WHITE PAPER

Considering Healthcare Label Design

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Ensure Label and Process Work Together

Why read this white paper?

In light of the growing concern among healthcare professionals about medication dispensing and point of need errors, providers are employing new methods and technologies to reduce medication errors across the organization. Pharmacy labels are especially susceptible to being misread or misinterpreted, yet it is supremely important to minimize errors and improve efficiencies as med labels directly link to the patient. This paper explores the best practices of information design and integrates them with current technology including barcoding, stock selection and available print technologies to provide highly effective patient medication safety strategies.

Understanding the full process from design to finished label will lead to streamlining workflow and eliminating waste; increasing patient safety by selecting the right positive patient identification methods and tools and reducing medication errors through automated, highly legible and barcoded medication labels.

This white paper will explore how best practices in information design and label production workflow can result in effective pharmacy labels that are easily understood, saving time and money and reducing errors.

Introduction

While there are governing bodies, corporate standards and as many different ideas about what constitutes good label design as there are people designing labels, the fact remains that for a label to be useful requires consideration of not only the generally accepted standards, but a thorough understanding of how the label is being used and by whom. For example, while the Institution for Safe Medical Practices provides checklists of fonts, fields and standards that provide general information about safe and effective label design (http://ismp.org/Tools/guidelines/labelFormats/default.asp), blindly applying these features without understanding how they apply to the various components of a particular label can be counterproductive at best, and potentially dangerous at worst.

Unfortunately, many people tasked with medication label design are not information design professionals and have neither the time nor the expertise to apply principles of good information design including conducting the necessary research to create a truly optimal medication label. It is the aim of this paper to provide a starting point for non-information design specialists tasked with designing or modifying acute care medication labels. Using the principles of information design will lead to effective labels with fewer errors and a reduction in time spent reading and verifying the data. And after all, that is the ultimate goal — efficient use of time and fewer errors.

The Five "R's"

1. The Right Patient
2. The Right Medication
3. The Right Dose
4. The Right Route
5. The Right Time

> *"Too often institutions look at either the label or the process, but neglect to look at both at the same time to get them to work together."*

Purpose of a Medication Label

We can begin this discussion with a review of the purpose of the typical medication label. Unfortunately, even that is not so simple and straightforward. There are multiple purposes for the medication label and they all depend on who is the audience. If the medication is a compound created internally, then the pharmacist needs to be able to read the ingredients and the amounts. When the medication is ready to go to the patient, the pharmacist or admin needs to be able to find the bed and floor information for proper delivery. On the floor, the nurse needs to verify the patient name and other identifying information along with making sure it is the right medication and dosage. This comes down to the five R's, what most health care professionals are aware of.

They realize that to truly and safely identify a medication for a particular patient, all five R's must be identified through a series of safeguards and checks. A well designed medication label will simplify and facilitate the confirmation of the five R's by being logically organized, visually directive and informationally complete. Still, even armed with the five R's, there is much to be done before a useful design can be developed.

Label Redesign Process

Most importantly, all users of the intended label should be consulted regarding:

- What information is critical for them
- How they use the label and the information
- To what and how the label is applied

We call this following a paper trail. That means interviewing ALL users, watching how they perform their duties relative to the label and asking why they do or do not do certain tasks. Sometime this leads to a change not only in the label design but the process too. Too often institutions look at either the label or the process, but neglect to look at both at the same time to get them to work together. We find that people are so used to the way they work, they want the label (or document) to fit into it. In reality, the process probably needs to change too. So no matter how it is done, all users of the label — pharmacists, nurses, physicians and any other resource who may handle the medication label — should be consulted.

Include pointed and direct questions regarding how the label is used. The answers should be dissected until a thorough understanding of the useful life of a given label is acquired.

While not a comprehensive list, the following questions can provide a good baseline on which to begin a label design project.

1. *Who are the users of the label?*
2. *How does each use the label?*
3. *What information on the label is used by each user?*
4. *Who will administer the medications marked by the intended label?*

   In general, understand the knowledge level, responsibilities and competencies of the label users as well as their roles. This can guide label design by increasing the understanding of the components and their relationships to each other and how they are employed by each user.

