

## IMPROVING COMPREHENSION OF MEDICATION INSTRUCTIONS IN OLDER ADULTS WITH HEART FAILURE: A PATIENT-CENTERED APPROACH

Daniel Morrow<sup>1</sup>, Michael Weiner<sup>2,3,6</sup>, James Young<sup>4</sup>,  
Douglas Steinley<sup>1</sup>, and Michael D. Murray<sup>3,5,6</sup>

1. University of Illinois at Urbana-Champaign, 2. Indiana University School of Medicine,
3. Regenstrief Institute, 4. Wishard Health Center,
5. Purdue University School of Pharmacy, 6. Indiana University Center for Aging Research

Chronic heart failure (CHF) is associated with reduced functional capacity and quality of life among older adults. Complex CHF medication regimens challenge older patients' ability to adhere to these regimens, in part because of cognitive declines and poor communication. We developed patient-centered instructions for CHF medications as part of a pharmacy-based educational intervention to improve health-related outcomes and adherence among older adults with heart failure. The present paper reports a preliminary study to test whether the instructions were easy to understand compared to instructions for the same medications available in a large chain pharmacy. Thirty-two patients varying in education, literacy, and cognitive abilities were presented instructions with patient-centered or standard formats for familiar and unfamiliar medications. Answer time and accuracy for questions were measured while patients looked at the instruction. The patient-centered instructions were understood more quickly than the standard instructions. They were also understood more accurately for unfamiliar medications, while the standard instructions were understood more accurately for familiar medications. These findings suggest that patient-centered instructions may improve patients' medication knowledge compared to standard pharmacy instructions.

### INTRODUCTION

Chronic heart failure (CHF) is associated with reduced functional capacity and quality of life, particularly among older adults (American Heart Association, 1999). Older patients often have multiple medications prescribed to provide symptom relief and to slow disease progression (Fonarow, 2001), but such complex regimens challenge their ability to take their medications (Ghali, Kadakia, Cooper, & Ferlinz, 1988; Murray, Darnell, Weinberger, & Martz, 1986).

Medication nonadherence is associated with many factors, including patients' cognitive ability (e.g., working memory), medication factors (e.g., regimen complexity, side-effects), and patients' representation of their illness and treatment (Park & Jones, 1997). These factors influence a patient's ability to develop an accurate and feasible plan for taking medication, including knowing how much medication to take and when, and what warnings to keep in mind when doing so (an *adherence plan*, see Morrow & Leirer, 1999). Aging may be associated with reduced adherence in part because of cognitive declines, or with improved adherence because of illness representations that support adherence (Park, 1999).

Communication factors such as the amount and clarity of instruction also influence adherence (Morrow & Leirer, 1999). While age-related cognitive declines can compromise the ability to understand and remember

medication information, well-designed instructions may support older adults' ability to create effective adherence plans despite these declines (Morrow & Leirer, 1999). The importance of medication instruction is underscored by the fact that older adults want more medication information (Smith, Cunningham, & Hale, 1994). Moreover, the federal government has mandated a private-sector program to improve the quantity and quality of medication information provided to patients at pharmacies (Svarstad & Bultman, 1999). However, older adults are only likely to understand and use expanded instructions for taking medication or other self-care tasks if these instructions are well designed.

We developed patient-centered instructions for older adults who were prescribed CHF medications as part of a pharmacy-based educational intervention to improve health-related outcomes and adherence (see Appendix 1 for sample instruction; for more detail see Murray, 2003). The instructions are patient-centered because they are designed to support comprehension by minimizing demands on age-vulnerable cognitive resources (e.g., working memory), and by building on age-related strengths (e.g., they were organized to match elders' schemas for how to take medication, Morrow & Leirer, 1999).

Such patient-centered instructions have been found to improve comprehension and memory for medication information among well educated, healthy older adults in laboratory settings (Morrow & Leirer, 1999). It is also

important to investigate whether these instructions improve comprehension by patients of varying education, literacy, cognitive ability, and health status. Previously, we found that older adults with CHF generally preferred these patient-centered instructions to standard instructions used in a large chain pharmacy (Morrow, Weiner, Deer, et al, 2003). The present study investigated whether they also better understand these instructions, because preferences do not always predict objective measures of performance (e.g., Davis, Holcombe, Berkel, Pramanik, & Divers, 1998).

