"To Err Is Human" but Disclosure Must be Taught

A Simulation-Based Assessment Study

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Introduction: Although error disclosure is critical in promoting safety and patient-centered care, physicians are inconsistently trained in its practice, and few objective methods to assess competence exist. We used an immersive simulation scenario to determine whether providers with varying levels of clinical experience adhere to the disclosure safe practice guidelines when exposed to a serious adverse event simulation scenario.
Methods: This was a prospective cohort study with medical students, junior emergency medicine (EM) residents (PGY 1–2), senior EM residents (PGY 3–4), and attending EM physicians participating in a simulated case in which a scripted medication overdose resulted in an adverse event. Each scenario was videotaped and scored by two expert raters based on a 6-component, 21-point disclosure assessment instrument.
Results: There were 12 participants in each study group (N = 48). There was good interrater reliability ($\kappa = 0.70$). Total scores improved significantly as the level of training increased: medical student = 10.3(2.7), PGY 1–2 = 12.3(6.2), PGY 3–4 = 13.7(3.2), and attending physicians = 12.8(3.7) ($P = 0.03$). Seventy-five percent of participants did not address preventing recurrence of the error. Fifty-six percent offered no apology or only offered it with prompting from the patient; only 23% offered an apology with the initial disclosure.
Conclusions: We demonstrated suboptimal adherence to best practices guidelines for error disclosure when providers are assessed in an immersive simulation setting. Despite a correlation in performance of medical error disclosure with increased physician experience, this study suggests that healthcare providers may need additional training to comply with safe practice guidelines for disclosure of unanticipated adverse events.
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Key Words: patient simulation, medical error, educational assessment, truth disclosure.

The 2000 Institute of Medicine report "To Err Is Human" cited as many as 98,000 annual deaths linked to preventable medical errors,[1] and recent literature estimates an even higher degree of burden leading to patient harm.[2] These staggering figures have fostered a serious discussion on the subject of error disclosure in the medical community. Are patients being made aware of the errors that may have occurred in their care? How are they made aware? What are the appropriate ways to disclose medical mistakes?

In response to these questions, the Agency for Healthcare Research and Quality (AHRQ) proposed guidelines for medical error disclosure based on the 2010 National Quality Forum report supporting disclosure as one of 30 safe practices for better health care.[3] These include (1) disclosure of all harmful errors, (2) an explanation as to why the error occurred, (3) how the error's effects will be minimized, and (4) steps the physician (and organization) will take to prevent recurrences.[3]

Although formal instruction in disclosure exists in the literature, published studies of error disclosure curricula[4–15] demonstrate wide variability in the way training programs incorporate medical error disclosure into their respective curricula. In our experience, providers are often deficient in their ability to disclose errors because of inconsistent training, and they often learn disclosure skills through direct observation of supervising physicians as a result. Trainees may even be exposed to negative role modeling, which increases likelihood of nontransparent behavior in response to an error in the future.[16] In a recent scoping review of error disclosure training,[17] only 5 of 21 studies performed a structured assessment of learners' performance.[5,6,15,18,19] Sixteen studies relied only on self-evaluation to assess learner performance during the teaching and learning process, rather than on objective measures.

Healthcare simulation aims to recreate elements of physical, situational, and psychological realism in a safe and controlled environment[20] and offers a unique opportunity that is particularly well suited to assessment of patient-physician conversations regarding medical errors.[21] Recently, educators have begun to use simulation technology to address error disclosure for trainees[22–26] and practicing clinicians.[27] This study aimed to assess error disclosure of health care providers at different levels of experience based on adherence to AHRQ disclosure safe practice guidelines during a simulation scenario. We hypothesized that our participants will be suboptimal in their performance across a range of clinical experience. Secondarily, we hypothesized that immersive simulation using a high-fidelity mannequin simulator can be used to assess clinicians' overall error disclosure performance.

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METHODS

This was a prospective cohort study conducted at a US medical school with an affiliated 4-year emergency medicine (EM) residency from October 2012 to November 2013. This study received a waiver of consent from our institutional review board.