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Considerations for Label Redesign

5. Have you analyzed the existing label?

Gather all examples of current labels. Analyzing the existing label can provide several benefits. First, despite design issues, the existing label will either include all of the necessary data or will serve as a good discussion focus for determining what data is missing for the facility's purposes or what data is extraneous and should be removed. Also, there may have been an attempt at logical data organization. What clues can be gathered from the way the original label was developed about the importance and relationship of various data elements?

6. Will Tallman lettering be used?

7. Have you anticipated your barcode needs?

a. Barcodes are becoming ubiquitous as a means of positive patient identification. Most facilities have the capacity to read barcodes both at the desk level with MFPS and other scanning tools, but also bedside with glucose meters and other handheld devices. What devices a facility uses or is anticipating purchasing are important questions.

b. In selecting an appropriate symbology, you must consider the capabilities and compatibilities of those devices.

c. At the very least, a scanner should read the basic and most common symbologies: Code 39 (3 of 9) and Code 128 (and its various iterations). Ideally, a facility's scanning capabilities will also include more sophisticated and modern two dimensional symbologies like Aztec and Datamatrix that provide storage for relatively large amounts of data compared to the linear symbols. Accordingly, a key factor in determining what symbology to use is how much data the facility needs to encrypt within the symbol. Also, a preference for multiple barcodes could be encountered. In this case, real estate may become a concern. Linear barcodes tend to require more clear space around them and are less sizable than two dimensional symbols, but in some ways are more fault tolerant than 2D codes.

Sample Barcodes

QR Code

Datamatrix

d. Does the system support barcodes?

e. Are barcodes currently being used? Which ones?

f. What are the placement and size requirements (including clear zones) for the barcodes?

Stock and Printing Considerations

8. Have you determined your stock criteria?

a. Selecting the stock is perhaps the single most important decision made during the label development process. Assuming that your printer will handle the range of stocks under consideration, the next consideration is whether the stock is suited to the application.

> *"Understanding the function and use of a particular label will often dictate the requirements for material."*

b. Some stocks are heat, humidity and fluid resistant. Understanding the function and use of a particular label will often dictate the requirements for material. Another consideration is whether the label is a one-use instrument to be applied at the time of compounding and left alone, or whether it is a piggyback-type application requiring a multiple label construction with peel and stick functionality.

c. Syringes obviously require a significantly smaller label than an IV bag. Smaller stock necessarily means less real estate to develop the design on. If minimum font size specifications come into play, it can quickly become a challenge finding

a way to get all of the important information on the label in a meaningful and useful way. This is where an expert in information design can be very helpful.

9. *Have you considered an appropriate printer for the chosen stock?*
   a. **Thermal Printers** — Thermal printers are available in two formats: Direct thermal and Thermal transfer. Direct thermal works by heating the specialized stock to produce a two-tone image directly on the stock. Thermal transfer printing uses a ribbon, similar to a typewriter ribbon, which is pushed against the stock and heated by the printhead to produce a two-tone image. Both provide excellent image adherence and stand up well to contaminants and solvents, and, typically, thermal printers are extremely fast when compared with their laser and inkjet counterparts. Thermal transfer leaves the ribbon with artifacts of protected personal information on it and requires handling additional components when refilling the device. For these reasons, most health care facilities opt to use direct thermal devices. One significant shortcoming of thermal printing is that color printing is limited to fixed zones on certain specialty stocks.
   b. **Inkjet Printers** — Inkjet printers are a relative newcomer to the healthcare market, but at least one manufacturer is producing a health care-specific, wristband printer that can print high-resolution color images on stock up to 4" wide. This allows the facility to reduce the storage and costs associated with preprinted color stock and enables the production of colored risk bands and patient images printed directly on the wristband, on demand. Inkjet printers tend to have a very low overall cost of ownership.
   c. **Laser Printers** — monotone and color laser printers are useful for sheets of labels and wristbands, but because of the limited tray capabilities of most laser printers, lasers are prone to more wastage. Lasers can produce excellent images, but toner costs, particularly in color laser applications, can be excessive.

> *"Printers are physical devices, and as such, have natural limitations on the sizes and types of stock they can support."*

Typography, Imagery and Data

10. *What fonts are available/required for the image? (printer resident only? Windows TTF?)*
    a. While many programs designed for creating digital label templates can access Windows print drivers and Windows True Type fonts, it is almost always more efficient to use printer resident fonts. Printer resident fonts are shipped with the printer in the devices firmware and after installation will typically be available to the design tool interface. Printer resident fonts print much more quickly than Windows True Type fonts because the data transfer for the font definitions is unnecessary. The font is defined in the output file and called from printer memory at print time. The downside is that printer resident fonts limit good information design. They are generally fixed (take up more space and visually harder to read), there are few weight options (mostly increasing the point size to make bolder) and few style options.

