance with medication regimens for mental and psychological disorders. Psychiatr Serv 1998;49:196-201.
6. Col N, Fanale JE, Kronholm P. The role of medication noncompliance in adverse drug reactions in hospitalizations of the elderly. Arch Intern Med 1990;150(4):841-5.
7. Burrell CD, Levy RA. Therapeutic consequences of noncompliance. In: Improving medication compliance. Proceedings of a symposium. Washington, DC: National Pharmaceutical Council, 1984:7-16.
8. Noncompliance with medication regimens. An economic tragedy. Emerging issues in pharmaceutical cost containing. Washington, DC: National Pharmaceutical Council, 1992:1-16.
9. Gurwitz JH, Field TS, Harrold LR, et al. Incidence and preventability of adverse drug events among older persons in the ambulatory setting. JAMA 2003;289(9),1107-16.
10. Marinker M. Personal paper: writing prescriptions is easy. BMJ 1997; 314:747.
11. Gray R, Wykes T, Gournay K. From compliance to concordance: a review of the literature on interventions to enhance compliance with antipsychotic medication. J Psychiatr Ment Health Nurs 2002;9(3):277-84.
12. Thistlewaite JE, Raynor DK, Knapp P. Attitudes towards concordance in medicine taking: exploring the impact of an educational intervention. Educ Health 2003;10(3):307-17.
13. Haynes RB. The teaching of patient education concepts on therapeutic compliance to medical students. Bull N Y Acad Med 1985;60:123-34.
14. McCann DP, Blossom HJ. The physician as patient educator: from theory to practice. West J Med 1990;153:44-9.
15. Scobie SD, Lawson M, Cavell G, Taylor K, Jackson SHD, Roberts TE. Meeting the challenge of prescribing and administering medicines safely: structured teaching and assessment for final year medical students. Med Educ 2003;37(5):434-7.
16. Bryne M, Dean FP, Lambert G, Coombs T. Enhancing medication adherence: clinician outcomes from the Medication Alliance Training Program. Aust N Z J Psychiatry 2004;38:246-53.
17. Weiden PJ, Rao N. Teaching medication compliance to psychiatric residents: placing an orphan topic into a training curriculum. Acad Psychiatry 2005;29:203-10.
18. Singla DL, MacKinnon GE, MacKinnon KJ, Younis W, Field B. Interdisciplinary approach to teaching medication adherence to pharmacy and osteopathic medical students. J Am Osteopath Assoc 2004;104:127-32.
19. Kastrissios H, Flowers NT, Blaschke TF. Introducing medical students to medication noncompliance. Clin Pharmacol Ther 1996;89:577-82.
20. Sutton EL, Transue ER, Comes S, Paauw DS. Placebo HAART regimen as a method for teaching medication adherence. J Gen Intern Med 2005;20:541-5.
21. Gilbert DT, Pinel EC, Wilson TD, Blumberg SJ, Wheatley TP. Immune neglect: a source of durability bias in affective forecasting. J Pers Soc Psychol 1998;75:617-38.
22. Wilson TD, Wheatley T, Meyers J, Gilbert DT, Axom D. Focalism: a source of durability bias in affective forecasting. J Pers Soc Psychol 2000;78:821-36.
23. Raynor DK, Thistlethwaite JE, Hart K, Knapp P. Are health professionals ready for the new philosophy of concordance in medicine taking? International Journal of Pharmacy Practice 2001;9:810-4.
24. Morse EV, Simon PM, Balson PM. Using experiential training to enhance health professionals' awareness of patient compliance issues. Acad Med 1993;68:693-7.