Participant Recruitment

Health care provider groups included third-year medical students (MSs), junior EM residents (PGY 1–2), senior EM residents (PGY 3–4), and attending EM physicians. At our institution, third-year MSs participated in a mandatory 12-week simulation course in which the current research scenario was incorporated into the existing curriculum. All participants were informed that performance in the research simulation scenario would have no effect on evaluations. Resident physicians received 1 hour of didactic credit as an incentive to participate in the study. Attending faculty received credit for 1 hour of required academic participation. Residents and faculty physicians were excluded from participation if they had previous exposure to the research scenario during the MS course. Neither the medical school nor the residency program had formal didactics or curricula in error disclosure before the implementation of this study.

Scenario Design and Execution

The research scenario (Appendix 1) was created based on an actual patient case, was reviewed by the authors, and rehearsed in the simulation laboratory before the initiation of the study. The same four simulation-trained faculty members served as the patient voice and case facilitator operating the computer program throughout the study. The facilitator voiced similarly scripted lines during all cases. All simulation scenarios were conducted in a simulation laboratory using a SimMan 3G (Laerdal, Stavanger, Norway) high-fidelity mannequin. The simulation laboratory treatment room replicated an emergency department patient care room with the availability of telemetry, blood pressure, and oxygen saturation monitoring. Electrocardiogram (ECG) and laboratory results were displayed to the participants on a large LCD monitor. Due to the complexity of the case and anticipated higher cognitive load, MSs completed scenarios in teams of four. One student was assigned as the team leader who was solely responsible for communication and discussion with the patient and only that student's discussion was scored for the purposes of error disclosure. All residents and attending faculty completed the scenario individually. An author (A.C.) was present in the treatment room as the confederate nurse for all scenarios. All scenarios were video recorded in their entirety.

Scenario Scene

The patient is a 40-year-old man with a history of asthma and several food allergies including anaphylaxis to peanuts. He normally carries his EpiPen but did not have it with him while he ate at a Chinese restaurant where he believes he ate a dish fried in peanut oil. The incident occurs in close proximity to the hospital (<5-minute transport). He calls 9-1-1 and emergency medical services transports him directly to the hospital with no interventions. Upon arrival to the emergency department, he complains of throat swelling and mild difficulty with breathing. His vital signs are notable for a pulse of 110 beats per minute, respiratory rate of 32 breaths per minute, blood pressure of 96/42 mm Hg, and oxygen saturation of 92%. Physical examination findings present on the mannequin include tongue swelling and expiratory wheezing.

Scenario Algorithm

During the course of the simulation scenario, when the participant orders epinephrine, the confederate nurse administers an intramuscular dose of epinephrine (0.3 mL 1:1,000 dilution) intravenously. Embedded in the computer program for the scenario is a pharmacological response to the medication error. The patient becomes tachycardic with ST segment elevations on the cardiac monitor. The patient immediately begins to complain of chest pain. If the participant does not immediately recognize the error in route of administration, the nurse volunteers that she gave the dose of epinephrine intravenously instead of intramuscularly. Regardless of the actions taken by the participant, the nurse response is standardized to clarify the medical error and apologize to the provider for the mistake. Subsequent to the medical error, the medical management of the participant determines the flow of the scenario. In every scenario, the patient states that he has been to the emergency department before for anaphylaxis and has never developed chest pain in response to epinephrine and asks the question, "How did this happen?" The participant is expected to immediately disclose the error to the patient before completion of the scenario.

Debriefing

All participants were debriefed after the scenario by an author trained in debriefing. The format and content of the debriefing were drawn from literature on "debriefing with good judgment".[28,29] All participants were given the opportunity to offer feedback on the scenario. Debriefing included discussion of clinical management and the individual participant's adherence to AHRQ guidelines regarding medical error disclosure.

