



Improving Trauma and Acute Critical Care by Applying Tactical Emerging Multi-Organizational Network Logistics in the Kingdom of Saudi Arabia

Abdulrahman Alharthy¹, Fahad Faqih¹, Mohammad Alsenan², Sharfuddin Chowdhury², Ahad Alhassan Al Saud Bin Abdulaziz Al Saud³, Peter G Brindley⁴ and Dimitrios Karakitsos^{1,5*}

¹Department of Critical Care, King Saud Medical City, Riyadh, KSA

²Trauma Unit, King Saud Medical City, Riyadh, KSA

³Department of Emergency, Harvard Medical School, Massachusetts General Hospital, Boston, MA, USA

⁴Department of Critical Care, Alberta Health Services, Edmonton, AL, Canada

⁵Department of Critical Care, Keck School of Medicine, University of Southern California, LA, CA, USA

Abstract

Launching trauma centers requires effective collaboration between various specialties that is influenced by several hurdles and promoters towards complex service development. Emerging Multi-organizational Network (EMON) logistics have been utilized by the military and other organizations in out-of-hospital (field) crisis to enable multidisciplinary team function and effectiveness. We briefly comment on the key logistics of EMON that may serve as a tactical roadmap in evolving trauma and acute/critical care services in the Kingdom of Saudi Arabia. Also, crisis resource management principles and simulation team training are outlined.

Keywords: Emerging multi-organizational network; Trauma and acute critical care; Crisis resource management; Simulation team training

OPEN ACCESS

*Correspondence:

Dimitrios Karakitsos, Department of Critical Care, King Saud Medical City, Riyadh, KSA,

E-mail: karakitsosdimitrios@gmail.com

Received Date: 17 Jun 2020

Accepted Date: 03 Aug 2020

Published Date: 08 Aug 2020

Citation:

Alharthy A, Faqih F, Alsenani M, Chowdhury S, Al Saud Bin Abdulaziz Al Saud AA, Brindley PG, et al. Improving Trauma and Acute Critical Care by Applying Tactical Emerging Multi-Organizational Network Logistics in the Kingdom of Saudi Arabia. *Clin Surg.* 2020; 5: 2900.

Copyright © 2020 Dimitrios

Karakitsos. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abbreviations

KSA: Kingdom of Saudi Arabia; RTAs: Road Traffic Accidents; EMON: Emerging Multi-organizational Network; TTL: Trauma Team Leader; CRM: Crisis Resource Management

Background

The thriving oil sector and the escalation in the living standards have brought many changes to the urban (intra- and inter- city) infrastructure and the road networks in the Kingdom of Saudi Arabia (KSA). These changes along with the increase in the number of vehicles might have at least partially contributed to the spectacular rise of Road Traffic Accidents (RTAs), which are mainly attributed to driver errors, number of injuries and deaths in recent years. RTAs are a well-known socioeconomic burden on the victims and their families as well as to health care providers [1-6]. The annual cost of RTAs to the Kingdom has been estimated to be approximately \$5.6 billion USD reflecting to a loss of 2.2% to 9% of the national income [4-6]. The need for improved trauma and acute care services is clear. Apart from developing efficient prevention strategies and public education, upgrading the infrastructure and operational capabilities of existing trauma centers and acute care services is mandatory. The latter echoes various logistical concerns. Therefore, we are briefly outlining the key logistics of Emerging Multi-Organizational Networks (EMONs), which may serve as a tactical approach in evolving trauma and acute/critical care national services.