Factors in addition to instruction design are likely to influence comprehension and memory for medication information in daily life. We examined whether comprehension is influenced by patients' familiarity with the medications. Patients may better remember instructions about medications that they are currently taking if prior knowledge about the illness and treatment provides a cognitive framework for organizing the comprehension and retrieval of new information (Park, 1999). However, research also suggests that learning new information may be more difficult for familiar than for unfamiliar health topics (Brown & Park, 2003).

To summarize, we examined the impact of instruction format and medication familiarity on comprehension of medication information among a diverse sample of older adults with CHF.

## METHODS

### Participants

Participants were a volunteer sample of 32 community-dwelling older adults (77% women, 61% African-American; mean age=63.8, range=51-87) who had been diagnosed with CHF for which they were prescribed a diuretic and angiotensin-converting enzyme (ACE) inhibitor. Besides demographics, we measured several cognitive abilities relating to comprehension and adherence. Working memory was measured by the Listening Span task (for details on materials and scoring see Salthouse & Babcock, 1990). Speed of mental processing was measured by the Letter Comparison and Pattern Comparison tasks (Salthouse & Babcock, 1991). Health-related literacy was measured by the Short Test of Functional Health Literacy in Adults (S-TOFHLA; Baker, Williams, Parker, Gazmararian, & Nurss, 1999). CHF-related functional status was determined using the New York Health Association class (The Criteria Committee of the New York Heart Association, 1964). Participants had completed a mean of 11.5 years of education (range=4-17 years). Over half of the sample scored at the two most severe levels of the NYHA

measure for CHF function (Level 1=12.5%; Level 2=28%; Level 3=40.6%; Level 4=18.8%). Thirty-four percent of the older adults had marginal or inadequate health-related literacy, as defined by the S-TOFHLA measure (36 items: 0-16= inadequate health literacy, 17-22=marginal literacy). Participants also experienced typical age-related declines on this measure ( $r=-.49$ ,  $p < .010$ ,  $\beta=-0.49$ ), as well as on the measures of working memory ( $r=-.54$ ,  $p < .010$ ,  $\beta=-0.06$ ) and processing speed ( $r=-.35$ ,  $p < .050$ ,  $\beta=-0.21$ ).

### Instructions

Patient-centered and standard pharmacy formats were compared for familiar (diuretic, ACE inhibitor) and unfamiliar (beta blocker, digoxin) medications commonly prescribed to patients with CHF. All participants had been prescribed the familiar medications at the time of the study. Compared to the standard pharmacy instructions, the patient-centered instructions had larger font (12-14 vs. 8-10 point for the body of the instructions), higher readability scores (mean grade level of 7.4 vs. 9.3, Flesch-Kincaid readability formula), and were shorter (mean of 251.3 vs. 557.8 words). The patient-centered instructions also contained icons that explicitly conveyed medication name, dose, and time information, and the information was organized to be consistent with patients' schemas for taking medication (see Appendix 1 for an example; for more information see Morrow, Weiner, Deer et al., 2003).

### Procedure

Older adults were tested individually at the Regenstrief Institute. In a 2-hour session, they completed a) demographic questionnaire; b) medication instruction task (described below); c) cognitive and literacy tests; and d) The New York Health Association classification of CHF functional status. For the comprehension task, participants were presented two patient-centered and two standard instructions (one each for familiar and unfamiliar medications). Participants reviewed each one for 30 sec, and then with the instruction still in front of them answered questions about information that was explicitly stated (e.g., name, purpose, dose, times to take medication, side effects) or implied by the instruction (e.g., how many pills to take in a 24-hour period). Comprehension was measured by answer time and accuracy. Next, the instruction was removed and recall was measured. While the standard contained more information than the patient-centered instructions, we only tested information contained in both instructions. Comprehension findings are reported in this paper and

recall findings are reported in Morrow, Weiner, Young, et al. (2003).