Assessment Instrument Design and Use

Our primary outcome was the total overall score on a 6-component, 21-point disclosure instrument developed using the AHRQ Patient Safety Primer on error disclosure (Fig. 1). The tool was developed using the National Quality Forum's 2010 "Safe Practices for Better Healthcare" Update on medical error disclosure.[3] Potential items to be included were selected from the publication. Items and their respective weighting were then refined using the Delphi method.[30] The Delphi decision group consisted of EM faculty with expertise in education and simulation. Each expert received a series of open-ended questionnaires referencing the AHRQ Primer through a study co-investigator who compiled the responses. Three rounds of blinded feedback were collected to build consensus for individual items in the final instrument. Secondary outcomes consisted of scores in each of the six domains. Disclosure, apology, and explanation of why the error happened were deemed most critical in provider-patient discussions and therefore were rated on a 0- to 4-point scale; acknowledgment of responsibility, explanation of how the error's effects would be minimized, and prevention of recurrence were rated on a 0- to 3-point scale. Each video-recorded scenario was viewed and scored independently by

Medical Ethics Research Project – Checklist for Medication Error

Disclosure of Harmful Error	
0	Error not disclosed
1	Error partially disclosed – acknowledge wrong dose but doesn't connect to outcome
2	Error fully disclosed in language confusing to patient
3	Error fully disclosed in language patient can understand
4	Confirms patient understands error by asking if any questions or "do you understand?"
Acknowledgement of responsibility	
0	No discussion of responsibility
1	Only holds nurse responsible
2	Team responsible
3	Personal responsibility
Apology	
0	No apology given
1	Apology implied but not explicitly stated
2	"I am sorry" offered with prompting from patient response
3	"I am sorry" stated by end of scenario but not initially
4	The words "I am sorry" used in initial explanation
Explanation as to why error occurred	
0	No explanation offered
1	Nonspecific explanation – "made a mistake in how much given" but not why this might have happened
2	Explanation for error only with prompting from patient – patient has to ask why this happened
3	Offers explanation but confusing language to patient
4	Offers clear explanation of different doses for different administration routes in understandable language
How the error's effect will be minimized	
0	No discussion about minimizing error
1	Downplay error by not discussing potential harmful side effects
2	Tests will be performed but not in reassuring way
3	Reassure patient – complete evaluation and treatment of cardiac effects – checking ECGs and enzymes, admitting to hospital
Steps to be taken to prevent recurrence	
0	No discussion of ways to prevent recurrence
1	Vague statement "won't let it happen again"
2	Discuss ways to prevent similar incident in ED
3	Will be reported to hospital and reviewed to create policy so cannot happen in future

FIGURE 1. Disclosure of medical errors checklist.

two members of the research team who were trained by scoring three sample videos not included in the final results using the instrument. For any score differences higher than 1 point on a single component, both raters reviewed the video together and that item was rescored if the experts could come to a consensus. If the experts could not reach a consensus, the original scores remained.

Statistical Analysis

Weighted κ statistics were calculated for interrater reliability. Agreement was considered moderate for κ between 0.40 and 0.60, substantial for κ from 0.61 to 0.80, and high for κ value of greater than 0.80.[31] Scores were compared across level of training using Mantel-Haenszel χ^2 tests of linear trend for ordinal variables. Spearman rank correlations were used to compare performance on disclosure with previous simulation exposure. We performed all analyses using SAS 9.3 (SAS Institute, Inc, Cary, NC).

RESULTS

There were 12 participants in each study group (N = 48). Demographics are shown in Table 1.

Interrater Reliability

Interrater reliability for scoring with the evaluative instrument is shown in Table 2. A count of items rescored after reaching consensus as well as weighted κ for each component is included. Weighted κ for scores of disclosure and participant's discussion of minimizing harm reflected moderate interrater

TABLE 1. Demographics

	MS	Junior Resident	Senior Resident	Attending
	n = 12	n = 12	n = 12	n = 12
Age, mean (SD)	24.8 (1.3)	27.4 (1.4)	31.3 (2.4)	46.8 (9.6)
Female, n (%)	9 (75)	6 (50)	6 (50)	4 (33)

TABLE 2. Interrater Reliability and Discrepancy Count of Expert Scoring

	Corrected Scores # per 48	Weighted κ
Disclosure	2	0.59
Responsibility	2	0.82
Apology	2	0.88
Explanation	6	0.74
Minimize harm	3	0.50
Prevent recurrence	0	0.86
Total	15	0.70

reliability (0.59, 0.50). There was high interrater reliability for scores of acknowledgement of responsibility, apology, and preventing recurrence (κ = 0.82, 0.88, 0.86, respectively). Interrater reliability for total scores was substantial (κ = 0.70).

