



Revista Colombiana de Anestesiología

Colombian Journal of Anesthesiology

www.revcolanest.com.co



Essay

Clinical simulation as a tool to facilitate culture change in healthcare: Practical application of advanced learning theory[☆]



Jose M. Maestre^{a,*}, Jose C. Manuel-Palazuelos^b, Ignacio Del Moral^c, Robert Simon^d

^a MD, PhD, Anesthesiologist, Education Director, Hospital Virtual Valdecilla, Santander, Spain

^b MD, PhD, General Surgeon, Surgical Director, Hospital Virtual Valdecilla, Santander, Spain

^c MD, PhD, Anesthesiologist, Director, Hospital Virtual Valdecilla, Santander, Spain

^d EDD, CPE, Center for Medical Simulation, Massachusetts General Hospital, Harvard Medical School, Boston, USA

ARTICLE INFO

Article history:

Received 19 July 2013

Accepted 28 January 2014

Available online 11 March 2014

Keywords:

Colonoscopy

Anesthesia

Systemic Inflammatory

Response Syndrome

Culture

Patiente

ABSTRACT

Introduction: Healthcare continues to grow in complexity. Numerous publications have confirmed that most adverse events are caused by inherent problems within the processes being used, which implies that reengineering the systems can reduce the incidence of error.

Objective: To understand the value of team education with clinical simulation to promote a systems-oriented, multidisciplinary team-driven, patient-centered approach for optimal patient outcomes.

Methodology: We present several simulation-based strategies as an example on how to cope with changes at the organizational level.

Results: After simulation based training inter-professional teams were able to safely provide sedation for colonoscopy, and to enhance teamwork for early detection and goal-directed treatment of sepsis in the surgical ward.

Conclusion: Clinical simulation provides a safe environment to reorganize care and train professionals to work in teams.

© 2013 Sociedad Colombiana de Anestesiología y Reanimación. Published by Elsevier España, S.L. All rights reserved.

[☆] Please cite this article as: Maestre JM, Manuel-Palazuelos JC, Del Moral I, Simon R. La simulación clínica como herramienta para facilitar el cambio de cultura en las organizaciones de salud: aplicación práctica de la teoría avanzada del aprendizaje. Rev Colomb Anestesiología. 2014;42:124-128.

* Corresponding author at: Hospital virtual Valdecilla, Avda. de Valdecilla s/n, 39008 Santander, Spain. Fax: +34 942 203 853.

E-mail address: jmmaestre@hvvaldecilla.es (J.M. Maestre).

La simulación clínica como herramienta para facilitar el cambio de cultura en las organizaciones de salud: aplicación práctica de la teoría avanzada del aprendizaje

R E S U M E N

Palabras clave:

Colonoscopia
Anestesia
Síndrome de Respuesta
Inflamatoria Sistémica
Cultura
Paciente

Introducción: Las organizaciones sanitarias continúan aumentando su complejidad. La mayoría de efectos adversos son causados por problemas inherentes a los procesos utilizados. **Objetivo:** Comprender el valor del entrenamiento de equipos con simulación para promover un enfoque orientado al sistema, centrado en el paciente y conducido por equipos interprofesionales.

Metodología: Reflexión sobre estrategias de simulación para afrontar cambios organizativos. **Resultados:** Equipos interprofesionales fueron capaces de proporcionar sedación de modo seguro para procedimientos de colonoscopia, y para promover el diagnóstico precoz y el rápido tratamiento de pacientes con sepsis severa.

Conclusión: La simulación clínica proporciona un entorno seguro para reorganizar el cuidado en salud y entrenar profesionales a trabajar en equipo.

© 2013 Sociedad Colombiana de Anestesiología y Reanimación. Publicado por Elsevier España, S.L. Todos los derechos reservados.

System complexity and implications for Quality & Safety Tools

Healthcare continues to grow in complexity. Each decade represents tremendous gains over previous years in terms of medical and technical innovation. With these new capabilities, we can effectively care for patients with more severe diseases than ever before. Advances in diagnostic and therapeutic procedures are time and again incorporated into interprofessional, teamwork environment.

In this context the report of the Institute of Medicine (IOM) "To err is human" revealed that modern healthcare is not as safe as it should be, and reframed medical error as a chronic threat to public health.¹ It was followed by the report of the Quality of Care in America Project, "Crossing the Quality Chasm", which documented deficiencies and large gaps in all healthcare settings, in all age groups and in all geographic areas.²

IOM defines medical errors as the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim. Interestingly, one of the report's main conclusions is that the majority of them do not result from individual recklessness or the actions of a particular group. More commonly, errors are caused by faulty systems, processes, and conditions that lead people to make mistakes or fail to prevent them.

