



Labels Save Lives:

Why Pharmacy Label Design Matters

Reduce Adverse Drug Events (ADEs)



Why read this white paper?

This paper has been created to provide an example of how good information design and clear communications can play a major role in saving time and reducing errors and costs in hospital pharmacy labels.

It is intended for anyone interested in ensuring that their communications, whether pharmacy labels, statements, forms or documents of any kind are clear and easy to understand making for a better experience by all the users.

“Police are investigating whether a nurse mistakenly gave a baby a drug intended for the baby’s mother. If such an error occurred, it wouldn’t be terribly unusual: a Pennsylvania state agency collected more than 800 reports of wrong-patient medication errors at hospitals during a recent six-month period.”

Patriot News of Pennsylvania, August 14, 2013

“The newborn twins of actor Dennis Quaid were among three patients accidentally given 1,000 times the common dosage of a blood thinner.”

USA Today, November 21, 2007

Headlines like this are a nightmare for hospital administrators, yet they occur all too often.

The facts are alarming:

- Preventable medical errors are one of the leading causes of death in the U.S.
- 45,000 medication errors occur daily in the U.S.
- 30% of medication errors are due to packaging and labeling issues and 33% of these errors result in fatalities.



Adverse Drug Events Increase Costs

The link between adverse drug events (ADEs) and costs is by now well established. The costs to a hospital can be devastating, affecting the bottom line at a time of increased scrutiny on operating expenses and margins.

The average cost of an ADE is estimated to be anywhere from \$2,000 to over \$9,000. Total medication error morbidity and mortality costs are estimated at \$77 billion annually.

In the U.S., the average annual cost for a hospital is up to \$5.6 million, reports the Agency for Healthcare Research and Quality. “Before the advent of managed care, hospitals would have shifted these costs to the patient or the insurance company. Today, however, hospitals are likely to absorb the extra expense.”

“Reducing and Preventing Adverse Drug Events to Decrease Hospital Costs.” Agency for Healthcare Research and Quality, Research in Action, Issue 1, March 2001. <http://www.ahrq.gov/research/findings/factsheets/errors-safety/aderia/index.html>

Both hospital administrators and clinical staff are under unprecedented pressure to improve the patient experience, ensure patient safety, and reduce the rising costs related to delivering quality medical care, all in a complex and changing healthcare landscape. Hospital pharmacy directors must do their part to prevent ADEs and the resulting costs and damaging publicity. Nurses, who are the primary point of contact in administering medications are being tasked with increasing job responsibilities while nursing staff headcount is simultaneously reduced. In addition to the real need to stay competitive, hospital executives, administrators, nurses and other clinical professionals are also coping with the pressures created by the gap between reimbursements from all sources – federal, state and third-party insurers – and the real cost of operations.

While the ongoing national debate regarding how best to tackle these ongoing issues will continue, using the practices of good information design to achieve effective pharmacy labeling can reduce ADEs and their related costs while increasing patient safety and improving the patient experience.

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Good Information Design Reduces Risk and Improves Patient Safety

Best Practices in Information Design for Pharmacy Labeling

Good pharmacy label design will improve patient safety, reduce risk and prevent ADEs, along with improving efficiency.

The best practices in pharmacy label information design include the following phases:

1. *Understand all users.*
2. *Define required content and its uses.*
3. *Apply domain expertise in safe medication practices.*
4. *Apply best practices in information design.*
5. *Incorporate color, readable fonts and graphic elements.*
6. *Perform usability testing.*
7. *Validate compliance.*

1. Understand all users

As with any document, the key to clear communications is to understand all users, the workflow that the document or label facilitates and how key information is utilized. In pharmacy labels, there are many people who interface with the label, from the pharmacist who inputs the required information, to the technician who receives the labels and has to match them to the medication, to the person who delivers them to the floor and to the nurse who administers the medication to the patient. All users must be considered.

2. Define required content and its uses

To achieve an optimal medication label, employing an experienced information designer will go a long way to a successful outcome. The information designer must first understand the content that is required and how it will be used, and then he will be able to combine that with the best practices of information design to create an effective label.

Which information belongs on the pharmacy labels for the hospital? Labels typically include the hospital pharmacy contact, patient demographic, patient location, drug information, dosage, route and

frequency. The label may also include information about special handling (such as “Keep Refrigerated”), special disposal (RCRA codes for chemo meds, for example) and STAT orders. The designer must determine what, if any, content can be deleted, what needs to be added, how to group information logically and must allow for the correct field sizes.