Participant Performance

Graphs of the distribution of scores for each category are shown in Figure 2. Notably, all participants disclosed the error, with most participants disclosing the error in language the patient could understand (score = 3). Twelve participants (25%) did not address responsibility for the error in any way. All participants discussed minimizing harm to the patient associated with the medical error. Seventy-five percent of participants did not discuss preventing the recurrence of the error with the patient.

Average scores for all domains across clinical experience are listed in Table 3. Total scores (maximum score of 21) improved significantly as experience increased ($P = 0.03$), from MSs [10.3(2.7)], PGY 1–2 trainees [12.3(6.2)], PGY 3–4 residents [13.7(3.2)], and attending physicians [12.8(3.7)]. Differences in scores across years of experience were not statistically significant for apology for the error ($P = 0.23$), disclosure of the error ($P = 0.08$), and acknowledgement of responsibility for the error ($P = 0.053$). Differences in scores across clinical experience were not statistically significant for participants' explanation of

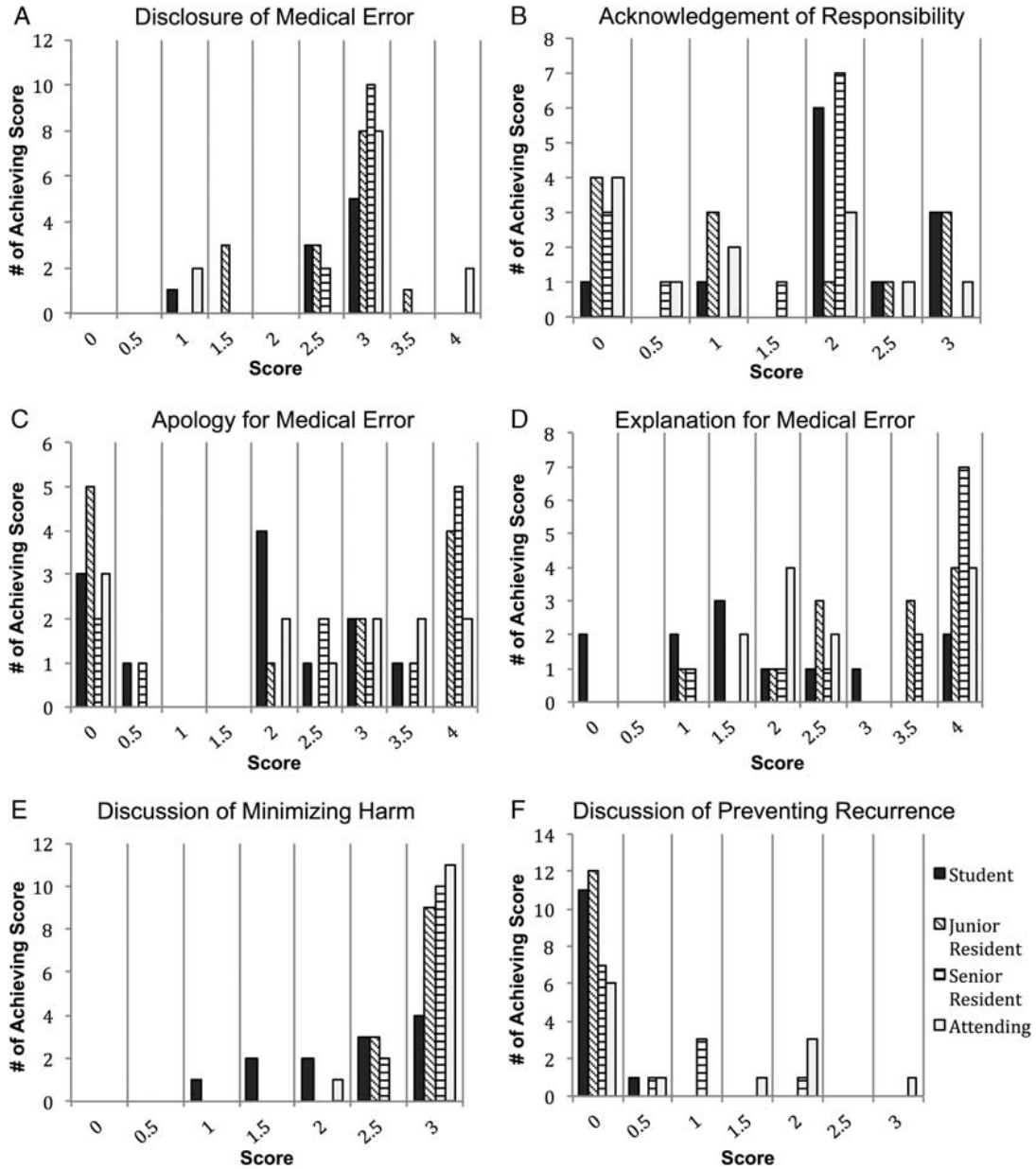

FIGURE 2. Distribution of scores by level of training for disclosure (A), acknowledgment of responsibility (B), apology (C), explanation (D), discussion of minimizing harm (E), and discussion of preventing recurrence (F).

TABLE 3. Scores by Level of Training

	MS	Junior Resident	Senior Resident	Attending	*P* for Trend
Disclosure	2.3 (0.8)	2.9 (0.3)	2.9 (0.2)	2.8 (0.9)	0.08
Responsibility	2.0 (0.9)	1.4 (1.3)	1.3 (0.9)	1.2 (1.1)	0.053
Apology	1.7 (1.3)	2.0 (1.9)	2.7 (1.6)	2.3 (1.5)	0.23
Explanation	1.8 (1.3)	3.1 (0.1)	3.4 (1.0)	2.7 (1.0)	0.07
Minimize	2.3 (0.7)	2.9 (0.2)	2.9 (0.2)	2.9 (0.3)	0.02
Prevent	0.0 (0.1)	0.0 (0.0)	0.5 (0.7)	0.9 (1.1)	0.001
Total	10.3 (2.7)	12.3 (2.6)	13.7 (3.2)	12.8 (3.7)	0.03

Data are presented as mean (SD).

the medication error ($P = 0.07$). Participant scores for discussion of minimizing the harm caused by the error were higher for greater clinical experience ($P = 0.02$). Only 25% of participants addressed preventing the recurrence of the medication administration error. Participant scores for this component were higher for greater clinical experience ($P = 0.001$).

DISCUSSION