## RESULTS

### Comprehension time

Question answer time was analyzed by an Instruction Format (Patient-Centered vs. Standard Pharmacy) X Medication Familiarity (medication prescribed or not) repeated measures ANOVA (only times for correctly answered questions were included). Questions about patient-centered instructions were answered more quickly than questions about the standard pharmacy instructions (Patient Centered=2.9 sec, Standard=3.3 sec;  $F(1,79)=7.0$ ,  $p=.01$ ). Questions about familiar medication instructions were also answered more quickly (Fam=2.3, Unfam=3.9 sec;  $F(1,79)=31.0$ ,  $p<.01$ ). The Format X Familiarity interaction was not significant,  $F(1,90)=1.1$ ,  $p>1.0$ .

To explore possible reasons for the patient-centered advantage for answer time, we examined instruction format effects for each type of information probed by the explicit and implicit questions. Table 1 shows that the patient-centered format advantage primarily occurred for medication dose and time information. This suggests that the icons in these instructions facilitated comprehension time, since the dose and time categories were conveyed by the timeline (medication name was also conveyed by icon, but this information was not facilitated).

Table 1.

Type of Medication Information	RT: Patient-centered (sec)	RT: Standard Pharmacy (sec)	Format F(1,79)	Format x Familiar F(1,79)
<i>Explicit Q</i>				
Dose	3.3	7.0	12.1**	2.4
Name	4.1	3.6	<1.0	<1.0
OTC Med	1.8	2.1	1.2	<1.0
Purpose	3.8	4.0	<1.0	1.2
Side-effects	4.0	2.7	2.6	<1.0
Times	3.0	4.3	4.0*	5.2*
<i>Implicit Q</i>				
Dose	3.8	4.5	<1.0	<1.0
Missed Dose	4.6	6.3	5.4*	<1.0
OTC Med	2.6	2.4	<1.0	<1.0
Side-effects	5.0	7.8	3.1	2.1
Times	2.2	3.8	4.9*	<1.0

\*  $p < .05$ ; \*\*  $p < .01$

### Comprehension accuracy

The number of correctly answered questions was analyzed by an Instruction Format X Familiarity ANOVA. Figure 1 below shows that the effect of format on accuracy was moderated by familiarity,  $F(1,93)=11.2$ ,  $p<.01$ . Patient-centered instructions were understood more accurately for unfamiliar medications (PC=81%, Stand=74%;  $t(93)=2.4$ ,  $p<.05$ ), while the standard format was understood more accurately for familiar medications (PC=75%, Stand=82%,  $t(93)=2.3$ ,  $p<.05$ ).

Influence of instruction Format and Medication Familiarity on Comprehension Accuracy

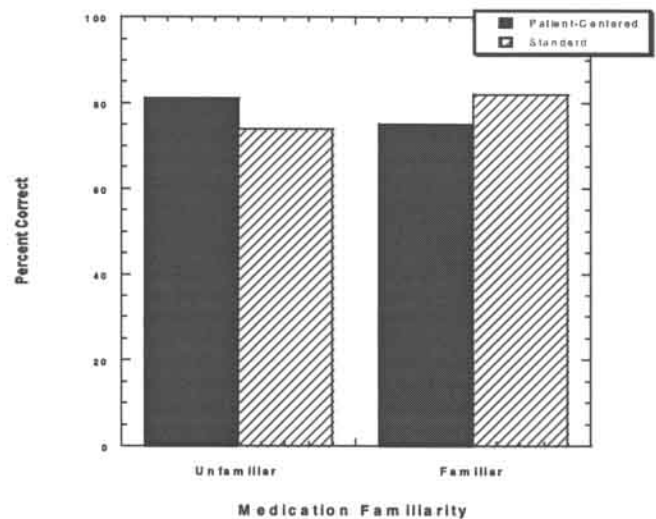


Figure 1.