Effective Label Design

11. Will graphic images be included on the label?

Special consideration must be given to graphic images. Thermal printers do a decent job of rendering line art, but bitmaps and other photographic image types typically don't render well. If a graphic image is required on a given label it should be determined whether the image can be preprinted by the stock vendor, or whether it is a suitable candidate for thermal printing. Experimentation is the best guide, but, in general, images requiring shaded colors, shadowing or photorealistic effects will not render well.

12. How will the data be provided?

Data can come from many sources.

- Manual input via a graphical interface,
- A spreadsheet or data file created manually or as an extract from a database
- As a print stream or spooled file
- As an HL7 transaction

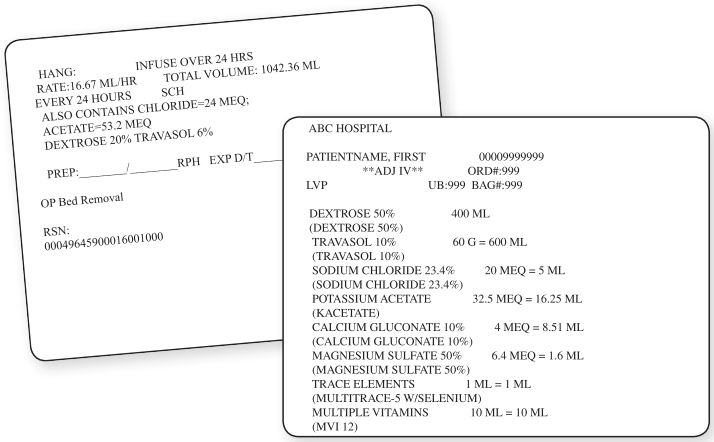
Furthermore, data can be provided in multiple formats. Common formats include:

- Delimited Data — .csv
- XML formatted text
- Print file — flat file or print image
- HL7 transaction file
- PCL or Postscript output
- Other proprietary formats by manufacturer

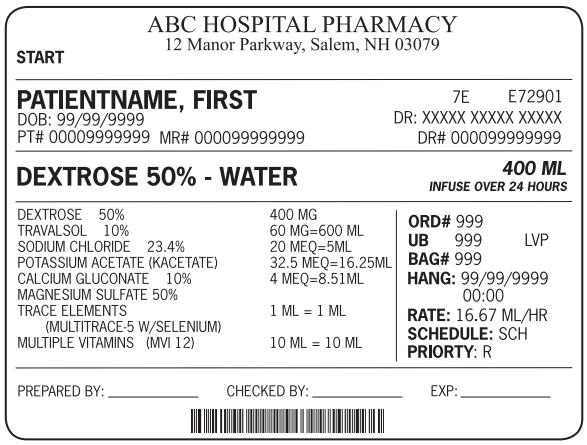
What is most important is to understand from your HIT vendor, or whoever is generating your data, how they will format it and what options they have for transferring it to the label output system. That will also involve understanding how your label solution vendor intends on receiving the data. Vendors often have multiple options for receiving label data from your HIT system, but the most common methods are:

- Watched (polled) folder — a special folder that is automatically monitored for the presence of a valid data file. Generally, the polling time is adjustable.
- Virtual Print Object — an input queue is set up to direct data to the merge engine. This queue is generally configured to look to the HIT user interface as a network printer. The user "prints" to the input queue and the data is managed by the label output system from there.

> *"Clearly, the task of developing an effective label design can be extremely complex and can require expertise in multiple, diverse fields."*



BEFORE



AFTER

Conclusion

Often, the process requires a committee from multiple departments within the facility and should also include vendor personnel as advisors and subject matter experts including an information designer. Additionally, understanding each component of the process and having a clear idea of the required final format and function is essential to a successful project. In many cases, it will be far more budget and resource sensitive to employ experts in the field of label design for health care. A good partner will identify your needs, analyze your infrastructure, work with you to develop an effective design, and put the design into your production flow which will ultimately lead to effective labels with fewer errors and a reduction in staff time spent reading and verifying the data.

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