Our study demonstrated that error disclosure performance correlated with increasing clinical experience, but adherence to AHRQ guidelines was suboptimal for both providers in training and attending physicians after managing an adverse event from a medical error. In addition, we found that a simulation-based approach can be feasible to assess compliance with current standards of error disclosure using an evaluative tool.

Previous studies have employed standardized participants for the assessment of learners' performance of error disclosure.[17] Standardized participants are particularly powerful to address communication skills, allowing for high degree of authenticity and provision of timely feedback from the direct recipient of the communication.[32] For acute care specialties, error disclosure has unique interpersonal contexts as providers attempt to stabilize, diagnose, and treat patients while rapidly establishing rapport and developing trust and alleviating anxiety with the patient and family.[33] For this purpose, we designed the scenario with a discussion between the participant and a simulated high-fidelity mannequin that occurred in a dynamic, immersive acute care environment. By juxtaposing the management of an acutely ill patient with a medical error that led to adverse outcomes, we were successful in assessing error disclosure for a unique but important clinical context through healthcare simulation.

We were particularly interested in capitalizing on the advantages of the simulation environment for assessment of error disclosure. Matos and Raemer[23] pioneered the design of an assessment instrument for error disclosure tailored for use in immersive simulation. The authors employed a behaviorally anchored rating scale and an instrument tied into the five stages of grief for anesthesia trainees after the patient overhears a conversation ridiculing his body habitus due to inadequate anesthesia. Our study focused instead on the components of the disclosure and adherence to national guidelines rather than on participant stress, body language, and patient-physician interaction. In contrast to other communication-related tasks, which center primarily on delivery and word choice, content is a key determinant of a full disclosure. Our instrument combined characteristics of a checklist containing items required in six domains with a behaviorally anchored rating scale that scored performance in each domain. Previous literature has also found success with global rating scales to assess teamwork and communication skills in the simulation environment.[34,35]

