Standardized Emergency Codes May Minimize "Code Confusion"

Susan C. Wallace, MPH, CPHRM
Patient Safety Analyst
Edward Finley, BS
Data Analyst
Pennsylvania Patient Safety Authority

ABSTRACT

Emergency code terminology (i.e., terms used to notify staff in healthcare facilities about an event that requires immediate action) varies significantly in Pennsylvania. For example, an emergency code for an adult medical emergency at different healthcare facilities could be announced as a "code blue," "code rescue," "code stat," or "code 99." Analysis of events reported to the Pennsylvania Patient Safety Authority from July 2004 through 2013 and a northeast Pennsylvania hospital survey found 80 different codes that were grouped into 37 categories. Over 25 hospital associations have recommended standardized codes and definitions for healthcare facilities in their states. More recently, several associations have endorsed "plain language" codes based on recommendations from government agencies such as the US Department of Homeland Security. To help promote consistency for patient safety and decrease "code confusion," it is suggested that Pennsylvania healthcare facilities develop a standardized emergency code system. This voluntary code standardization could lead to the reduction of code terminology variations, increase awareness and knowledge of healthcare staff working in multiple facilities, and promote transparency of code meanings. (Pa Patient Saf Advis 2015 Mar;12[1]:1-6.)

Corresponding Author
Susan C. Wallace

INTRODUCTION

Emergency code terms, used to notify staff in a healthcare facility about an event that requires immediate action, vary significantly from facility to facility in Pennsylvania, which can cause confusion for healthcare providers.[1] (For the purpose of this article, emergency code terminology will be referred to as "emergency codes" or "codes.") This variation may lead to code confusion and cause a potential delay in care, a patient safety event, or confusion for healthcare providers who work in more than one facility.[2,3]

A survey by the Northeast Pennsylvania Regional Task Force's Health, Medical and EMS Committee and a search of the Pennsylvania Patient Safety Reporting System (PA-PSRS) database for reports involving emergency codes revealed that from July 2004 through the end of 2013, Pennsylvania healthcare facilities used 80 different emergency codes. These codes were grouped by analysts into 37 categories that varied significantly in their purpose. For example, "code green" was used in different facilities to report a patient needing a rapid response, a combative person, a missing patient, a stroke, a fall, and an "all clear."

A literature search showed that hospital associations in more than 25 states have recommended standardized emergency codes for their respective healthcare facilities. Several hospital associations have advocated using "plain language" codes based on recommendations from government agencies such as the US Department of Homeland Security.[4]

To help promote consistency for patient safety, Pennsylvania healthcare facilities may consider developing standardized emergency codes. This voluntary code standardization could reduce terminology variations, increase awareness and knowledge of healthcare professionals working in multiple facilities, and promote transparency of code meanings.

METHODS

To understand the range of codes and the possible complications associated with them in Pennsylvania, Pennsylvania Patient Safety Authority analysts queried the PA-PSRS database for all relevant events reported from July 2004 through December 2013, using keywords such as "code" and "condition."

Using text mining (IBM SPSS Modeler 16.0), analysts were able to identify relevant terms through keyword proximity to other terms associated with emergency conditions in the descriptions of unsafe conditions and patient safety events, such as letters, numbers, colors, and other descriptive nouns (e.g., Armstrong, stroke, manpower), and to eliminate irrelevant terms, such as patient conditions, "barcode," "codeine," and electronic health record codes. Further analysis of the data was performed using terms that could be associated with emergency code events, such as "wrong," "mistake," "delay," and "not called." This was done to review if any events occurred when announcing an emergency code that compromised the safety of the patient.

In addition, Stephanie A. Gryboski, MS, manager, emergency management, Geisinger Health System, and chair of the Northeast Pennsylvania Regional Task Force's Health, Medical and EMS Committee, which consists of about 80 members, conducted a survey in January 2014 to ascertain the differences in the code terms used in each of the committee's healthcare facilities. Authority analysts reviewed the survey and incorporated the answers of the 34 respondents into the results found in the PA-PSRS database.