Since then numerous publications have confirmed that most adverse events are caused by inherent (latent) problems within the processes being used, which implies that reengineering the systems can reduce the incidence of error.³

This means that, although medicine has long been viewed as a science, understanding the physiology and treatment of disease is no longer enough. Healthcare today requires a systems-oriented, multidisciplinary team-driven, patient-centered approach for optimal patient outcomes. There is a need to point the focus on changing systems, and stimulate a broad array of stakeholders to engage in patient safety, and motivate hospitals to adopt new safe practices.

In the midst of the constant medical advances, concordant increasing costs, and this suboptimal safety reality, most countries are struggling to contain the costs in an era of rising life expectancy and insatiable demand among patients. Public and private healthcare providers are striving to balance new technology, medicines and systems changes in the organization of healthcare with the challenge of maintaining safe and cost effective care.⁴

Simulation as a tool in safety initiatives: facilitating culture change

Healthcare organizations are beginning to understand the value of effective teaming and as a result, are now providing team education to staff with clinical simulation. Yet a question arises, "why is simulation being used only sporadically within their healthcare systems as a safety and quality improvement tool, when there is overwhelming scientific evidence documenting the value of simulation in high-risk professions, including that of clinical medicine?"

Actions taken for the improvement of efficiency and productivity cannot always be successfully implemented in hospitals. A number of organizational and human factors have been advocated to limit the effect of many methodological approaches taken. Key factors include inadequate or inappropriate leadership, constraints imposed by external stakeholders and professional allegiances, perceived lack of ownership, and subcultural diversity within health care organizations and systems.^{5,6} Change means instability, and is so demanding and stressful. What was the standard once is quickly tossed aside now for some new directive or research result. When a change is contemplated or promoted, there will always be a conflict between those supporting the status quo and those advocating new ideas. Human resistance to change is an understandable barrier. New concepts sometimes clash with clinician's deeply rooted thoughts and emotions about how the social and organizational structure of healthcare works. Human change, whether at the individual or

group level, is a profound psychological dynamic process that involves unlearning without losing one's identity and relearning to restructure one's thoughts, perceptions, feelings, and attitudes.⁷ Health professionals traditionally have to accomplish this adaptation in an environment where there is high degree of risk, uncertainty and workload, in the midst of facing relatively frequent emergencies with vulnerable patients. This environment makes change even more difficult.⁸

Important theoretical foundations

In this context, although many tools have arisen in the processes of healthcare safety and quality reformation, the concepts of such healthcare systems reengineering approaches are recognized.⁹ And simulation has emerged as a training methodology that overcomes many of these barriers and facilitates the process for individuals and teams to change.¹⁰ Simulation complies with the adult experiential learning process theoretical framework grounded in goal-setting, practice, reflection and conceptualization. Learners start with a concrete experience and involve themselves fully, openly, and without bias. Then they reflect upon it and observe it from many perspectives. They make comparisons with existing theories and create concepts that integrate their observations into logically sound theories. Then they actively test these theories and use them to make decisions and solve problems. They are then motivated to undertake new experiences and thereby restart the cycle.^{11,12} Simulation associated with good quality debriefings allows participants surface, analyze and enhance the quality of our mental models. Simulation associated with good debriefing serves as a tool for developing a healthy organizational culture and facilitates professional development; it helps us to maintain the habits that help us and develop new approaches for habits that do not serve our patients well.^{13,14} Simulation provides a safe environment for providers to reflect on their practice and affords the time specifically for that purpose.¹⁵⁻¹⁸ Our experience has shown that simulation-based educational interventions produces long-term changes and significantly reduces complications in a cost-sensitive approach.¹⁹ Change must be clearly mission-driven, and it is best accomplished by combined top-down and bottom-up collaboration.

Practical examples to cope with changes at the organizational level: performance of teams depends on the whole group, and not on individuals

Colonoscopy is more predictably completed and is better tolerated in terms of patient satisfaction when performed with sedation.²⁰ Due to limited anesthesiology resources, sedation is increasingly administered by trained teams of endoscopists and nurses in selected patients ensuring patient comfort and safety.²¹ Simulation has been used to overcome the organizational barriers to establish and train these special teams to work effectively in an interprofessional environment. It has been described that, before team-training, procedures with sedation were only provided by anesthesiologists. After

completing the training, sedation was also provided by the specially trained teams. Only ASA I/II patients were selected. No major complication was evidenced during the procedures and the post-sedation care during the first three months after the training. No additional resources were required to implement sedation in an increased number of patients.²² This is an example of collaborative effort between leadership at all levels of the hospital and the hands-on healthcare providers. Physicians and nurses participating in organizational innovations need a comprehensive framework to understand how to implement and effectively practice their clinical skills.

