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# Prescription Medicine Labeling Design: Connecting Stories And Personalizing Information

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## Abstract

One of the most important aspects of health literacy—a patient’s ability to find, understand, and use healthcare information—is prescription medicine labeling. People can better comprehend prescription medicine labels when information about the medicine matches their individual information needs. This paper discusses how Wayne State University students developed new designs for prescription medicine labels by interviewing people and connecting the “stories” of both the individual and the medicine to produce patient-based prescription medicine labeling.

A two-year old is diagnosed with an inner ear infection and prescribed an antibiotic. Her mother understands that her daughter should take the prescribed medication twice a day. After carefully studying the label on the bottle and deciding that it doesn’t tell how to take the medicine, she fills a teaspoon and pours the antibiotic into her daughter’s painful ear. (Parker, Ratzan, & Lurie, 2003, p. 147)

“Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.” (U. S. Department of Health and Human Services, 2000, p. 11-20)

## Introduction

Health literacy, a patient’s ability to find, use, and understand healthcare information, is a pressing issue in the United States today. The story of the 2-year-old and her mother addresses one of the most important aspects of health literacy: prescription medicine labeling. In the story, the information needs of the woman giving medicine to her daughter and the information provided on the medicine bottle did not match. While we do not know what happened to the daughter (did she just get better after a few days or did she become violently ill from the medicine being administered incorrectly?), a good guess is that she and mother went back to the doctor or to a hospital emergency room, using more personal and professional time and resources. In some cases, the ability of a person to understand what medicine he or she is taking, how to take it, and why he or she is taking it can literally be the difference between life and death. The issue of prescription medicine labeling affects everyone because it revolves around the necessity of designing medicine labels that respond to an individual’s informational needs. As the demographics of the United States population continually evolve—more elderly people, more people speaking languages other than English—the need for medicine labeling to respond to individual informational needs

will only be amplified. At both personal and national levels, the ability to take medicine correctly can prevent health care crises, reduce healthcare costs, and help people live healthier, happier, and more productive lives.

The kind of medicine labeling that a person in the United States encounters when he or she picks up a prescription from the local pharmacy consists of two parts: the bottle label information and the Consumer Medicine Information (CMI) sheet that accompanies the bottle. The bottle (or box or dispenser) minimally contains the patient’s name, the doctor’s name, the name of the medicine, the dosage, the amount of medicine dispensed, pharmacy information, and any additional warning stickers appropriate to the medicine. The CMI reiterates the information on the bottle, plus it gives detailed information about the medicine itself and about side effects of the drug. Most bottle labels and CMIs are visually quite crowded with dense type (of various sizes, fonts, and other characteristics) and pharmacy identification; the words and phrasing are usually very official in tone and terminology. The bottles are usually round and the labels almost completely encircle the bottles; one or more colored warning stickers may also be attached to the bottle. The CMI is a flat sheet of paper separate from the bottle (often stapled to the bag containing the bottle); it may be folded or consist of multiple pages. Each state requires specific information to be on the bottle and CMI; this can vary from state to state. Most bottle labels and CMIs designs are not designed with input from the people who have to use them.

The topic of prescription medicine labeling was the focus of a class project for Graphic Design students at Wayne State University for the course AGD 5700 – Special Topics: Information Design, done during Winter term 2006. The class project was to develop prescription medicine labels derived from the information needs of individual patients. The most effective information design is user-based, that is, designs developed from the point of view of persons who must find, understand, and act upon the information. The students approached their

information design task from the perspective of storytelling, that is, connecting the “story” of a specific kind of information to the story of the person who needs to use that information. The result was to be a new story—a new design—that personalized the information in ways that responded to their individual informational needs. Through this class project, students discovered ways to link the medicine’s story—what it is, how to take it, why to take it, etc.—with the story of people’s comprehension of and perceived need for medical information (which are influenced by such realities as literacy level, language use and ability, and cultural background). This paper presents the case for storytelling as information design and describes how the students connected the stories of the person needing a medicine with the information about that medicine to produce prescription medicine labeling design that responded to specific, individual informational needs.

