

Can Color-Coded Bracelets Help Prevent Medical Errors?

By Laura J. Sanger Kelly, M.S., J.D., C.I.P., LL.M. Candidate

The hospital setting epitomizes our societal concept of a place of healing. This same environment, however, can sometimes pose risks that threaten the health and well being of the patients entrusted to the hospital's care. Hospital falls, for example, comprise a significant bulk of injuries sustained within the hospital environment.¹ Other potential hazards include allergic reactions, confusing patients of the same name with one another, and bleeding risks.

Patients may also have specific health care choices regarding their care, which need to be effectively communicated to health care providers. Examples of these circumstances include religious beliefs regarding blood transfusions and do-not-resuscitate (DNR) orders.

Communication in the hospital setting may be compromised by a variety of factors. Shift changes and multitasking may impair the smooth flow of information among caregivers. In an effort to improve communication of pertinent patient information (such as allergies) and patient decisions regarding their health care choices (such as a DNR) it has been proposed that color-coded bracelets worn by patients serve as a visual cue to such information. The option has recently received attention in the popular press.²

Improving Medical Communications

Previous efforts directed towards improving patient safety focused on "systems";³ color-coded bracelets, while representing a systematic attempt to identify critical health care information, tend to centralize the focus back onto individual patients interacting with individual caregivers. By integrating a personalized information feature, such as a bracelet, patient safety and reduction in hospital error may be facilitated in a proactive fashion. A bracelet system, neutral in its application, may also avoid factors (such as assigning blame)⁴ that may be counter effective in implementing risk-reduction strategies in today's complex hospital environment.

Color-coded bracelets

Color-coded bracelet health information alerts could serve as a quick, readily recognizable system of alerting health care providers of patient information and preferences. The presence of a bracelet might give an attending caregiver an observational opportunity to recognize that there is important information regarding a particular patient's care that needs to be acknowledged.

The concept is very simple – different colors would indicate different conditions or health care choices. The addition of written words to the bracelets – the word "Allergies" on the bracelet

¹ Krauss MJ, Nguyen SL, Dunagan WC, Birge S, Costantinou E, Johnson S, Caleca B, and VJ Fraser. *Circumstances of Patient Falls and Injuries in 9 Hospitals in a Midwestern Health Care System*. *Infect Control Hosp Epidemiol* 2007; 28: 544-550, 550.

² Anemona Hartocollis. *Hospital Bracelets Face Hurdles as They Fix Hazard*. *The New York Times*, September 25, 2008, available on line at: http://www.nytimes.com/2008/09/25/nyregion/25bracelets.html?_r=1&scp=1&sq=%2Barthritis&st=nyt&oref=slogi (last accessed September 25, 2008)

³ Longo DR, Hewett JE, Ge B and S Schubert. *The Long Road to Patient Safety: A status report on patient safety systems*. *JAMA* 2005; 294(22): 2858-2865.

⁴ *Id.*

color-coded for allergies, for example – might reinforce the concern the bracelet is communicating.

One of the primary criticisms of the color-coded bracelet system is that even while the system is being advocated, it is not currently subject to standardization. This leads to the concern that color-coded bracelets may be misinterpreted by health care workers.⁵ According to a study by Sehgal and Wachter, as many as nine colors (for example) may be currently in use to indicate DNR status at various facilities.⁶ This potential confusion could frustrate efforts to correctly identify whether a patient has an active DNR. The confusion could be further complicated if blue is the chosen color for a facility's DNR bracelet, as "code blue" is a common hospital parlance for resuscitation efforts.⁷

Do-Not-Resuscitate Orders (DNRs)

In fact, the most controversial bracelet may be the one denoting DNRs. The primary point of contention regarding wearing a bracelet that signifies a DNR is its effect on the issue of privacy.

Exercising autonomy, and deciding to make such an important treatment decision, can be a very personal and private matter. There is concern that by wearing a DNR bracelet, the bracelet may alert the public in general – and the patient's family and friends in particular - to a decision that may not be popular (or even known) by all of the patient's family members or other visitors.⁸

DNRs themselves carry with them a certain level of controversy. For example, a recent online continuing medical education unit illustrated that physicians may feel that their extraordinary efforts at patient care may be 'undone' by the patient going into cardiac arrest in recovery, and no resuscitation performed, resulting in patient death.⁹ This scenario is reminiscent of a recent lawsuit filed in Florida, where a physician was being sued for not honoring a patient's DNR; this case was notable because the patient's family accused the doctor of "negligence for allegedly disregarding [the patient's] living will and failing to put a DNR order in her chart."¹⁰ The ability

⁵ NL Sehgal and RM Wachter. *Identification of Inpatient DNR Status: A Safety Hazard Begging for Standardization*. J. Hospital Medicine (2007); 2(6): 366-371.