Interventions that reduce preventable complications such as rapid diagnosis and management of septic patients are critical to successful outcomes in terms of patient welfare and hospital cost.²³ Severe sepsis and septic shock continue to be a major complication in surgical patient care despite the implementation of multifaceted infection prevention and control strategies, such as dissemination of patient care bundles, hand hygiene campaigns, providing status reports or other hospital policies. Because of its complexity, many healthcare providers are involved in diagnosis and treatment of sepsis. Symptoms can easily be misattributed to other conditions, the course varies widely from patient to patient, and there are complex communication and interpersonal interactions in the wards among different medical specialists, nurses and nurse-assistants. Key to success is the cross-functional cooperation of the healthcare professionals. As a consequence, promoting a better teamwork has become an important goal of many organizations. To date, a such training has been primarily addressed focusing only on the members of one discipline and through traditional educational methods. Recently, numerous reports support the effectiveness of high-fidelity simulation-based training for teaching teamwork competencies, transfer of learning to clinical practice, and maintenance of improvements or innovations in practice.²⁴ Multidisciplinary teams undergoing simulation based training were able to reduce the number of patients with sepsis who evolve to septic shock. Times from criteria present in the medical record to initial awareness (first call), from first call to effective response, and to definitive response (e.g. drainage, surgery) were decreased. Alert symptoms and signs were better detected after training. Also the communication pattern evolved from random clinical data to a criteria-based format.²⁵

Summary: changing the world of training in healthcare

Although multiple providers deliver healthcare, processes have historically been structured around the performance of expert, individual practitioners. As a result many organizations have experienced a progressive loss of efficiency and a failure to leverage the expertise of interprofessional teams. Organizations that want to take full advantage themselves of their highly trained professionals are shifting some of their resources to organize patient care, to redefine processes, around teams and training professionals to effectively perform in a team environment.²⁶

In our experience an effective teamwork needs to be understood as the coordination of individual activities for

effective results; not the subordination of the individual to the group. Healthcare professionals have to develop the ability and enthusiasm to work with others. Reorganizing care and training the professionals to work in a team environment appear to be worthwhile investments. What we see emerging in many organizations is that the truly best and most respected practitioners are the ones who are highly skilled in clinical care and as team members.

Simulation-based training can be a central element in the training regimen to help teams practice and reflect on their performance to meet these new demands; demands that required new clinical skills and innovative teamwork approaches. Simulation and debriefing provided a safe container to discuss new concepts, practice technical skills and, more importantly, to develop new mental models that allowed clinicians to make better team-based decisions and effectively use all available resources within the interprofessional team.

Simulation appears to help in making this needed organizational change by helping to shift behaviors and attitudes in people in trying to adopt and embrace the future state of our organization. Simulation and debriefing give personnel a safe environment to cope with change by providing the opportunity to practice and discuss new ways of working together.

Funding

None.

Conflict of interest

The authors have no conflict of interest to declare. Both "Hospital virtual Valdecilla" in Santander, Spain and "Center for Medical Simulation" in Boston, USA have the mission of improving patient safety by means of expert training and development of healthcare professionals.