To create designs for prescription medicine labels that could address the information needs of individual patients, the students needed to design from the standpoint of the user—the patient, the person who is to take the medicine. Each student interviewed 3 to 5 people (all over 18 years of age) about their medicines and asked about their ability to comprehend the information on the labels. Each student then asked those same people to critique his or her new labeling designs. The underlying premise of the project was that information must be made personal to be meaningful and that knowing people’s information needs (what they want to know, how they get and process information) is the key to enabling them to make that information their own.

### **Storytelling: Making Information Personal<sup>1</sup>**

Storytelling—which adapts a tale’s information to each audience—personalizes information and functions as the key to effective information design. Storytelling recounts of our experiences: observations, feelings, thoughts, and imaginings. Stories are also a means of “organizing our experiences” (Dyson & Genishi, 1994, p. 2). Through the telling of stories we acknowledge those experiences, share our interpretation of those experiences, and discover commonalities and differences between our experiences and the experiences of others. On a grand scale, storytelling is the essence of the oral tradition that uses stories to pass along a people’s cultural experiences and teachings, tying individuals’ experiences to a shared heritage. On a more intimate scale, personal storytelling happens as we share the events and concerns of our day-to-day lives with our families and friends. Through this conversational, personal storytelling, we claim and validate our own experiences, “us[ing] narrative to

shape and reshape [our] lives, imagining what could have or should have happened, as well as what did happen” (Dyson & Genishi, 1994, p. 2). While recognizing that cultural experience is rooted in individual experience and cultural heritage provides the context for individual experience, students were asked to concentrate on conversational or personal storytelling in developing their designs (Moldenhauer, 2002/2003). The personal storytelling in each student’s cohort of participants allowed the student to use those participants’ personal experiences as the basis for his or her medicine labeling strategy. The participants’ personal responses to the bottle label and CMI information greatly affected each student’s choice of words, typographic signaling, images, as well as the sequence and pace of the information in the new designs. The students’ new designs clearly demonstrated that “stories help people connect with health information in a very personal way” (Osborne, 2005, p. 209) and that using storytelling as a design methodology recognizes that “the challenge in designing effective and understandable health communication is to determine the optimal channels, and content which reflects the realities of people’s everyday lives, situations, and communication practices” (Nielsen-Bohlman, Panzer, & Kindig, 2004, p. 221).

### **The Stories: The Individual’s Story**

The initial step of the design process called for each student to do a visual and verbal analysis of an actual medicine label—one of his or her own. At this point, the problems with medicine labels became personal as each student had to address questions like: Do I know how to use the information on the medication? What does this label ask me to do? How do I do that? What information is clear and what do I guess at? What do I do first, second, third, and so on? How do I understand what I encounter on the label, both in terms of content and format? What do I have trouble with and why? What do I have to mentally readjust to make sense of this information (i.e., add, delete, or rearrange)? If I could change anything about how the label reads or looks, what would that be? What do I like or not like about using this medicine label? (Moldenhauer, 2002/2003). Putting themselves in the position of coping with prescription medicine labeling allowed the students to empathize with others and to personally experience the impact of information design.

The next step was for each student to interview his or her participants. Many of the questions that the participants were asked are listed below. Additionally, the students learned about the participants’ demographics (culture, age, etc.), their spoken languages and literacy levels, and their physical interactions with the bottle and CMI (e.g., how the

medicine is dispensed, how the bottle is handled to read the information). The collective answers and observations became the participant's story. The following are examples of questions that students asked in the initial interview; the questions reference the participant's own medicine bottle labels.