Our results revealed significant improvement in error disclosure performance as providers gained clinical experience. Although this result may be intuitively logical, the correlation between the ability to disclose errors and experience in patient care is not clearly established in the literature.[17] This is in light of the fact that a survey found only 33% of trainees reported any formal instruction in error disclosure, and 92% indicated that they felt underprepared for error disclosure encounters.[36] Our study has compared error disclosure performance across a broad level of experience that included MSs and practicing physicians. One previous study compared junior and senior residents in disclosing either an iatrogenic injury or an incidental cancer finding to a patient's family member through a self-assessment and a global rating scale.[15] On self-assessment, senior residents were more comfortable than junior residents with disclosure of an iatrogenic injury. Although senior residents scored higher on some individual items for disclosure of iatrogenic injury, the difference in overall performance was not statistically significant. This may have been due to small sample size (n = 15) with only trainees but reflects further work needed to measure and establish competence in error disclosure across levels of experience.

Finally, our participants underperformed overall on the adherence to guidelines for error disclosure. Although it is difficult to accurately judge performance because no benchmarks exist for any particular level of clinical experience, it is notable that scores were particularly lower for the domains related to responsibility, apology, and prevention of recurrence of the medical error. Physicians-in-training have cited multiple reasons for not fully disclosing errors, including fear of litigation, concerns regarding reprisal and punishment, discomfort with patients' emotional responses, and uncertainty with the process to disclose an error.[37] For practicing physicians, error disclosure is still not universally accepted as standard practice. One study showed that 42% of surveyed physicians did not believe full disclosure is necessary, whereas partial disclosure was believed to be necessary by 56% of physicians, and no disclosure was the choice of 3% of physicians.[38] It would be unsafe to presume the etiology of medical errors immediately during a patient encounter, and a review process through a root cause analysis or a follow-up investigation is needed to determine the correct course of action to prevent future occurrences. However, providers should be aware that error prevention is one of the recommended steps in best practices guidelines, and patients should be told that a medical error will be investigated thoroughly by the healthcare system. Given our results, more consistent and in-depth education regarding error disclosure best practices may be needed, even for practicing clinicians who have completed training.

LIMITATIONS

This study had several limitations. Participants may have spoken more frankly with the patient in a simulated encounter than they would have in a real clinical situation where an error resulting in harm to a patient had occurred. More junior participants, particularly MSs, may have had higher cognitive load because of management uncertainty, the stress of which may

have interfered with their communication with the simulated patient. Previous exposure to simulation within the faculty was much more varied than in the other participant groups. Familiarity with the simulation laboratory and capabilities of the simulator may have influenced participant performance.

Because it was difficult to estimate an effect size for clinical experience on performance on our instrument due to lack of established provider performance in error disclosure in the literature, we were unable to perform a power analysis. This may inflate error for individual domains of the instrument. Finally, to ensure that an error consistently occurred and that the participant would need to perform error disclosure as part of the case, we wrote the medication administration error into the script to be performed by the confederate nurse in the scenario rather than the physician participant. This may have caused some participants to not feel personally responsible for the error and impact their performance of the error disclosure. However, we explicitly made it clear to participants that they were solely responsible for all communication with the simulated patient. The use of a standardized participant rather than a mannequin simulator may have facilitated the realism of the case, although the confederate nurse assisted in the psychological fidelity of the scenario. Finally, the psychometric properties of our instrument and lack of additional raters may have affected error disclosure performance scores for our participants.

CONCLUSIONS

We have created an instrument and an immersive simulated scenario for objectively assessing adherence to AHRQ error disclosure guidelines. In addition, although improvement in disclosure of medical errors increased with physician experience, this simulation study indicated that health care providers do not comply fully with safe practice guidelines for disclosure of adverse events. This suggests that current training may be inadequate and more effort should be placed on education of error disclosure, including practicing physicians in the process. Expanded training has the potential to improve patient-physician communication with respect to disclosure of medical errors and ensure that patients are provided with the information they desire regarding unanticipated outcomes related to their care. Going forward, our consensus instrument of error disclosure compliance will require use on a larger scale and in multi-institutional settings to provide further validity for simulation-based assessment purposes. More granularity regarding individual components of the medical error discussion and potential barriers to full compliance of disclosure guidelines will be important in designing future educational interventions to address this need.