RESULTS

Types of Codes

Examination disclosed 80 emergency codes (in 37 categories) contained in PA-PSRS reports and the hospital survey from Pennsylvania healthcare facilities. These codes were used in 154 combinations of terminology and intended meanings. Analysts then categorized the terms as letters (e.g., code R, code STEMI), numbers (e.g., code 99, code 222), colors (e.g., code orange, code green), words (e.g., code triage), or names (e.g., Dr. Quick).

For example, there were over 15 different emergency codes used by Pennsylvania healthcare facilities to identify a combative person, including "code gray," "Dr. Armstrong," "code manpower," "code 12," "code control," and "code green."

In another example, "code yellow" meant a bomb threat in one facility and meant patient fall, internal/external emergency, and hazardous material spill in three other facilities. See Figures 1 and 2 for treemap representations of the number of codes used for specific conditions (Figure 1) and the number of different conditions associated with distinct codes, by category (Figure 2).

Figure 1. Number of Distinct Codes by Condition

Note: Based on reports submitted to the Pennsylvania Patient Safety Authority from July 2004 through 2013 and a survey by the Northeast Pennsylvania Regional Task Force. The 16 conditions with only one distinct code were as follows: all clear, biological incident, blood needed, change in patient behavior, emergency department baby delivery, emergency department predivert/high census, emergency patient, hostage incident, labor and delivery requiring blood, medical gas system emergency, oxygen shut down, patient/family care concern, power failure, radiation incident, therapeutic hypothermia, and unusual event.

Figure 2. Number of Conditions Associated with Distinct Codes, by Category

Color ▮ Letter(s) ▮ Name ▮ Number ▮ Word

Note: Based on reports submitted to the Pennsylvania Patient Safety Authority from July 2004 through 2013 and a survey by the Northeast Pennsylvania Regional Task Force. Fifty-nine distinct codes were used once for various conditions, as follows:
– Color (n = 5): crimson, gold, lavender, neon, rainbow
– Letter(s) (n = 16): A, condition A, condition C, condition O, D, H, L, MET, NBC, O/OB, O2, PALS, PCI, PERT, R, Z
– Name (n = 4): Dr. Armstrong, Dr. Gray, Dr. Quick, Dr. Strong
– Number (n = 12): 1, 2, 3, 6, 12, 30, 44, 45, 68, 77, 88, 222
– Word (n = 22): alpha, AWOL, baker, chill, control, elopement, fall alert, hazmat, heart/heart alert, ice alert, lake, lift, MI alert, rapid response, STEMI, stork, stroke/alert, team, team delta, triage, wintergreen, wireless

Code Events

Analysis of the event reports identified 12 instances in which there was confusion when announcing an emergency code. No harm was reported for any of these events, but the potential for harm from delays in care or incorrect response team activation could be significant.

Examples representative of events caused by code confusion are as follows:

> Operator called a "[Code] Team" instead of a "Code Green." The three warning bells were not used prior to calling the code. The room number was not entered on the text pager.

> The patient had an unresponsive episode. Unable to arouse. "Code Red" called by mistake, then "Code Blue" called immediately. Patient responded well.

> Infant delivered and required resuscitation. Code pink button pushed but code blue paged overhead by operator.

DISCUSSION

An emergency code system notifies staff in healthcare facilities about an event that requires immediate action. The intent is to relay urgent information in a timely, understandable manner and elicit the proper staff response.

Agency workers such as nurses; clinical staff such as physicians; first responders such as police, firemen, and paramedics; and nonclinical staff such as environmental services and security professionals may work at several facilities and may be particularly confused when having to remember several discrepant sets of emergency code definitions. A lack of standardization increases the potential for misunderstanding and delayed or inappropriate responses during serious and urgent situations.[4]

It is likely that the examples identified by the analysts underrepresent the actual number of emergency codes used in Pennsylvania. Additional emergency codes used by hospitals that were not associated with a specific event reported through PA-PSRS—and some types of emergency conditions and terms identified in the Northeast Pennsylvania Regional Task Force's survey (e.g., medical gas system emergency)—would not be collected in the PA-PSRS reports submitted to the Authority, as they would be categorized as Infrastructure Failures.