- What do you want to know about your medicine?
- What is the most important information to you about your medicine?
- What is the least important information?
- Do you know how to take your current medicines? When? How often? How do you take it? How much?
- Do you know what your medicine is for?
- Do you know how you are to feel after you have taken your medicine? What are you not supposed to feel?
- Do you know about any allergic reactions or drug interactions with your medicine?
- Do you know why you are taking this medicine?
- What is hard to read on the label? What is easy to read on the label?
- What makes it hard or easy to understand the label?
- What do you read or see first on the label?
- What don't you understand about the information on the label?
- What associations do you have with colors?
- How do you read the label? [Note how the participant turns the bottle or holds it.]
- How does your eye follow the information on the label? In what order do you see things on the label?
- How do you keep track of when to take your medicine?
- Does anyone help you take your medicine?
- Have you ever asked the pharmacist (or anyone else) to explain something about the medicine or how to take it? What did you ask?
- What would prevent you from taking your medicine?
- Do you read the information sheet (the CMI, Consumer Medicine Information) that comes with your medicine? What do you do with the CMI?
- What would make the CMI information better?
- What problems have you had with the physical label itself? Wearing off? Scratched?
- Have additional warning labels been put on the bottle?
- Do you read the additional warning labels? Can you understand them?
- If you could design the perfect label, what would it look like?
- Is a bottle the easiest way to dispense your medicine? Should it come instead in a blister pack? If it is a liquid, should it have a dropper or syringe?
- Of all your medicines, either prescription or over the counter, which is easiest to use and why?

### **The Stories: The Information's Story**

The information that appears on a medicine label has a purpose, a story, and the students needed to also tell that story. After recording their participants' responses, the students then completed a verbal and visual analysis of their participants' medicine labels and researched the kinds of information required on a label by the state of Michigan. They also had to learn about the specific characteristics of the medicines and about the state of Michigan pharmaceutical regulations regarding prescription medicine labeling. From this research and analysis, the students heard the story of the information itself.

Questions about verbal and visual prescription information included: What is the point of the information? Why does it exist? How, when, where, and by whom is it used? What sequence of steps is needed to extract the information? What kind of words are used (e.g., medical terminology, complex or simple)? What is the tone of the voice of the words? Are they sentences or phrases? What are the categories of information (e.g., patient information, dosage, description of medicine)? How many colors are used? What kind of visual alignments and typographic thresholds are there? What about the use of rules, boxes, outlines? Size, weight, slope and face of type? Use of space? Line length?

The students learned that a pharmacy outputs the adhesive bottle labels and the CMI page layout on a laserprinter using layout software purchased by the particular pharmacy. If the pharmacy is part of a chain of stores (i.e., one of many stores owned and operated by the same brand name company), the parent company determines the software to be used in the stores. The pharmacy (or parent company) determines the size of the labels and CMIs, determine the typefaces and type sizes that are used, and decide to place additional warning stickers on the bottles.

### **The Stories: The Individual's Story And The Information's Story**

As the students went through the analysis of their participants' medicine labels, they began to see how the participants' personal stories could enable the information's story to be better understood. The students wove the two stories together in such a way that their participants' experiences with and needs concerning the information shaped or interpreted the information and the visual design of the information. They used their participants' stories to personalize the design of the information of the prescription medicine through changing both the verbal and visual aspects of the labeling—the words, the visual elements, and the organization of the information. By addressing the interaction between words and visual appearance, the students were able to make the labeling information

both more meaningful and more accessible for their participants (Moldenhauer 2002/2003).

### **Process And Procedure**

Over the duration of the term, the students met with the participants up to 6 times. The initial session consisted of an interview with each participant. The students also photographed each participant's medicine bottles as reference for the design process. [Any identifying information about the participant, the prescribing doctor, and the pharmacy was deleted in any presentation of the photographs.] During the following sessions, the student presented his or her new designs and discussed the pros and cons of the design decisions. Each subsequent session let the student and participant evaluate the on-going design refinements and revisions together.

The following sequence of steps was used by the students to develop their designs.

- Analyze the design (visual and verbal) of examples of current bottle labels and CMI's.
- Conduct interviews with 3 to 5 people about their experiences (pros and cons) with understanding and using their current medicines; specifically analyze the design of their bottles and CMI's.
- Establish goals of what the labeling should accomplish.
- Design new prescription medicine labeling based on their specific research.