REFERENCES

1. Committee on Quality of Health Care in America, Institute of Medicine. In: Kohn LT, Corrigan JM, editors. *To err is human: building a safer health system*. Washington, DC: National Academy Press; 2000.
2. Inst Med. *Crossing the quality chasm: a new health system for the 21st century*. Washington, DC: National Academy Press; 2001.
3. Fabri PJ, Zayas-Castro JL. Human error, not communication and systems, underlies surgical complications. *Surgery*. 2008;144:557-65.
4. Maestre JM, Alonso A. Interdisciplinary human simulation. In: Wilson L, Rockstraw L, editors. *Human simulation for nursing and health professions*. New York: Springer Publishing Company; 2011.
5. Scott T, Mannion R, Davies HTO, Marshall MN. Implementing culture change in health care: theory and practice. *Int J Qual Health Care*. 2003;15:111-8.
6. Osorio J, Paredes E. Process re-engineering in public hospitals: re-inventing of the wheel? *Rev Esp Salud Publica*. 2001;75:193-206.
7. Schein EH. Kurt Lewin's change theory in the field and in the classroom: notes toward a model of managed learning [WWW document]; 1995. <http://www.a2zpsychology.com/articles/kurt.lewin's.change.theory.htm> [09.09.04].
8. Reason J. Beyond the organisational accident: the need for "error wisdom" on the frontline. *Qual Saf Health Care*. 2004;c13 Suppl. II:ii28-33.
9. Reid PP, Compton WD, Grossman JH, Fanjiang G, editors. *Building a better delivery system: a new engineering/health care partnership*. Washington, DC: National Academies Press; 2005.
10. Dunn WF, Murphy JG, Ziv A. Re-engineering healthcare via medical simulation tools. *Chest*. 2011;140:840-3.
11. Dunn WF. Education theory: does simulation really fit? In: Dunn WF, editor. *Simulators in critical care and beyond*. Des Plaines, IL: SCCM Press; 2004, 130P.
12. Armstrong E, Parsa-Parsi R. How can physicians' learning styles drive educational planning? *Acad Med*. 2005;80:680-4.
13. Lachman VD, Smith ME, Donnelly GF. Teaching innovation. *Nurs Admin Quart*. 2006;33:205-11.
14. Chen YC. Restructuring the organizational culture of Medical Institutions: a study on a Community Hospital in the I-Lan area. *J Nurs Res*. 2008;16:211-8.
15. Ramírez LJ, Moreno MA, Gardner L, Gómez LM, Calderón M, Sáenz X, et al. Modelo de enseñanza de las habilidades psicomotoras básicas en anestesia para estudiantes de ciencias de la salud: sistematización de una experiencia. *Rev Colomb Anestesiología*. 2008;36:85-92.
16. Ruiz-Parra AI, Angel Müller E, Guevara O. La simulación clínica y el aprendizaje en las tecnologías complementarias para la educación médica. *Rev Fac Med*. 2009;57:67-79.
17. Rincón DA, Navarro JR. Comparación de dos métodos usados para el reconocimiento de arritmias: experimento educativo controlado en estudiantes de medicina. *Rev Colomb Anestesiología*. 2009;37:41-8.
18. Ospina JM, Manrique-Abril FG, Martínez-Martín AF. La formación de médicos generales según los requerimientos del sistema general de seguridad social en salud en Colombia. *Rev Colomb Anestesiología*. 2012;40:124-6.
19. Cohen ER, Feinglass J, Barsuk JH, Barnard C, O'Donnell A, McGaghie WC, et al. Cost savings from reduced catheter-related bloodstream infection after simulation-based education for residents in a medical intensive care unit. *Simul Healthcare*. 2010;5:98-102.
20. Amornyotin S, Prakanrattana U, Kachintorn U, Chalayonnavin W, Kongphlay S. Propofol based sedation does not increase rate of perforation during colonoscopy. *Eur J Anaesthesiol*. 2010;27 Suppl. 1:37.
21. Dumonceau JM, Riphaus A, Aparicio JR, Beilenhoff U, Knappe JTA, Ortmann M. European Society of Gastrointestinal Endoscopy, European Society of Gastroenterology and Endoscopy Nurses and Associates, and the European Society of Anaesthesiology guideline: non-anesthesiologist administration of propofol for GI endoscopy. *Endoscopy*. 2010;42:960-74.
22. Sancho R, Terán A, Maestre JM, editors. Highly realistic simulation as a useful learning tool for non-anesthesiologist sedation skills in gastrointestinal endoscopy. 18th annual conference of the Society in Europe for simulation applied to medicine, SESAM 2012 Safer practices in healthcare. 2012.
23. Zendejas B, Cook DA, Bingener J, Huebner M, Dunn WF, Sarr MG, et al. Simulation-based mastery learning improves patient outcomes in laparoscopic inguinal hernia repair: a randomized controlled trial. *Ann Surg*. 2011;254:502-11.
24. Paige JT, Kozmenko V, Yang T, Gururaja RP, Hilton CW, Cohn I, et al. High-fidelity, simulation-based, interdisciplinary

- operating room team training at the point of care. *Surgery*. 2009;145:138-46.
25. Cagigas C, Manuel-Palazuelos JC, Martínez A, Maestre JM, Ramos E, Gómez-Fleitas M. Sepsis management in the hospital ward after a multidisciplinary simulation training program. In: 17th annual meeting of the Society in Europe for simulation applied to medicine, SESAM 2011. 2011.
26. Maestre JM, Del Moral I. A view at the practical application of simulation in professional education. *Trends Anaesth Crit Care*. 2013;3:146-51.