## DISCUSSION

We previously found that older adults with CHF preferred patient-centered instructions to instructions for the same medications currently provided in a large chain pharmacy (Morrow, Weiner, Deer et al. 2003). The present study provides evidence that they also better understand these instructions. Patients could find information more quickly from the patient-centered instructions. We have also found that they better remember these instructions (Morrow, Weiner, Young, et al., 2003). This advantage for older adults' comprehension and memory may reflect several characteristics of the instructions. For example, larger fonts may reduce input or data limitations on comprehension; simpler language (reflected in higher grade-level readability scores) may address verbal ability and literacy limitations; and patient-centered organization and icons may reduce the cognitive resources necessary for relating the instructions to knowledge about how to take medication. Analysis of instruction format benefits

for answer time at the individual item level suggested that information conveyed by icons was especially easy to find (also see Morrow & Leirer, 1999).

The patient-centered instructions were understood more accurately as well as more quickly for the unfamiliar medications, while the standard instructions were more accurately understood for the familiar medications. This could reflect the fact that patients were familiar with the format as well as the content of the standard instructions in the familiar medication condition, and that this prior experience with the standard format reduced the effectiveness of the novel patient-centered format. However, it is worth noting that the advantage of the standard format for the comprehension of familiar medications did not hold for recall: patient-centered instructions were better remembered regardless of familiarity (Morrow, Weiner, Young et al., 2003). Nonetheless, it may be the case that patient-centered instructions will be most effective for newly prescribed medications.

Familiar medication instructions were understood more quickly than unfamiliar instructions. Participants may have already known some facts about these medications (e.g., purpose, name) that improved learning. It is also possible that variable content and linguistic complexity for different medication instructions contributed to performance (although the readability scores for familiar and unfamiliar instructions did not significantly differ).

In conclusion, we found that patient-centered instructions improved knowledge of medications among older adults with CHF who varied in cognitive ability and literacy. This finding suggests that this patient-centered approach will improve the design of expanded printed instructions for prescribed medications that are available in most pharmacies. Patient-centered instructions may also improve adherence to CHF medications by supporting older patients' ability to create effective adherence plans. This prediction will be addressed in our clinical trial designed to test the impact of a pharmacist-based educational intervention on health outcomes and adherence.

## ACKNOWLEDGMENTS

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# ACE Inhibitors

(Pronounced: ACE in hib IT ors)



## IDENTIFYING YOUR MEDICATION

- The ACE Inhibitor label is red.
- ACE Inhibitors are used to manage blood pressure and chronic heart failure.
- The types of ACE Inhibitors are Fosinopril (Monopril<sup>®</sup>), Benazepril (Lotensin<sup>®</sup>), Enalapril (Vasotec<sup>®</sup>) and Lisinopril (Privilil, Zestril<sup>®</sup>).

## DIRECTIONS

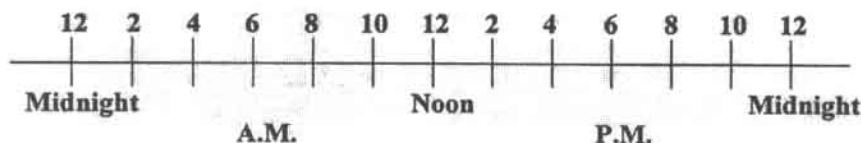
The pills in the bottle with the red label are used to decrease the blood pressure and severity of chronic heart failure, and should be taken continuously. Ask your pharmacist if you can take this medication with food.

If you happen to miss a dose, do not "double-up". Just wait until the next dose should be taken and begin taking the medication at the dose prescribed by your doctor.

Do NOT take these medications 1 hour before or 2 hours after taking an antacid (like TUMS<sup>®</sup>, MAALOX<sup>®</sup>).

TAKE 1 TABLET AT 10:00 A.M.

= 1 Tablet



## SIDE EFFECTS

Some patients experience dizziness, headache, low blood pressure, nausea, vomiting, diarrhea, fatigue, bad rash or swelling, difficulty breathing, fever or a cough. Contact your doctor if these symptoms become bothersome to you.

## NOTES

- Before taking these medications, make sure your doctor and pharmacist know about all other prescription and over-the-counter medications that you take.

### REMINDER:

**WINNING  
TAKES WORK.  
YOU HAVE TO  
CONCENTRATE.**

**GETTING BETTER  
TAKES WORK.  
YOU HAVE TO  
FOCUS ON  
YOUR GOAL:  
A BETTER  
TOMORROW.**