The third step, establishing goals of what the labeling should accomplish, was the pivotal step in transforming the data that the students gathered into the reality of their new designs. This is referred to as performance-based design and, in the case of medicine labeling, it starts with the question of "what are the actions that we want people to be able to perform using the information on the label?" (Seymour, 1996, p. 2). By determining the task (goal) that a new design is to enable a user to do (or understand), the current design is tested to determine how well it performs that task. The new design is also tested and the results of the two tests can be compared to determine the degree of performance change. The specific goal of each student's design varied according to the information needs of his or her participants. One student's goal was to let someone clearly see the connection between the information on the bottle and the information on the CMI. Another student's goal was to design labels that let a person, who lived in a household of several people who were each taking several medicines, easily identify her or his own medication. Through the questions and observations of their initial interviews, the students essentially conducted what David Sless, director of the Communication Institute of Australia, calls diagnostic testing: "finding out what is wrong with the document [in this case, the participants's medicine labels]" (Sless

& Wiseman, 1997, p. 74). And the students essentially "test[ed] the accessibility, comprehensibility or the capacity to act appropriately on the information" (Sless & Wiseman, 1997, p. 79) of their work each time they returned to their participants for feedback on the latest version of the designs. In all cases, the students found that their participants' ability to achieve the specific goal of the design (e.g., find their own medicines among the medicines belonging to several people) improved with the new label designs.

I should note that my students were not the first persons in the United States to explore new designs for prescription medicine labeling. One of the most noteworthy changes in prescription medicine labeling in the United States was initiated in 2005 by Target, Inc. for their in-store pharmacies. It is called ClearRx and is based on the MFA thesis work of Deborah Adler at the School for Visual Arts in New York. Ms. Adler's thesis was inspired by her grandmother who got sick after accidentally taking her husband's medicine: the labels were hard to read and any differences of information between the two labels were virtually indistinguishable. ClearRx is an excellent example of user-based design: the use of the flat surfaces for labels, a clear hierarchy of information, and color-coding. ClearRx provided a good reference for my students and the story behind its development underscored the importance of the medicine labeling project for my students.

### **Student Designs**

I have selected the work of four students to explain how they connected the stories of people needing prescription medicine and of the information concerning the medicine itself. The labeling designed by the students responded to the specific, individual information needs of their participants. Some designs use the usual round pill bottle; others use square, rectangular, triangular, or blister packs. The orientation of the label information changed—the words, the visual relationships between groups of information, and even the size, shape, and location of the label itself. Some designs incorporated the CMI into the design of the bottle label while other CMI's remained separate items. While there was much visual variety, all designs were based on the input of the people who must use the medicine.

It should be noted that all the participants in the project commented on the CMI: it was hard to read and hard to understand; some people said that they threw the CMI away without reading it. The students addressed this issue through rewriting the CMI text (e.g., use of phrases or simpler, shorter sentences; less jargon; less formal tone of address) and making better typographic decisions such as shorter line length, use of bulleted list, increased space between lines, fewer

number of typefaces, and sans serif typefaces with larger x-heights (easier to recognize and read individual letters in words).

The following discussion of each student's designs is in two parts: the participants' prescription labeling information concerns that shaped the student's design goal and how the student's new designs (based on those participants' concerns) could accommodate prescription labeling for future patients. Accordingly, the terminology changes from "participant" in the first part of the discussion to "patient" in the second part.

### Design #1: Nicole Comsa

Nicole's participants told her that they had no problem with the round shape of the bottles but found it difficult to find information on the bottle label such as the prescription number when they need it to refill the prescription. They admitted that they knew that the CMI was supposed to be important to read, but they encountered CMIs so dense with text and so difficult to read and understand that they simply threw the CMIs away, figuring that the bottle label contained the most pertinent information. Some participants lived in households where others also took prescription medicines so it was important for those clients to be able to easily spot their names on the bottle label. The order of importance for the bottle information was name first, how much and how to take the medicine was second, and the name of the medicine was third. Her participants knew what they taking but needed to identify their medicine and be reminded of how often to take it.

Nicole's goal for her prescription medicine labeling was to reorganize the bottle label information into a few clearly marked sections and to make it easier for people to read the CMI and understand how the bottle label and CMI information worked together.

