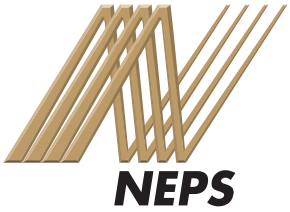

A Splash of Color: Leveraging color to save time & money while reducing errors in healthcare label printing

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Who should read this whitepaper?

This paper has been created to provide a comprehensive overview of the advantages of implementing color label printing in a healthcare facility. It is intended for pharmacy and executive decision makers who may be considering moving to color label printing, or who simply wish to gain a better understanding of the technology and advantages. To that end, this paper will explore a number of relevant topics including the functional advantages of using color label printing, the requirements and infrastructure required to implement, design considerations and suggestions for integrating color labels into a new or existing workflow.

This paper is not intended to be a primer on label design, for that please download and read "Considering Health Care Label Design." from www.neps.com.

Saving time & money with color

It is safe to assume that by reading this white paper you have some interest in improving an existing or developing a new label printing system. While there are many ways to optimize the information on a monotone thermal label, the fact is monotone printing necessarily limits the design and formatting possibilities. Furthermore, optimal performance with thermal printers is achieved by using the limited set of resident fonts on the device. That is not to say that excellent results cannot be achieved with thermal output, but the added dimension of color creates additional possibilities for patient identification and safety to reduce medication administration errors. For example, the addition of color makes it possible to produce easily recognizable images of the patient on wristbands, clinical documentation and within the EMR system. From a design standpoint, color adds a dimension of clear communication that is not available from a monotone output a useful design can be developed.

Consider a patient wristband

With the addition of color, coded bands enhance the administration of special risk alerts. Many facilities have adopted some form of alert banding system in addition to demographic wrist-banding. The alert system notifies clinical personnel of specific risks for the patient. For example, while not nationally standardized, the most common risk alert coding system recognizes three risks:

The risk alerts are commonly created by adding an additional colored band to the patient's wrist. This present problems when a patient has multiple risk factors, and the bands become uncomfortable for the patient and difficult for clinical personnel to maneuver around. A better solution is to print the colored risk bands right on the demographic wristband at the time of creation. This solution removes the issues involved with manually applying the bands, reduces expense and increases patient comfort and satisfaction.

Brilliant colors and contrasting text make the alerts stand out against the white background of the stock. Other types of color alerts, for example MRSA, can be added to the band, too.

The second color feature, and perhaps the most obvious, is the patient image. A clear, color image, along with barcoded demographic information is one of the best possible ways to satisfy minimum patient identification requirements.

Finally, to get the patient name to "pop." The text is printed in a bold font with a unique color.

Just the color elements of this wristband alone (patient name, patient photo and risk alerts) provide two points of identification and key medical information in a single, comfortable device.

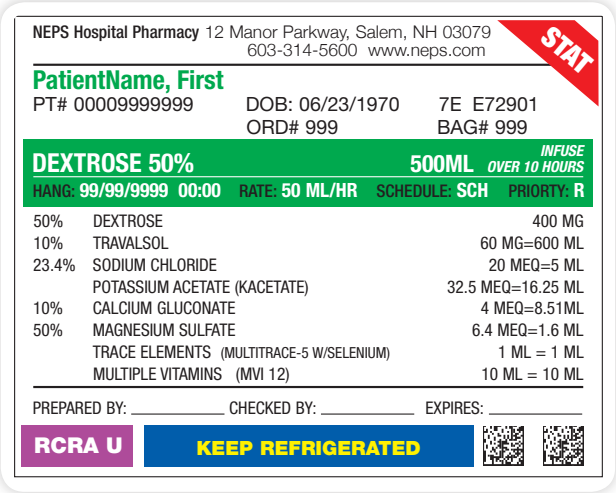
Consider Medication labels

As we have seen with wristbands, color printing can be used to improve the function of medication and IV labels as well. By enabling color label printing, facilities can expect to see reduced costs and errors and more efficient use of clinical personnels' time by improving the labeling workflow. The color features illustrated on the label sample on the next page enable these enhancements. For example, the red "**STAT**" and the blue "**KEEP REFRIGERATED**" indicators are improvements over the common manual process of attaching auxiliary labels for those, and other, special alerts. As with the wristband, these indicators can be turned on and off with software and minimize or eliminate time-consuming and error prone manual processes.