⁶ *Id.* at 368. ("When asked whether most ("greater than 75%") physicians and nurses could properly identify the color associated with a DNR patient wristband, responses differed by discipline. Eighty-five percent of respondents believed that most nurses at their institutions could correctly report the color for DNR, whereas on 15% believed physicians could do the same.")

⁷ *Id.* at 369.

⁸ For example, in the debate over if family members should be allowed to witness CPR in the emergency room setting, it has been suggested that witnessing resuscitation may alleviate the family's feelings of guilt, "support healthy grieving, and assure them that 'everything was done.'" T Quest. *Precious Last Moments: Family Presence During Resuscitation*. Medscape J Med (2008); 10(10): 230. By implication, refusing to accept, or perform, resuscitation may appear to certain family members to be doing less than 'everything.'

⁹ JM Teno. *Cases from AHRQ WebM&M: The Wrongful Resuscitation*. Available at http://www.medscape.com/viewprogram/14699_pnt (last accessed September 25, 2008). (In this scenario, a surgeon, having performed life-saving abdominal aortic aneurysm repair, changes a patient's post-surgery status of "DNR" to "full code." Upon later consultation, the surgeon agrees to honor the DNR, which is reinstated.)

¹⁰ AL Sorrel. *Lawsuit showcases DNR liability twist for doctors*. Available at: <http://www.ama-assn.org/amednews/2007/02/05/pr120205.htm> (Last accessed on September 25, 2008)

to express a patient's medical choices via a visual and physical cue, such as a bracelet, may assist in avoiding clerical and other oversights, such as omission of a DNR order in a chart.¹¹

Another concern is that the quality of care, including non-cardiopulmonary resuscitation interventions, may be diminished once a patient has been identified with a DNR.¹² Supposedly a DNR operates to preclude administration of CPR. However, at least one study has suggested that the presence of a DNR may affect a wide range of medical management options,¹³ which strongly supports that if a patient is going to wear a color-coded DNR order bracelet, it is important that the patient engage his/her physicians and caretakers in discussions regarding other therapeutic options and medical preferences.

What could possibly go wrong?

While wearing color-coded bracelets seems innocuous enough, there are potential problems with even a system as facile as this.

As noted above, primary among these concerns is privacy. A note in a chart is relatively hidden. A publicly visible bracelet, readily identifiable to a color-coding scheme, conveys information in a notorious fashion. While being allergic to latex may not be considered the most sensitive information, personal religious beliefs regarding blood transfusion or end-of-life decisions, represent more sensitive data.

In addition to the concerns discussed above, the bracelets themselves may even become a subtle form of attractive nuisance. It has been suggested that pediatric patients may exchange the bracelets, in a pattern reminiscent of trading friendship bracelets, without comprehending the meanings of the color-coded hospital bracelets. It could be a dangerous situation where a patient has managed to "collect the whole set" as a fashion accessory, not realizing the misinformation now being conveyed by his or her hospital jewelry.

On the subject of pediatric patients, there also may be confusion with an already established color-coding system in place for properly treating children. The Broselow-Luten system was designed to accommodate rapid identification of appropriate medication doses, proper equipment, and intervention strategies in the emergency room, based on the child's weight. This color-coded system uses the weight of the child (red for children weighing 8-9kg, purple for children weighing 10-11kg, yellow for children weighing 12-14kg, et cetera) to correspond to instructions and supplies in a pre-stocked cart containing the appropriate supplies for that weight range. If a child presented in the ER with an already attached color-coded bracelet, this could possibly complicate a necessarily rapid decision making process and lead to confusion.

¹¹ The AMA has listed a number of guidance points for doctors when discussing end-of-life advance directives with patients. These are available at the end of <http://www.ama-assn.org/amednews/2007/02/05/pr120205.htm>

¹² Chen JLT, Sosnow J, Lessard D and RJ Goldberg. *Impact of do-not-resuscitation orders on quality of care performance measures in patients hospitalized with acute heart failure*. Am Heart J (2008); 156: 78-84. ("The interpretation of what a DNR order means, however, may vary considerably between physicians.")

¹³ *Id.* at 80. ("Specifically, [patients with DNRs] were less likely to have their cardiac function assessed, be prescribed ACE inhibitors or ARBs, and nonpharmacologic strategies, than those without DNRs... Among the different nonpharmacologic strategies examined, patients with DNR orders were less likely to receive information about fluid restriction, dietary advice, alcohol reduction, or importance of regular physical activity than their counterparts without DNR orders.")