Ideally, the designer will identify all users and then follow the label throughout the organization, speaking to each user, finding out what information pertains to them and learning how they use the information.

For example, at one hospital, a pharmacy batch prints around 75 labels at a time on continuous label stock perforated at one-inch intervals, using black ink on a white background. Each label varies in length from two to four inches, depending on how much data must be included. A staff member retrieves the roll of labels and separates each label. An identifying mark at the top or bottom of each label would make separation faster, easier and less error-prone.

NEPS HOSPITAL GROUP 12 Manor Parkway, Salem, NH 03079 • 603-314-5600		STAT
Thompson, Robert James		7E E72901
DOB: 06/23/1970	53Y F	PT# 12345678901 MR# 09876543210
SODIUM CHLORIDE		40MG
SODIUM CL IRRIG SOLN		INFUSE OVER 25.00 HOURS
RATE: 20 ML/HR	SCH	R MFG IRR HANG: 10/11/2014 20:00
GENTAMICIN SULFATE		40MG
POLYMYXIN B SULFATE		10MG
NEOMYCIN SULFATE		250 MG
GENTAMICIN		40MG
POLYMYXIN B		500,000 UNITS
NEOMYCIN		250 MG
	10/10/2014	Prep: _____ Check: _____ Date: _____

TIP: Prevent errors by comparing label data with the display on a handheld code reader.



How will the information on the label be used?

Which tasks will people perform when they read the labels? For example:

- A maternity ward nurse locates a pediatric symbol, avoiding an adult-only medication with the same family name on it.
- The floor staff understands which medicine needs refrigeration, preventing spoilage.
- A nurse in the intensive care unit acts upon drug warnings, adjusting dosage to a patient whose vitals have suddenly changed.

3. Apply domain expertise in safe medication practices

The designer must be attentive to lettering, suffixes in brand names, spacing, abbreviations and more. The designer must be aware of any regulatory requirements and any best practice recommendations from industry analysts, regulatory bodies, or other “thought leading” organizations such as ISMP, ASHP and JCAHO.

4. Apply best practices in information design

A large body of theory and research informs good information design. Information design focuses on many things including clear, easy to understand language, well-organized content, graphically pleasing layout, psychology and usability. Best practices in Information Design ensure that the result meets the three requirements of LUNA™, the design of information for clear communications. Applying the principles of LUNA, stakeholders can easily **L**ocate information, **U**nderstand the information they find and can **A**ct on the information found.

5. Select colors, fonts and barcodes

Effective labels combine the judicious use of color, fonts and 1D or 2D barcodes in an easy-to-read layout.

Color grabs your attention and quickly conveys important information; imagine traffic lights without red, green and yellow! Color emphasis ensures that tired personnel notice critical information, preventing errors and aiding positive patient identification.

Previous generations of label printers used only

black ink, but affordable color printers now open new possibilities. The designer must be familiar with the limitations of production software and hardware, choosing colors and fonts that which reproduce well. Color should identify special handling requirements, carefully positioned for rapid comprehension. This eliminates the need for error-prone, time-consuming auxiliary labels, improving both safety and efficiency. These indicators can be turned on and off with the software tool.

	NEPS Hospital Group	Room: 317	Floor: 3 South	Bed: 2
	MR: 3025222	Acct: 700081672	Age: 12/30/77	
THOMPSON, ROBERT JAMES				
ORD#: 92	BAG#: 25	PIGGYBACK	SCHEDULE	
DOXYCYCLINE	100 MG	Infuse over 1 HR		
DEXTROSE 5% MED PLUS	100 ML	Total Volume: 100 ML		
Hang: 03/20 09:00		Rate: 100 ML/HR		
Exp: 12/21/14 11:00		Freq: Q12H		
Prep: 12/19/14		RPH: _____		
DOXYCYCLINE 100 MG = 1 INJ		Date: _____		
DEXTROSE 5% MED PLUS 100 ML		Time: _____		
Lot: _____ Acct: 700081672		Tech: _____		
THOMPSON, ROBERT JAMES		RPH: _____		
Order: 92	Bag#: 25			

Information Design for Clear Communications

By carefully selecting fonts, a lot of information can be packed onto a small label, while keeping it easy to read, and working well on the printer.