Emerging Multi-organizational Networks

Health Care Networks are associated with higher quality care, improved survival and better functional outcomes for severely injured patients [1-3]. Accordingly, many jurisdictions have upgraded their trauma systems/centers in order to integrate clinical leaders, supportive administrators and effective managers. In the KSA, significant progress has been made in identifying gaps between optimal evidence and everyday practice, but issues still exist [4-6]. These include the need to upgrade infrastructure, care delivery pathways, and culture. As per the UK Medical Research Council there is also the need to systematically explore implementation barriers and

enablers [7,8]. EMONs' logistics have been used in business/project management, weather emergencies, civil defense, military operations and in the development of acute care services but have not been adequately validated thus far [9]. Furthermore; we outline how they could theoretically streamline trauma care and acute care medicine. EMON logistics are:

Crisis-driven: Lack of designated trauma teams and acute/critical care services and/or the event of multiple polytrauma patients can exacerbate crises. EMON advises that operations should mimic an umbrella, namely opened to protect against conflicts and to offer mutual aid but closed when the crisis abates and the clinical teams is no longer required. Importantly, this strategy should be cost-effective and ergonomic (Figure 1).

Task oriented: EMON mean creating flexible, task-oriented, multidisciplinary teams, and optimizing workflow. For example, following polytrauma, the Trauma Team Leader (TTL) should form a nimble team that includes access to a neurosurgeon, general surgeon and orthopedic surgeon. These specialties then co-manage the patient as one multidisciplinary team which limits conflicts and redundant communication.

Self-evolving: The case may evolve such that more specialties are needed or transfer is required. This increases the need for common communication protocols, norms of practices, team structures and administrative backup.

Time-sensitive: Clinical emergencies need prompt attention and expeditious action. This can be aided by having clinical information transmitted from the out-of-hospital scene to the emergency room, which in turn allows team to prepare, equipment to be gathered, and tasks to be pre-assigned [1-3].

Composite: Assigning a TTL is also consistent with EMON aspects because it helps coordinate a complex multi-disciplinary team. This should decrease team conflict and work duplication during the crisis. It should also facilitate debriefing afterwards, thereby improving future performance and team cohesion.

Temporary: EMON is active only during the crisis in the same way that an umbrella is only opened when it is raining (Figure 1). Undeniably, the applicability of the aforementioned EMON derived operational logistics on the existing trauma and acute care services of a national health care system remains to be further explored by future simulation studies.

Discussion and Conclusion

The application of theoretical frameworks to inform the development and the evaluation of complex interventions in trauma and acute critical care services may be beneficial [8-10]. Although scarce literature exists, EMONs have been validated in out-of-hospital (field) critical incidents especially regarding war zones, terrorist attacks and urban trauma [11,12]. Notwithstanding, in the aforementioned settings a far more complex spectrum of trauma exists (i.e., nuclear, biological and chemical injuries) compared to the usual polytrauma cases due solely to RTAs. However, the quality of trauma and acute critical care that is delivered should not only embrace the principles defined by the Institute of Medicine, but also Crisis Resource Management (CRM) guidelines [13-15]. The latter could aid national health care systems to adapt to a rapidly changing socioeconomic environment. In many ways, multidisciplinary trauma and acute critical care teams are moving towards the implementation

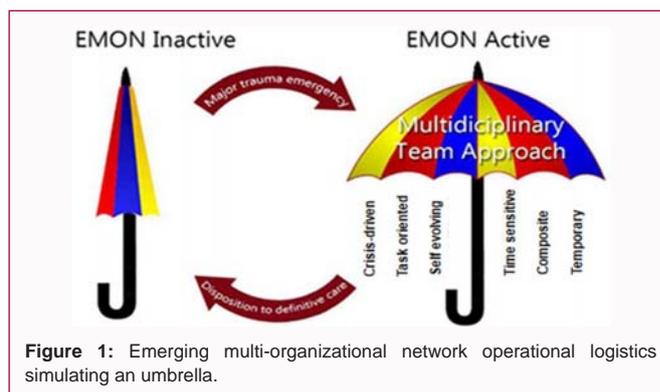


Figure 1: Emerging multi-organizational network operational logistics simulating an umbrella.