There can also be confusion with regard to *non-medical* colored bracelets. While the color-coded bracelets are sometimes styled closely after traditional hospital bracelets, concerns have been raised that they could be confused with the popular colored bracelets worn as a fashion accessory or a symbol of support for various causes.¹⁴ The most frequently cited of these is the Lance Armstrong Foundation “Livestrong” bracelet, which is yellow.¹⁵ Discussions ensue over whether these non-medical bracelets must be removed, or can be concealed, in order to prevent them being read as relaters of medically relevant information.

In addition, there would need to be establishment of a hierarchy of information sources – the bracelets, for example, should not necessarily substitute for (or overrule) information contained in patient charts, or information gleaned in the course of a physician-patient relationship.

There is also the issue of who is bound by information conveyed by the bracelet. DNR bracelets, for example, might become widely recognized, raising the issues of the implications if the bracelet is worn in non-hospital settings. Would non-medical responders be expected to honor the bracelet? Bystander CPR increases a heart attack victim’s chances of survival four-fold;¹⁶ however, CPR performed by untrained or inadequately trained personnel can carry a risk of injury¹⁷ – possibly the very type of injury the patient is trying to avoid by electing the DNR order in the first place. Would either of these scenarios (being resuscitated and/or being injured during unwanted resuscitation) be satisfactory to someone openly wearing a DNR directive on their wrist?

Emergency personnel will perform CPR when called in an emergency situation; if there is a valid “Emergency Medical Systems Out-of-hospital Do Not Resuscitate Form” emergency personnel are directed not to perform CPR.¹⁸ These forms are usually kept at home, in anticipation that end-of-life emergencies may occur in the home setting. What would be the potential consequences and ethical challenges presented where a patient wearing a clearly indicated DNR bracelet outside of the hospital and home environments suffers a heart attack in a public place where there is no ready access to supporting documentation of the DNR? Likewise, would removal of a DNR bracelet serve to evidence a late intent on the part of an individual to revoke a DNR?

¹⁴ The author has also observed bracelets closely resembling hospital bracelets worn as fashion accessories.

¹⁵ NL Sehgal and RM Wachter. *Identification of Inpatient DNR Status: A Safety Hazard Begging for Standardization*. *J. Hospital Medicine* (2007); 2(6): 366-371, 369. (“In December 2004 the issue of patient wristbands made headlines in Florida, when hospitals using yellow DNR wristbands (as was the case in 3 hospitals in our sample) reported several near-misses among patients wearing yellow Lance Armstrong Livestrong bracelets.”)

¹⁶ Vaillancourt C, Stiell IG and GA Wells. *Understanding and improving low bystander CPR rates: a systematic review of the literature*. *CJEM* (2008); 10(1): 51-65.

¹⁷ CPR, which has some risk in the hospital setting, can be even more damaging when administered by persons minimally trained, or even untrained, in the technique. See, for example, Reardon MJ, Gross DM, Vallone AM, Weiland AP, and WE Walker. *Atrial Rupture in a Child from Cardiac Massage by His Parent*. *Ann Thorac Surg* (1987); 43: 557-558. (A young boy was admitted following a seizure and was later found to have a laceration of the right atrium, caused by his father’s administration of cardiac massage in response to the son’s seizure.)

¹⁸ Family Caregiver Alliance. *Fact Sheet: End of Life Choices: CPR & DNR*.

http://www.caregiver.org/caregiver/jsp/print_friendly.jsp?nodeid=397

The mere presence or absence of the bracelet may also have implications regarding what messages are being sent and received between patient and caregiver. For example, what if someone was fitted with a bracelet (by a family member, for example) in order to direct care decisions (i.e. no blood transfusions for a child, or a DNR on an estranged spouse) against the best interest of the patient? This implies a certain level of security and vigilance regarding bracelet application, which might turn a simple solution into a slightly more complex system of bureaucracy.

Summary

The goal of minimizing hospital error is laudable and should be supported. The utilization of a simple, low-cost, readily initiated system that conveys important medical information could substantially aid in reducing the risks of hospital-based errors.

To counter potential problems, the solutions may also be relatively straightforward. Removing non-hospital bracelets, for example, may serve to diminish confusion. Also, if the bracelets are optional, a patient may elect not to wear the bracelet if he or she does not desire for that medical information to be publicly expressed. Certainly the bracelets, as a *supplementary* information source, would augment information already in medical records and patient charts. In the end, satisfactory communication between patients and caregivers, and whatever aids recognizing and remembering medical decisions, should work together to guide patient care.

Health Law Perspectives (October 2008), available at
<http://www.law.uh.edu/healthlaw/perspectives/homepage.asp>