Standardization of Codes to Decrease Confusion

Over 25 state hospital associations have recommended voluntary adoption of standardized emergency codes on a state level. As of 2014, Maryland is the only state that approved regulations (in 2003) mandating hospitals to adopt and implement uniform code terminology as part of their emergency or disaster plans.[5]

The Hospital Association of Southern California (HASC) was one of the first to propose voluntary standardization with its 2000 guidelines, as a result of a tragedy occurring after an emergency code was broadcast on an overhead speaker.[2]

In 1999, the West Anaheim Medical Center announced a code meant for a violent/combative person after a man entered the hospital carrying a gun. Following established response protocols, several hospital employees proceeded to the area where the gunman was located, unaware that the man was armed with a gun. The man opened fire and killed three hospital employees.[6]

A year after the tragedy, HASC adopted standardized healthcare emergency codes (see Table 1). The association recently published its fourth edition of *Health Care Emergency Codes: A Guide for Code Standardization*, which is aimed at assisting healthcare staff respond in a uniform way to situations that may occur in and around the hospital.[2]

After rollout of the voluntary emergency codes, a 2011 survey of California hospitals showed improved consistency in

Table 1. Standardized Code Names Recommended by the Hospital Association of Southern California

CODE NAME	EVENT TYPE
Blue	Adult medical emergency
Gray	Combative person
Green	Patient elopement
Orange	Hazardous material spill/release
Pink	Infant abduction
Purple	Child adduction
Red	Fire
Silver	Person with a weapon and/or active shooter and/or hostage situation
Triage external	External disaster
Triage internal	Internal disaster
White	Pediatric medical emergency
Yellow	Bomb threat

Source: Hospital Association of Southern California. Health care emergency codes: a guide for code standardization [online]. 2014 May [cited 2014 Jun 19]. http://www.hasc.org/hospital-emergency-codes

emergency response activation. Of the 240 hospitals that responded to the 2011 survey, 75% or more reported using the HASC-recommended emergency codes for a majority of their codes. About 80% of survey respondents separated the codes for a violent/combative person (i.e., code gray) and a person with a weapon (i.e., code silver).[7]

Review of codes recommended by several state hospital associations shows that there are inconsistencies among state code systems. Healthcare workers who travel between states need to know different code systems even if the healthcare facilities adhere to state-recommended standardized codes. HASC plans to recommend its code designations for all healthcare systems on a national level, according to Darren Morgan, chair, HASC Safety and Security Committee.[8]

Use of Plain Language to Clarify Meaning

State recommendations. In an effort to increase safety and better communication among staff, patients, and visitors, several hospital associations, including Colorado,[9] Florida,[4] Iowa,[10] Minnesota,[3] Missouri,[11] and Wisconsin,[12] have recommended the use of plain language. Plain-language systems, instead of systems based on colors, letters, names, or numbers, communicate information in a manner that is easily understood by listeners, which may include patients and visitors in addition to staff.[3]

A facility using plain language would announce the alert category, the specific code description, and the location of the emergency. For example, the announcer would state: "medical emergency, cardiac arrest, room 123."

The Minnesota Hospital Association (MHA) Patient Safety Committee published a plain-language implementation guide. Steve Mulder, MD, chair of the committee, stated that he served on the medical staff of five different hospitals during his career and never knew all the

"color codes" at any of the five.[3] In a letter to Minnesota healthcare facilities, he stated, "I don't think this level of ignorance is unique to me. The clear language policy offers a more practical and sustainable approach."[3]

The Iowa Hospital Association (IHA) recommends the use of plain language instead of a color system.[10] Kirk Norris, president and chief executive officer, IHA, states that alerts like "code blue," "code pink," and "code yellow" have been in existence for many years, but there is no uniform standard as to what they mean

and this can cause confusion. Plain language helps to fulfill IHA's commitment to safety and transparency. See Table 2 for the plain-language codes recommended by IHA.

National recommendations. The US Department of Homeland Security Federal Emergency Management Agency (FEMA) and the US Department of Health and Human Services advocate the use of plain language for all emergency communications. FEMA states, "It is important that responders and incident managers use common terminology.

