Which Reality Matters? Questions on the Path to High Engagement in Healthcare Simulation

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With heart racing, sweaty palms, and tightness in her throat, the code team leader takes a deep breath and tries to remember the next step of the new Advanced Cardiac Life Support algorithm.

As the needle pops gently up through the tissue and he secures the knot, the surgical resident notes with satisfaction that his 35th stitch was clean, quick, and completed with a minimum of wasted motion.

The first rush of blood gushes into the Vacutainer; the first-year nursing student exhales a sigh of relief, thinking that maybe she will be able to do this phlebotomy stuff after all.

His mind suddenly blank, the second-year medical student wracks his brain to find something useful to do for the patient complaining of chest pain and nausea.

The significant contribution of "Deepening the Theoretical Foundations of Patient Simulation" is to help us understand how participants in simulations like those above became so engaged in what they were doing. Peter Dieckmann, David Gaba, and Marcus Rall help us understand how to engage participants by bringing clarity and definition to the concept of realism in healthcare simulation. Although many of us in the simulation community concern ourselves deeply with the fidelity or realism of our simulations and actively debate how much they matter, our vocabulary for thinking about realism has been impoverished and our concepts are murky. Often, we intuitively know how to engage trainees, but many of us are at a loss when it comes to making that tacit knowledge explicit. We understand that how trainees view the realism of the scenario is somehow important to engaging them; we can describe anecdotally which simulations really work; we can even enumerate which elements make for a highly engaging simulation. But it has been difficult to systematically plan and design simulations geared to different participants and learning objectives because we lack a conceptual framework to describe what we do that works. Dieckmann, Gaba, and Rall provide a framework to improve the design, execution, and research about trainee engagement in health-care simulations.

This editorial 1) highlights the high-leverage concepts in Dieckmann and colleagues' article we can all use to design and improve our simulations; 2) makes the case that realism matters only in the service of engagement; and 3) describes some of the important aspects, other than simulation realism, that influence how and whether our trainees engage.

The high-impact advance in Dieckmann et al.'s argument is that we need to understand realism in simulation not simply as physical realism, as many of us have, but in other ways as well. The idea that fidelity is not unidimensional (simply high fidelity or low) is not new; Beaubian and Baker argued persuasively that simulations via role-plays, part-task trainers, or full-mission simulators are qualitatively different.[1] Similarly, Rehmann and colleagues offered a three-dimensional typology of simulation fidelity to aid simulation designers: equipment, environmental, and psychologic fidelity.[2] The aviation community has engaged the challenges of realism and fidelity for years. Aircraft simulators made tremendous advances in terms of physical fidelity but aviation simulations lacked in areas such as psychologic fidelity. In the early days, airplane simulators were used predominantly for training and practicing routine and emergency maneuvers and procedures. It was not until the

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1990s with the advent of crew resource management that aviation began to include considerations of psychologic fidelity by including full missions (flights) with various routine and challenging events along the way. Training and practicing in a "full mission" condition was among the factors that dramatically improved aviation safety.

Dieckmann et al. advance this work by providing a nuanced way of conceptualizing how simulation participants experience reality. To highlight the important message of Dieckmann's article, we propose slightly different terminology and attempt to clarify their argument. We do not disagree with Dieckmann et al., but we are simply trying to make the framework and nomenclature more accessible.

An exciting simulation that captures the imagination, triggering physiological responses and the execution of ingrained clinical algorithms, is a social and psychologic endeavor. That is, it taps into participants' history of previous social interactions and past psychological history to evoke similar responses in the present. Dieckmann et al. argue that it is a fallacy to focus only on physical realism. It is not physical realism, or certainly not physical realism alone, that allows our trainees to act and feel "as if" a simulation had real stakes and consequences.

To engage our participants deeply in simulation, we need to recognize that humans think about reality in (at least) three ways: 1) the physical, 2) conceptual, and 3) emotional and experiential modes. The physical mode of thinking concerns phenomena well described by the disciplines of physics, chemistry, anatomy, and biology. Weight, viscosity, color, anatomic accuracy, conductivity, gravity and the like are physical properties of our simulation mannequins and accoutrements. In the mannequin-oriented simulation community, for example, we may complain about poor physical realism related to such clinical signs as pupil dilation, blink responses, breath sounds, skin texture, body shape and size, and lung compliance. These are matters of physical realism.

Humans also think about reality in a conceptual mode (Dieckmann et al. use Lauken's term "semantic"). The conceptual mode of thinking concerns theory, meaning, concepts, and relationships. The conceptual mode of thinking is well described by the disciplines of linguistics, philosophy, and processes such as diagnostic problem solving, decision-making, and prediction. The conceptual mode involves "if-then" relationships such as, "If there is substantial hemorrhage, then blood pressure will decrease."

The third mode of engaging with reality is emotional and experiential (Dieckmann et al. use Lauken's term "phenomenal"). The emotional and experiential mode relates to the holistic experience of the situation, and to actions and relationships of an emotional kind. The emotional and experiential aspect of the simulation may relate to trainees' feelings of higher or lower activation combined with pleasant or unpleasant feelings.[3]

Expanding our vocabulary regarding realism alone is a helpful advance for the field of health-care simulation. Dieckmann et al., however, also provide a preliminary map of how the three modes of thinking about realism can enhance or inhibit participants' engagement. They note that if the simulation "works," participants experience the simulation in an experientially and emotionally relevant manner and are able to make conceptual sense of the scenario despite its physical differences from a real clinical situation.

What does it mean for the simulation to "work"?