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.

Color printing increases the amount of usable information by taking advantage of the psychological effects of color that can make information more easily acquired. 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, but the drawbacks to this method are the added expense of the auxiliary labels, the time spent and potential for error with manual human intervention. A more cost effective and error free method of adding the color alert is to print it directly on the label, on demand. This allows all of the necessary information to administer and verify a medication to be printed on the label without further intervention.

Infrastructure and Hardware

Types of Color Printers

For color label printing, there are three dominant printer technologies available: thermal, laser, and inkjet. Each technology has advantages over the others and relative shortcomings, but all three technologies have the ability to produce sharp text and colors.

- **Thermal**
  Thermal technology is no new comer to the healthcare industry. The majority of facilities still use black and white thermal printing for wristband and pharmacy label applications and it remains a cost effective and viable alternative. In order to compete in the color label printing marketplace some label manufacturers have developed thermally sensitive color toner embedded in the stock. When the thermal print head heats the media in a specific zone of the label, the treated stock will change to a predetermined color. This method can be useful for some alerts and cautions, but is very limiting in terms of available design space.

- **Laser**
  Laser printing is a proven and well-known technology, and there are many options for speed, toner types and output quality. Label stock is available for virtually any application and easily acquired through multiple sources. The biggest drawbacks to laser printing are costs related to wastage and the relatively large footprint. Due to the limited capabilities of

laser printers to handle small and odd-sized stock, or variable length stock, laser printer stock tends to be die cut out of larger, commonly sized substrates, much of which is thrown away after the label is removed.

- **Inkjet**
  Relative newcomers to the marketplace are professional inkjet printers. While inkjet is typically considered a low-end technology and is usually relegated to home office use, the POS and Healthcare specific devices are robust, and well suited for the rigors of health care printing. Stock handling includes sizes comparable to thermal label stock, but the substrate uses a different coating technology than thermal printer stock to ensure a good bind between the ink and the paper. In general, inkjet printers provide the same output capabilities as thermal output, but with the additional dimension of color. This allows the designer to place variable, color objects on the form and use logic to determine what information to place, what color, or colors, to tone it with and where to place it on the label.

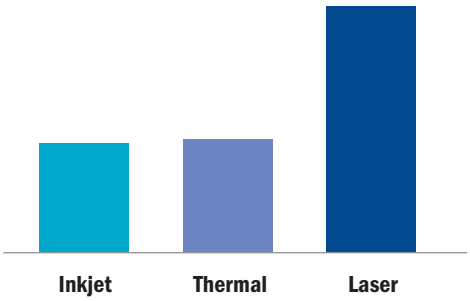
Healthcare facilities that combine color printing with good information design principles will experience reduced medication errors and improved workflow.

Which one is the right one?

In order to determine which architecture is right for your situation, a number of criteria should be considered.

- **What is it going to cost?**
  The variability in pricing due to market fluctuations and other factors makes it inappropriate to provide absolute pricing for any of these devices; however, given similarities in capacity and throughput, you can expect initial, per unit, purchase prices to be fairly consistent across all three platforms. The real differences in platform cost are in the return on investment and cost of owners' hip metrics.

- **How fast will the device show returns on the investment?**
  Thermal, laser and inkjet printers all are highly cost-effective devices, but there are significant differences on ROI between the different architectures. For example, the chart to the left compares the relative ROI for typical devices in each format. Laser printing is roughly 30-40% more expensive than thermal or inkjet to operate. While initial investment on Inkjet printers tends to be slightly higher than laser or thermal per unit, the operating costs (maintenance and toner) are significantly lower, and while laser toner refills are 3 to 5 times more costly per unit than inkjet, they are compatible with the cost of replacing a print head on a thermal device.



The clearest difference in cost tends to be the substrate on which the labels are printed. Laser costs can be as much as 20-30% higher than inkjet or thermal, and as discussed elsewhere in this paper, are prone to significant waste.