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Section I: Scenario Overview

Scenario Title:	**Anaphylaxis – Medical Error Disclosure**
Original Scenario Developer (s):	**Ashley Crimmins, MD** **Leigh Evans, MD**
Date – original scenario	**5/2013**

Estimated scenario time: 15 Debriefing time: 30 minutes

Target group: medical students, EM residents, EM faculty

Brief Summary of Case:

A 40-year-old man presents with anaphylaxis due to peanut allergy. The patient is given epinephrine dose 30× higher than is appropriate and develops chest pain and ECG changes. Participant must address acute clinical findings and disclose medical error to patient.

Section II: Curriculum Integration

A. Scenario Learning Objectives

Learning objectives

1. Recognize presentation of anaphylaxis
2. Describe indications for use of epinephrine
3. Manage acute complications of epinephrine administration error
4. Understand how to communicate medical errors to patients and families

Critical learner actions – teamwork and communication

1. Introduce self to patient
2. Obtain concise HPI, medical history, allergies
3. Explain diagnosis, treatment options, prognosis to patient
4. Disclose error to patient according to safety guidelines

Section III: Scenario Script

A. Case summary

A 40-year-old man with a history of multiple food allergies, usually carries an EpiPen, but forgot it and ate something fried in peanut oil. This happened close to the hospital, so EMS just brought him straight to the emergency department. He complains of throat swelling. Patient receives a dose of epinephrine IV instead of IM, at which point he begins to complain of chest pain and reports that he has never felt this way in the past with his EpiPen. Describes pain as severe pressure over his chest. Nurse realizes that he/she gave incorrect dose and informs healthcare provider. Electrocardiogram demonstrates ST elevation.

B. Key contextual details

He has had anaphylaxis to peanuts in past requiring hospitalization

C. Scenario narrative (what learner will experience)

Patient is anxious. He is tachycardic and tachypneic on arrival.

D. Scenario cast

Patient	Laerdal SimMan 3G
Role	Descriptor
Sim fellow	Expert debriefer – nurse in room
Technician	Video recording
Faculty	Patient voice, cardiology consultant

E. Patient profile

Last name:	**Branton**	First Name:	**Thomas**
Gender: Male		Age: 43	Code Status: Full
Ethnicity: White		Primary Language Spoken: English	

Chief Complaint:

Throat swelling

History of Present Illness: (information given to participants)

Throat swelling which began at Chinese restaurant. He has history of allergy to peanuts. He is concerned his food was fried in peanut oil.

HPI: (To be elicited by participants)

Shortness of breath. Difficulty swallowing
Denies: Dizziness, syncope.

Medical History/Surgical History:

Asthma, anaphylaxis

Social History:

Nonsmoker of cigarettes, drinks 1–2 drinks on weekend
Denies illicit drug use

Review of Systems

Constitutional	Anxious
HENT	Tongue swelling
Eyes	Negative
Cardiovascular	Negative
Pulmonary	Short of breath, wheezing
GI	Mild abdominal cramping
GU	Negative
Endocrine	Negative
Musculoskeletal	Negative
Skin	Rash – wheals
Heme	Negative
Neuro	Negative
Psych	Negative

Medication Allergies:

1. NKDA

Medications:

1. Flovent
2. EpiPen

Physical Examination Findings:

VS: HR 110 BP 96/42 RR 32 SpO_2 92% RA T 98.2
Gen: Anxious male sitting upright, diaphoretic
HEENT: conjunctiva normal. Oropharynx with tongue and uvula swelling
Neck: Normal
CV: Regular rhythm, but tachycardia
Lungs: Expiratory wheezing
Abd: Abdomen is soft. No masses. Tender in RUQ. Positive Murphy's sign
MS: 2+ pitting edema of bilateral LE to the knees.
Skin: Wheals on trunk, back
GU: Normal
Neuro: A + O × 3
Psych: Anxious