The design of the bottle label (Figure 1 and 2) takes into account that 1/3 of the label space can be seen on a round bottle at a time and groups related information accordingly. For example, the prescription number (required for refills of the medicine) is in the same 1/3 as the name and contact information for the pharmacy. The bottle label uses light purple horizontal bands to divide categories of information; the section headings are called out by being printed on the purple bands. The largest size type is reserved for the patient's name. The bottle of medicine is physically attached to the CMI so the patient cannot easily dispose of the CMI. The cover of the CMI simply contains the patient's name, the medicine and the pharmacy name, address, and phone number. The inside cover contains a diagram that replicates the label on the bottle, clearly identifying the components of the label (Figure 1). The singularity of the diagram on the page and its position directly opposite the actual bottle, make it very easy for

the patient to become familiar with the bottle's label; it is the first thing that the patient can do upon receiving the medicine. The inside cover then unfolds to the detailed CMI material (Figure 2). The bottle label again appears to reinforce the connection between the bottle label information and the CMI details.

Figure 1  
Comsa: Bottle Label And Inside Front Cover

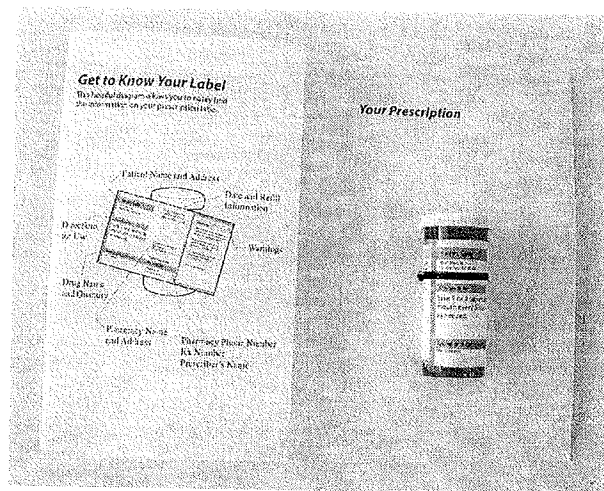
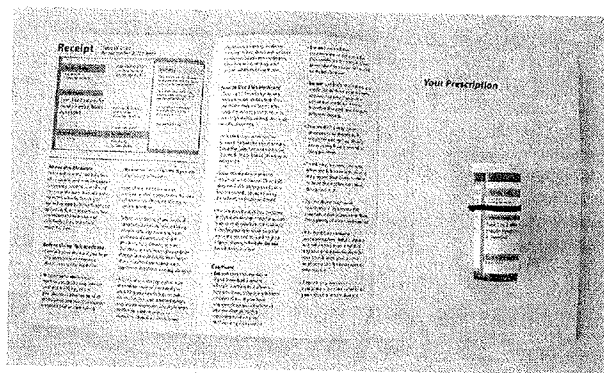


Figure 2  
Comsa: Bottle Label And CMI Information



### Design #2: Holly Lagrasso

Holly's participants lived in households where several people also took several prescription medicines so it was critically important for each participant to be able to easily identify his or her own medicine; they kept all their medicines together in a large basket. They knew about the importance of a CMI, but found the CMI language to be intimidating and the size and shape of CMI to be awkward to store. The participant's name was the most important piece of information, followed closely by the name of the medicine, and then the dosage information.

Holly's prescription medicine labeling goal was to enable people to easily see their names and the name of

the medicine on the bottle label and to make the CMI more useful by reducing its text to the minimum amount of necessary information, writing the text in a more conversational style, making it smaller in size, and giving it a place to “live” under the front label.

Figure 3  
Lagrosso: Bottle Label and CMI



The structure of the bottle provides two relatively flat surfaces (front and back) for labels; some of the participants had found the labels on round bottles hard to read. In the new design, the patient's name and the name of the medicine are set in large, bold type and dominate the front label (Figure 3). The patient's name is printed on a wide colored band; each patient's name is coordinated with a different color of band. The prescription number is located directly under the patient's name—the name of the patient and the prescription number are the two key items of information needed to obtain a refill. The front label provides the most important kinds of information (patient name, medicine name, and prescription details). The back label provides the purpose of the medicine, side effects and cautions in bulleted, brief, precise phrases so that a person can quickly scan the label for information.