The authors introduce the concept of "as if" to help explain what makes full-field simulations work (procedural simulations have other requirements we will address below). Skillful blending of the three modes of thinking about realism will allow our trainees to "suspend disbelief," or to actively sign up for the "fiction contract" that this is a situation with real relevance for them. A successful scenario is not based on the realism of the simulation itself, but rather the alchemy of participants stepping into their roles, connecting with others in the scenario, and actively linking to their previous social, clinical, and psychological experience. A well-designed scenario gradually "draws people in" such that they are increasingly engaged, and no single element of realism violates their expectations in a way that disrupts the engagement. High emotional engagement, what the theater community calls being "in role," and the psychology community calls "high activation" seems to synergistically enhance engagement with the conceptual and physical aspects of the simulation.

The notion of the fiction contract is an important one for scenario designers to consider. Before the phrase was introduced here, our community used the term "suspending disbelief" to refer to the degree of engagement that trainees were willing to give to the simulated event. The term "suspending disbelief" puts the onus on the participant. But in this article, Dieckmann et al bring the notion of the fiction contract to simulation in healthcare. The reason Dieckmann and colleagues' argument is so appealing is that it implies that engagement in simulation is a contract between the designer and instructor with the learner: each has to do his or her part to make the simulation worthwhile.

The three modes of engaging realism combined with the "as if" concept suggest the following guidelines for designing scenarios that meaningfully engage trainees: High physical fidelity is likely important for developing kinesthetic skills that involve muscle memory. High conceptual fidelity is likely important for developing clinical reasoning and diagnostic problem solving skills. High emotional and experiential fidelity is important for helping people manage complex processes that involve emotion and cognition. Because it often catalyzes autonomic nervous system responses, high emotional and experiential fidelity is a doubled-edged sword.[4] High autonomic activation can, on the one hand, trigger regression to well-learned (potentially unhelpful) responses, interfere with higher-level processing, and constrict situation awareness.[5] On the other edge of the sword, it can stimulate higher-level processing and improvisation, activate pertinent stored knowledge, and anchor important lessons for the future.[6]

It is likely that a single simulation activity triggers more than one mode of thinking. Different simulations address each of the three modes in its own way. The art and science of simulation scenario design is to blend the three skillfully. We offer the following examples to advance the conversation about interactions among the three types of realism:

Teamwork/Crisis Resource Management (CRM) Simulations

The teamwork CRM simulations introduced into anesthesia by David Gaba in the early 1990s rely heavily on emotional and experiential and conceptual realism to engage trainees. Physical fidelity, while important, is secondary. Weak physical fidelity is a problem to the extent that it undermines people's ability to process conceptual reality or bothers them in a way that causes them to disengage from the emotional and experiential mode.

Procedural and Task Simulations

If the goal is to develop kinesthetic awareness and muscle memory, high physical fidelity is desirable. Conceptual and emotional and experiential modes of thinking are secondary. It is important that the conceptual aspects of the simulation do not undermine or contradict expectations generated by the physical task.

Developing Critical Thinking and Clinical Reasoning Skills

Drawing on the evidence that emotional activation influences immediate cognitive processing as well as long-term retention of information, the Gilbert Program in Medical Simulation at Harvard Medical School uses a blend of conceptual and physical fidelity to generate high emotional and experiential engagement among medical students.[7] Students are required to interview, examine, diagnose, and treat a variety of simulator-patients whose physical findings are inherently limited by existing technology. To compensate, a dynamic patient voice provides a clear account of symptoms, and a nearby monitor displays real-time vital signs. When needed, an overhead voice (as a consultant, laboratory technician, etc.) or faculty facilitator provides a clear description of additional physical findings and can guide interpretation of laboratory and imaging studies. Medications can take effect as soon as a student mentions giving them. Instructors allow the patient to deteriorate and recover in a way tailored to each trainee. The result: a simulation that provides strong conceptual realism, and relies heavily on the patient's personality (via voice) and vital signs to engage the trainee experientially and emotionally, without requiring high physical fidelity.

CONCLUSION

We end with some propositions and questions about how nonsimulation elements of the simulation education environment might influence emotional and experiential engagement. To the extent that attending the simulation course costs or benefits the trainee, we believe this influences their willingness to engage. Leadership theory suggests that emotional and experiential engagement is amplified when respected leaders care about the activity. If the dynamic Chief of Emergency Medicine endorses and participates in simulation, his residents are more likely to engage also. Conversely, when the Chief of Intensive Care or Director of Nursing requires faculty to attend simulation courses on their personal time, simulation instructors may face resentment and reluctance to the idea of acting "as if." A number of important questions will need to be explored regarding simulation realism as simulation-based education becomes more ubiquitous. For example, how do we support psychologically safe simulation that allows for emotional and experiential engagement in an environment that uses simulation for assessment? What aspects of realism are most important to create clinically valid scenarios for high-stakes assessment? Would it be possible to determine which aspects of realism are necessary to assess different skills so that fair testing simulations can be developed?

The Dieckmann, Gaba, and Rall article provides a useful theoretical framework for discussing the interaction of realism and fidelity in healthcare simulation. Just as aviation simulations were able to improve aircraft safety by addressing multiple dimensions of fidelity, similarly healthcare simulation that takes account of multiple dimensions of reality may make strides in enhancing patient safety and reducing medical error.

It is likely that simulation fidelity, in all of its forms, will continue to improve regardless of the lexicon we choose or the timeliness of the experimental results aimed at answering the questions posed above. Fortunately for the growth of simulation, a significant truth articulated by Virginia Woolf remains current: "It is far harder to kill a phantom than a reality."[8]

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