Barcodes identify medications at the unit-dose level for dispensing and administration, and are a proven and effective tool in preventing ADEs, permitting nurses to verify the “five rights of patient safety.” Both the Joint Commission (JCAHO) and the American Society of Health-System Pharmacists (ASHP) recommend barcodes. The FDA has concluded barcodes would reduce medication errors by 50 percent.

Barcodes are available in a variety of formats. The software converts your data into the code type you choose. Some handheld readers automatically log events for future investigation, if needed. The layout includes all of the elements with alignments, indentations and separation lines that combine to create an intuitively obvious label.

6. Perform usability testing

The information designer performs usability testing with real staff members in their normal workplace. The designer unobtrusively observes the staff member, such as a floor nurse, using the labeled medication. The success of the label is determined if pain points have been reduced or eliminated and if users can easily and rapidly:

- Locate all needed information for a given task.
- Understand the information.
- Use the information to successfully perform the task.

The label is successful if it naturally fits into work routines like a thermometer or any other well-designed tool.

7. Validate Compliance

The final label must work within the facility environment. It must meet the requirements of the organization and any applicable state or federal regulations for safe medication practices.

NEPS Hospital Group		8SOU 6803ST	
Acct: 1001004841	DOB: 01/01/1980	Expires 24 hours from 11/21/2014 04:45	
Thompson, Robert James			
ORD#: 111	BAG#: 2		
POTASSIUM CHLORIDE 30MEQ			
Rate: 80	Freq: 780 HRS		
DEXTROSE 5%-WATER	1000ML		
POTASSIUM CHLORIDE	30 MEQ = 15 ML		
GENTAMICIN SULFATE	40MG		
POLYMYXIN B SULFATE	500,000 UNITS	Tech: _____	
NEOMYCIN SULFATE	250 MG	RPH: _____	
			
REFRIGERATE	STAT	HIGH ALERT	INSULIN
Acct: 1001004841		DOB: 01/01/1980	
Thompson, Robert James			
ORD#: 111	BAG#: 2	DUE: 11/21/2014 04:45	
POTASSIUM CHLORIDE 30MEQ			in 1015ML
DEXTROSE 5%-WATER	1000ML		
POTASSIUM CHLORIDE	30 MEQ = 15 ML		
			Tech: _____
			RPH: _____

TIP: Reduce labor, costs and errors with special handling requirements printed on the label.



Our Approach

With years of experience in pharmacy label information design, we have developed a methodology that includes best practices to reduce risk and improve efficiency. Hospital pharmacy labels by Taylor Communications give customers these benefits:

- Risk mitigation through prescription accuracy and better patient identification.
- Lower cost of delivery through operational efficiencies.
- Improved compliance with regulatory requirements.
- A quick start with pre-designed templates.

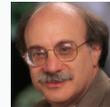
Locate/UNderstand/Act (LUNA™) addresses language, aesthetics, usability, business and regulatory requirements as well as IT and print production processes. LUNA is the design of information for clear communications. It is also a tool to validate if the communication is clear, understandable and actionable. LUNA addresses the needs of all stakeholders and takes into account all delivery channels such as paper, web, email, computer, tablet, smart phone and social media. Stakeholders, broadly defined as anyone who uses or interacts with the communication in any way, may be internal to an organization, or external.

Also, as part of the Positive Patient ID intention, the patient name is printed in bright green to catch the eye and make it stand out from other information. Finally, reverse printing within a bright green box highlights all of the key identification and administration information. Grouping like information and calling it out with color is a highly effective way to reduce administration errors.

For example, a med label may require a STAT alert. With thermal printing, a variable field can be created that reverse prints a white STAT alert against a black background. While this will set apart the STAT alert

on the label, the lack of color emphasis could cause tired and fatigued personnel to miss this critical information, resulting in errors. Another common solution is to affix auxiliary labels to the primary label. A color STAT alert label will certainly spark the cognitive processes that draw the eye to a bright red alert on an otherwise monotone label.

About the Author



Robert Linsky

As an expert in Information Design, Robert has created solutions for many financial, insurance and healthcare companies. He has developed the concept of LUNA™ (Locate/UNderstand/Act) – the design of information for clear communications.

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