Table 2. Standardized Plain-Language Emergency Codes Recommended by the Iowa Hospital Association

EVENT TYPE	PLAIN-LANGUAGE CODE
Facility	
Evacuation	Evacuation + location + action required
Fire	Fire alarm + location + action required
Weather	
Severe weather	Weather alert + descriptor + action required
Security	
Abduction or elopement	Missing person + descriptor + action required
Acts of violence	Active shooter + location + action required
	Violent intruder + location + action required
Bomb threat	Bomb threat + location + action required
Combative patient/person or show of force	Security assistance requested + location + action required
Disaster (internal or external) (e.g., hazardous agent, chemical spill, power outage)	Internal emergency + descriptor + activate incident command system
	External emergency + descriptor + activate incident command system
Medical	
Mass casualty	Mass casualty + descriptor
Medical emergency	Medical emergency + location
Obstetrics (OB) team activation	OB team + location
Rapid response team activation	Rapid response team + location
Stroke team activation	Stroke team + location
Trauma team activation	Trauma team + location

Source: Iowa Hospital Association. Plain language emergency codes: implementation guide [online]. [cited 2014 Jun 19]. http://www.ihaonline.org/iMIS15/Images/IHAWebPageDocs/publications/Plain%20Language%20Document.pdf

There simply is little or no room for misunderstanding in an emergency situation. The use of plain language in emergency response is a matter of public safety, especially the safety of first responders and those affected by the incident."[13]

The US Department of Homeland Security requires plain language for multiagency, multijurisdictional, and multidisciplinary events, such as major disasters and exercises.[3] There is no requirement at the federal government level (or known state requirement) that mandates the use of plain language in daily operations inside of a single organization, such as a healthcare facility.

Uniformity Sought in Pennsylvania

Pennsylvania does not have a statewide standardized emergency codes system, according to Thomas L. Grace, RN, PhD, vice president, emergency preparedness, Hospital and Healthsystem Association of Pennsylvania (HAP).[1]

"While PA DOH [the Pennsylvania Department of Health] and HAP have not implemented specific guidance on the topic of emergency codes, our emergency preparedness staff have encouraged facilities to consider use of plain English announcement in place of

codes," Grace said. "Such an approach is guided by NIMS [the National Incident Management System] to reduce confusion and delays that can be experienced when codes are used during a crisis."

Gryboski, of the Northeast Pennsylvania Regional Task Force, leads emergency management training for 8 hospitals, 5 helicopter transports, 78 clinic and outpatient facilities, and 2 research centers across the state.[14] She advocated for uniformity of emergency codes for the facilities she manages and all Pennsylvania healthcare facilities.

Uniformity of codes is important for patients and staff safety, she said. "It is confusing for staff who go from one facility to another, and also for patients who go to different hospitals, when emergency codes have different meaning," she said.

It is not only about the healthcare facilities, because the response needed to handle emergencies often requires help from others, such as the fire and police departments and other external emergency responders, she said.

The answers to the Northeast Pennsylvania Regional Task Force's survey showed the lack of uniformity in the use of codes among these facilities. Some of the codes, such as "code red" and "code blue," were common, but for a combative person,

there was an array of codes used, Gryboski said. The committee would favor a uniform statewide system, she said.

Implementation

A transition to new emergency codes requires commitment, consensus, comprehensive education, and training. Several hospital associations provide consensus on terminology, training guides, policies and procedures, emergency code posters, and competency tests.[15] Training is recommended for all staff, including physicians, as well as external emergency responders; a commitment from leadership is necessary.

CONCLUSION

There are no national or statewide standard definitions for emergency codes,[15] and a variety of emergency codes, sometimes with conflicting meanings, are used throughout Pennsylvania's healthcare facilities. More than 25 state hospital associations have recommended standardizing emergency codes within their states. Federal organizations and several state organizations recommend the use of plain language. Standardizing hospital emergency codes can benefit hospital employees and external emergency responders, as well as patients, by reducing code confusion and aiding staff in providing the correct response to emergencies.

NOTES

1. Hospital and Healthsystem Association of Pennsylvania. E-mail to: Pennsylvania Patient Safety Authority. Pennsylvania emergency codes. 2014 Aug 21.