Most laser form factors are based on the common 8.5" X 11" letter and 8.5" X 14" legal-sized paper. Hence, the minimum footprint for such printers is those dimensions plus mechanical and enclosure requirements and clearance is needed for airflow and cooling, too.

- **Can the platform handle my output needs?**
  Volume is always a concern. Relatively speaking, all three platforms are robust and quite capable of handling the most rigorous output situations with nothing more than normal maintenance. In general, volumes between inkjet and comparable thermals will be approximately the same and are measured in inches per second (IPS). Volumes for laser printers are measured by page and so are not easily correlated to the volumes from thermal and inkjet devices.

- **Are there any placement restrictions?**
  Of concern for many facilities is space. Desk space and floor space are always at a premium, and so most facilities are looking for the smallest footprint possible. Laser printers tend to be bulkier than either inkjet or thermal printers, except for the highest capacity thermal units, simply due to the dimensions of the stock they support.

- **What about maintenance?**
  From an Information Services perspective, thermal, laser and inkjet printers all require some degree of maintenance and may require regular professional service. Apart from basic maintenance, toner and stock supply, little else is required of these printers in terms of administration. Most come with self-configuring utilities that automatically integrate with your network to locate and configure the unit. Ultimately, from an IT perspective, there is no clear preference among the three platforms.

How do I integrate color into my workflow?

There are as many answers to this question as there are facilities considering the migration to color. So, while every installation is unique and requires significant planning and effort, there are a few steps that can be taken to ensure a successful integration and migration to color printing.

First step

Define your workflow – Before you can determine how color will benefit your organization, you need to analyze the workflow for inefficiencies and determine whether color is the solution to removing those broken and inefficient processes. For instance, the point was made earlier that applying manual auxiliary stickers for alerts opens the potential for numerous errors from incorrect or misapplied stickers. This is a clear opportunity to enable color printing.

Next step

Identify opportunities for color – Admissions and Med Administration workflows are known to be inefficient and are a good place to start looking for opportunities to leverage color. Look for activities that are tied closely to the information on the document, label or wristband at the core of the process. Then ask these questions:

- Can color be used to direct the activity more effectively?
- Is there an ambiguity in the format that costs time and interrupts the process flow that could be clarified by the use of color?"
- Does staff lose time looking for information on labels?
- Do your labels meet corporate/industry/government standards?

Given the information above, a knowledgeable information designer can create a document, label or wristband that is not only attractive, but also functional and customized to fit your workflow and process needs.

Where and by whom will color be printed?

In the healthcare world, color printers are most often used at admitting stations (to create patient wristbands), in Human Resources (to create employee ID) and in the Pharmacy (to print medication and IV labels.) How many printers are at each station is a function of volume and process, but it is wise to maintain one or more backup units to prevent critical process downtime in the event of a hardware failure.

Conclusion

The advantages of color printing are manifold and within the reach of even the most underfunded facilities. The return on investment is relatively quick and the peace of mind gained through increased patient safety is of inestimable value. Also, considering the legal costs of a single mismanaged medication administration event, the relative expense to implement color is negligible. Choosing the platform is perhaps the most difficult decision to make, but with the advent of healthcare-specific color inkjet units, the choice, for those who are committed to color migration, is clear. Stock handling, volume, footprint, durability and ease of integration all favor inkjet for most color labeling purposes. Color laser has its place as well, but wastage will always be a problem with that platform, as well as the size of the footprint. For those who choose to maintain monotone thermal printing as their primary label output platform, there are some stocks that provide limited colorization of specific areas.

Finally, taking the most advantage of color label printing often will require the services of an experienced information designer. Engaging an experienced Information Design Specialist early in the process, can provide significant cost savings by avoiding costly pitfalls and mistakes in the design development process.

About NEPS

NEPS is an expert provider of communications management solutions, services, and strategy. For more than two decades, we have been helping businesses design, develop, and deliver multi-channel communications that are simple, personal, clear, and effective.

By managing the complexity inherent in communications processes, we help our clients improve communications in a measurable way. From strategy to delivery, our solutions are scalable, cost-effective, and customized to meet the needs of companies in the financial services, insurance, and healthcare industries.

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