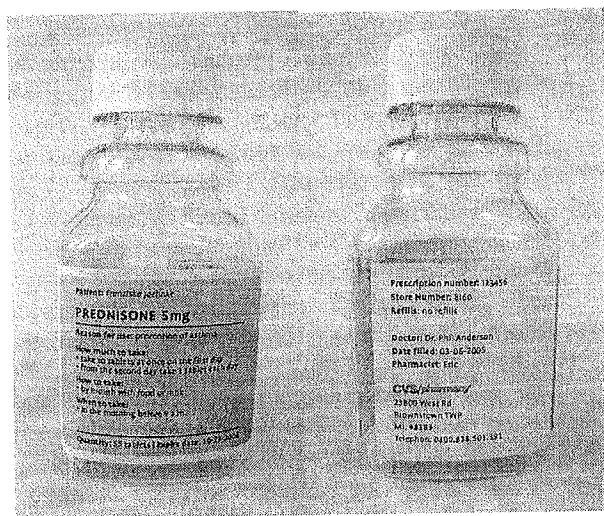
The CMI is also color-coded for each individual patient. Stored under the front label, the 4-page, concisely written CMI and is easily pulled out by grasping the edge that protrudes slightly from behind the right side of the front label..

### Design #3: Franziska Jaehnke

Franzi's participants did not like the round bottles because the labels were difficult to read (they had to keep turning the bottle to read everything) and to store. Her participants wanted the information on the bottle label to first state what medicine they are taking; second, why they are taking it and how much they are to take; third, state their name (they had no need to easily distinguish their medicines from other people's medicines). They paid little attention to CMIs, but one participant had had a reaction to the medicine and in retrospect would have liked to have kept the CMI to know more about what was happening at that time.

Franzi's prescription medicine labeling goal was to keep the information of the CMI with the medicine, to always have it available for reference. Franzi devised a triangular shaped bottle. The structure of the bottle provided three flat sides for information—flat surfaces for easy reading, an inherent shape that helped define information groupings, and a means to permanently attach and store the CMI.

Figure 4  
Jaehnke: Triangular Bottle And Two Label Sides



On the front panel of the bottle label, the name of the medicine is most prominent (Figure 4). The name of the patient is above and details about the medicine—how to take it, how much to take, and when to take it—are listed below. Short, concise phrases plus bullets and changes of type weight make the information very clear to understand. This panel is



distinguished by a light grey background; the other panels and CMI have white backgrounds. The left-hand panel provides the prescription information (doctor, date, pharmacy) and the right-hand panel provides cautions about the medicine and the signal “pull here” to access the fold-out CMI (Figure 5). The text for the CMI and cautions are written in a straightforward, calm tone. The 6 panels of the CMI provide ample space to clearly organize detailed information about the medicine and the use of rules around the section headings makes it easy to find that information.

Figure 5  
Jaehnke: Bottle Label And Fold-Out CMI



**Design #4: Doerte Waechter**

Doerte’s participants knew that the information on a CMI was important, but the CMIs were difficult to read and seemed to get lost amid the clutter of life. While the participants really did not have much problem with the traditional round bottle or the labels around them, blister packs of medicine were another matter. Instructions and information about taking the medicine were on the box and the insert that accompanied the blister pack, but the participants only carried the packs, tossing the packs into a purse or pocket when leaving home. Occasionally information was printed on the backside of the blister pack but dispensing the medicine (i.e., punching tablets through the back of the pack) made the information increasingly less legible. The participants wanted to see their names on the labels and a way to identify their own medicines more easily, but also wanted the name of the medicine to be more prominent, followed by the instructions on when to take and not to take the medicine.

Doerte’s prescription medicine labeling goal was to make sure that the CMI information remained with each article associated with the medicine. In the case of the blister pack, this meant that the CMI information had to be brief, to the point, and conform to multiple formats: box, insert, and blister pack.