2. Hospital Association of Southern California. Health care emergency codes: a guide for code standardization [online]. 2014 May [cited 2014 Jun 19]. http://www.hasc.org/hospital-emergency-codes

3. Minnesota Hospital Association. Plain language emergency overhead paging: implementation toolkit [online]. [cited 2014 Jun 19]. http://www.mnhospitals.org/Portals/0/Documents/ptsafety/overhead-paging-toolkit-2011.pdf

4. US Department of Homeland Security. National incident management system [online]. 2008 Dec [cited 2014 Jun 19]. http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf

5. Md. Code Reg. 10.07.01.33 (2003). Uniform emergency codes. Also available at http://www.dsd.state.md.us/comar/comarhtml/10/10.07.01.33.htm

6. Leonard L, Gottlieb J, Warren PM. Gunman kills 3 in Anaheim hospital [online]. Los Angeles Times 1999 Sep 15 [cited 2014 Jun 19]. http://articles.latimes.com/1999/sep/15/news/mn-10258

7. California Hospital Association. Hospital emergency code standardization survey: survey report [online]. 2011 Sep [cited 2014 Jun 19]. http://www.hasc.org/general-information/hospital-emergency-code-standardization-survey

8. Morgan, Darren (Chair, Hospital Association of Southern California Safety and Security Committee). E-mail to: Pennsylvania Patient Safety Authority. 2014 Jun 6.

9. Colorado Hospital Association. Colorado Hospital Association emergency code implementation guide [online]. [cited 2014 Jun 19]. http://www.cha.com/Documents/Focus-Areas/Patient-Safety/Emergency-Code-Implementation-Guide.aspx

10. Iowa Hospital Association. Plain language emergency codes: implementation guide [online]. [cited 2014 Jun 19] http://www.ihaonline.org/iMIS15/Images/IHAWebPageDocs/publications/Plain%20Language%20Document.pdf

11. Missouri Hospital Association. Standardized, plain language emergency codes: implementation guide [online]. 2013 Apr [cited 2014 Jun 19]. http://web.mhanet.com/uploads/media/2013_Emergency_Code_Implementation_Manual.pdf

12. Wisconsin Hospital Association. Wisconsin hospital standardized alert code recommendations [online]. [cited 2014 Jun 19]. http://www.wha.org/data/sites/1/emergencyprep/StandardizedAlertCodeRecommendations.pdf

13. Federal Emergency Management Agency. NIMS and use of plain language [online]. NIMS alert. 2006 Dec 19 [cited 2014 Jun 19]. http://www.fema.gov/pdf/emergency/nims/plain_lang.pdf

14. Gryboski, Stephanie A. (Manager, Emergency Management, Geisinger Health System). Conversation with: Pennsylvania Patient Safety Authority. 2014 May 29.

15. ECRI Institute. Public address system emergency codes. *Healthc Risk Control* 2012 May;Suppl A:Safety and security 16.

PENNSYLVANIA PATIENT SAFETY ADVISORY

THE PENNSYLVANIA PATIENT SAFETY AUTHORITY AND ITS CONTRACTORS

The Pennsylvania Patient Safety Authority is an independent state agency created by Act 13 of 2002, the Medical Care Availability and Reduction of Error (Mcare) Act. Consistent with Act 13, ECRI Institute, as contractor for the Authority, is issuing this publication to advise medical facilities of immediate changes that can be instituted to reduce Serious Events and Incidents. For more information about the Pennsylvania Patient Safety Authority, see the Authority's website at http://www.patientsafetyauthority.org.

ECRI Institute, a nonprofit organization, dedicates itself to bringing the discipline of applied scientific research in healthcare to uncover the best approaches to improving patient care. As pioneers in this science for more than 40 years, ECRI Institute marries experience and independence with the objectivity of evidence-based research. More than 5,000 healthcare organizations worldwide rely on ECRI Institute's expertise in patient safety improvement, risk and quality management, and healthcare processes, devices, procedures and drug technology.

The Institute for Safe Medication Practices (ISMP) is an independent, nonprofit organization dedicated solely to medication error prevention and safe medication use. ISMP provides recommendations for the safe use of medications to the healthcare community including healthcare professionals, government agencies, accrediting organizations, and consumers. ISMP's efforts are built on a nonpunitive approach and systems-based solutions.

Scan this code with your mobile device's QR reader to subscribe to receive the Advisory for free.