Laerdal Monitor Results

Category/Label	Result
ECG	
1 ECG	1 Sinus tachycardia with ST elevation
2 ECG	2 Resolution of ST elevation
Radiology	
1 CXR	1 Normal

E. Baseline Simulator/Standardized Patient State

Initial Appearance

Gender: Male		Attire: Street clothes	
Alterations in appearance: (moulage) Wheals on trunk, back			
Initial Vital Sign Display: (simulation room)			
No monitor display	Monitor on, no data	X	Monitor on, standard display
BP: 96/42 HR: 110	RR: 32	T: 98.2	Sat: 92% RA
CVP:	Tongue edema		
Lung sounds Wheezing	Left: Clear	Right: Clear	
CV		Heart sounds: S1S2 ECG Rhythm: Sinus tachycardia Other:	
Bowel sounds:		Normal	

Equipment/supplies available:

Bed pan/urinal	Foley kit	Straight cath kit
IV pump	Wall suction	NG Tube
Pressure bag	Oral suction cath	ETT suction cath
Chest tube tray	Pelvic binder	Backboard
Pneumovac	Code Cart	US Machine
CVC kit	12 lead ECG machine	Defibrillator
Transcutaneous pacer	Direct laryngoscopy equipment	Glidescope
Other: Ultrasound machine		

Respiratory Equipment:

Nasal cannula	Face mask	Nonrebreather mask
BVM/Ambu bag	Nebulizer	Flow meter

Medications to be available:

#	Medication	Dosage	Route
	Epinephrine (1:1000)	1-10 mg	IVP
	Solumedrol	125 mg	IV
	Benadryl	50 mg	IV
	Pepcid	20 mg	IV
	Nitroglycerin	0.4 mg	SL
	ASA	325 mg	PO

Section IV: Computer Program
Program uses 0 handlers, 0 trends, and 1 frame.

Scenario Progression

Frame 0: HR 110 BP 96/46 RR 32 SpO_2 92% RA T 98.1

Frame 1: HR 150 BP 85/46 RR 38 SpO_2 88% RA

Create Physiologic Trends

Trend name: Time:

Value Time in Minutes

: : : : : : : :

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Baseline

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Parameters

Heart Rate Temp

RR CVP

SpO_2

BP

Create an Event Handler

Handler Name: **Number of Frames:**

Event **Event**

Epinephrine 1:1000 IV

Actions **Actions**

Heart rate increases to 150

ST elevation on ECG

Stage 1: Recognition of Anaphylaxis, Initial Treatment

Nurse: [background of scenario] This is a 45-year-old man brought in by EMS. He has an allergy to peanuts and was eating a local Chinese restaurant and starting having his usual symptoms. EMS established a peripheral IV en route but did not give him any medications.
Physician: "What brings you in today"
Patient: "I was out to lunch at a Chinese restaurant. I started getting hives and short of breath and then my tongue felt swollen. I have an allergy to peanuts. I didn't have my EpiPen with me so I called 9-1-1."
Physician: [evaluates the patient, orders epinephrine, may order diphenhydramine and steroids as well]
Nurse gives epinephrine. Regardless of dose and route ordered, pushes epinephrine IV.

Stage 2: Medication Error and Disclosure

20–30 seconds later
Patient: My chest is really tight right now. [If asked: My breathing and my tongue feels a bit better.]
[Physician assesses chest pain, often orders an EKG. EKG shows ST elevation in V1–V3, and subtle depressions in III and aVF.]
If physician reassured patient that this was likely the effect of epinephrine, the patient would say, "I've had epinephrine before and it's never felt like this."
Nurse (to physician): I think I might have given the wrong dose of epinephrine. I gave the whole vial (1 mg) IV rather than the anaphylaxis dose (0.3 mg).
Physician [explanation to patient]
If physician disclosed error but didn't share anything about a plan:
Patient: So, is there anything you can do about this?
[Explanation from physician should include telemetry monitoring, observation, potentially admission and serial troponins.]
Regardless of nature of physician error disclosure, the scenario ends.