Figure 6  
Waechter: Box

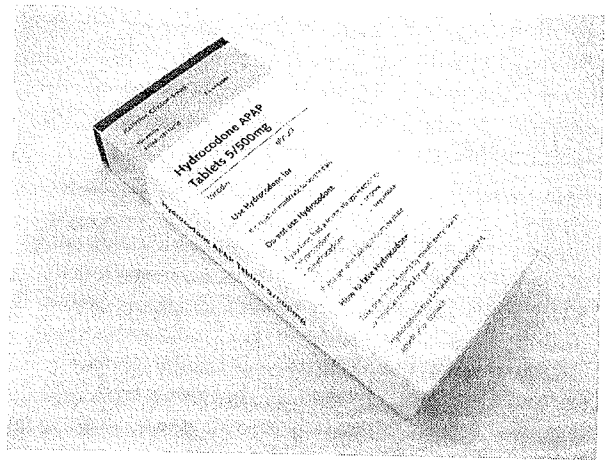


Figure 7  
Waechter: Insert

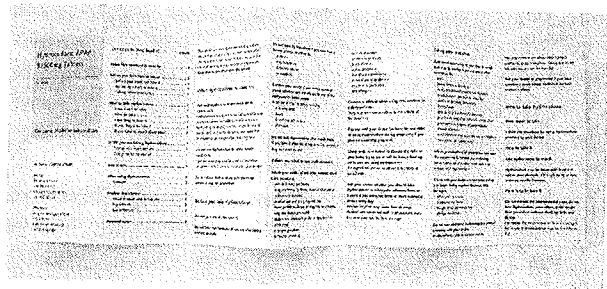
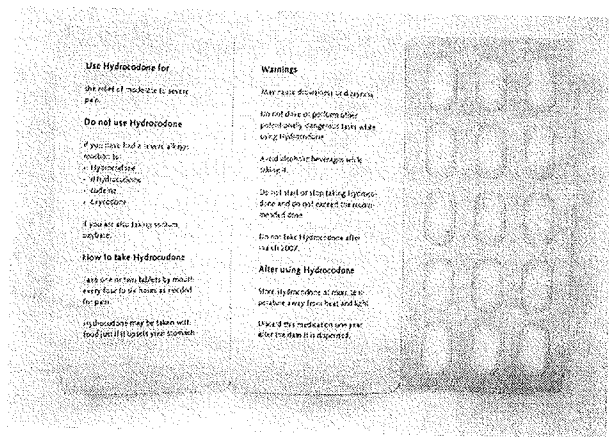


Figure 8  
Waechter: Blister Pack



The name of the medicine is the largest typographic element on the front and side of the box, so it can clearly be seen regardless of whether the box is lying down or standing up (Figure 6). The patient’s name is above, printed on a colored band that wraps around the box’s four sides; a color would be assigned to each client. The front of the insert and the blister pack

follow through on the color-coding. The text for the insert is run over 7 panels; a table of contents at the beginning lets the patient quickly locate specific information (Figure 7). Two panels are attached to the blister pack, matching its size and contour. The blister pack folds between and is protected by the panels (Figure 8). As the patient uses the blister pack, the CMI information remains intact.

### Conclusion

While there was only so much the students could accomplish over the course of a 16-week semester, the designs provide a good start for broader user testing and future refinement. Ideally these designs would have been the first step in much longer period of testing and retesting, of designing and redesigning. And, ideally, discussions with pharmacists would be part of the students' research, but due to the difficulties that would have been involved in securing consent from hundreds of pharmacies in the Detroit metro area (both locally owned and franchises of national chains), the university protocol constraints on the project did not permit the students to discuss the project with individual pharmacists; the students' research on pharmacy labeling came from other sources. Within the context of these limitations, however, the students' work produced three important results.

First, the students recognized the importance of storytelling to information design and that information design must be made personal to be meaningful. Second, the participants felt that their information needs were better addressed by the student designs than by the current medicine labeling. With the participants' stories as the basis of the designs, the information on the labeling became more personalized and meaningful. Third, the student designs offered new options for and insight into the dialogue about prescription medicine labeling.

As the discussion about medicine labeling continues, more attention will need to be paid to patients' informational needs and abilities. And that can only be done when designers and health care professionals listen to the stories of the people using the medicines.

### Endnote

<sup>1</sup> Information regarding storytelling as a design methodology is from/based on "Storytelling and the Personalization of Information: A Way to Teach User-based Information Design." In *Information Design Journal*, 2002/2003, pp. 230–242. Reprinted with kind permission from John Benjamins Publishing Company, Amsterdam/Philadelphia. [www.benjamins.com](http://www.benjamins.com)

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