of a competence culture. In addition, successful teams display commitment, common goals, performance consistency, and efficient communication as mentioned in CRM principles [16,17]. The integration of CRM principles in the operational framework of trauma and critical care teams may facilitate the communication and the timely distribution of information between their members and reduce overlapping activities optimizing thus the workflow. Also, these principles promote quality control and feedback measures to ensure ongoing standards are maintained, and identified areas of improvement are achieved [13-15]. Multidisciplinary team dynamics may be both complex and direct. EMONs logistics provide flexible and CRM enhancing solutions that may rationalize acute care services in an evolving national health care system [1-6]. The aforementioned solutions mimicking an umbrella (Figure 1) could be interpreted as a safety pin that holds all members of a team together while respecting their private operational space and activities. In that sense, this could further promote team building culture, as well as performance review and improvement. The development of high-level trauma and acute critical care is a multifactorial process. Conversant methodologies to evaluate and improve the level of care, from analysis of performance data, to expert opinion and cultural progress achieved through effective training programs exist. However, effective training through multidisciplinary simulations remains a key method in improving the level of delivered clinical care [17-19]. Concluding, multispecialty care could be facilitated by applying EMONs concepts. It offers not only great potential but also a cost-effective and practical roadmap with which to overcome common barriers, and promote teamwork and evidence-based practice. Simulation research would help further hone and prove its potential.

Authors Contribution

All authors have equally drafted and reviewed the manuscript. The final version of the manuscript was approved by all authors.

Acknowledgment

Part of this manuscript was presented at the 3rd Annual Congress and Medicare Expo on Trauma and Critical Care, March 13-14, 2017 London, UK.

References

- MacKenzie EJ, Rivara FP, Jurkovich GJ, Nathens AB, Frey KP. A national evaluation of the effect of trauma-center care on mortality. *N Engl J Med*. 2006;354:366-78.
- Davenport RA, Tai N, West A, Bouamra O, Aylwin C, Woodford M, et al. A major trauma centre is a specialty hospital not a hospital of specialties. *Br J Surg*. 2010;97(1):109-17.

3. Liberman M, Mulder D, Jurkovich G, Sampalis JS. The association between trauma system and trauma center components and outcome in a mature regionalized trauma system. *Surgery*. 2005;137(6):647-58.
4. Al-Naami MY, Arafah MA, Al-Ibrahim FS. Trauma care systems in Saudi Arabia: An agenda for action. *Ann Saudi Med*. 2010;30(1):50-8.
5. Bener A, Jadaan KS. A perspective on road fatalities in Jeddah Saudi Arabia. *Accid Anal Prev*. 1992;24(2):143-8.
6. Ansari S, Akhdar F, Mandoorah M, Moutaery K. Causes and effects of road traffic accidents in Saudi Arabia. *Public Health*. 2000;114(1):37-9.
7. Roberts N, Lorencatto F, Manson J, Brundage SI, Jansen JO. What helps or hinders the transformation from a major tertiary center to a major trauma center? Identifying barriers and enablers using the Theoretical Domains Framework. *Scand J Trauma Resusc Emerg Med*. 2016;24:30.
8. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M. Developing and evaluating complex interventions: The new Medical Research Council Guidance. *BMJ*. 2008;337:1655.
9. Bunker R, Heal S. Splitting an EMON. *The Tactical Edge*. 2008;1:58-60.
10. Michie S, Prestwich A. Are interventions theory-based? Development of a theory coding scheme. *Health Psych*. 2010;29(1):1-8.
11. Stein M, Hirshberg A. Medical consequences of terrorism. The conventional weapon threat. *Surg Clin North A*. 1999;79(6):1537-52.
12. Jacobs LM, Wade DS, McSwain NE, Butler FK, Fabbri WP, Eastman A, et al. The Hartford Consensus: THREAT, a medical disaster preparedness concept. *J Am College Surg*. 2013;217(5):947-53.
13. Institute of Medicine (IOM). *Performance measurement: Accelerating improvement*. Washington, D.C: National Academy Press; 2005.
14. James R. Human error: Models and management. *BMJ*. 2000;320(7237):768-70.
15. Institute of Medicine (IOM). *Crossing the quality chasm: A new health system for the 21st century*. Washington, D.C: National Academy Press; 2001.
16. Heiskell LE, Carmona RH. Tactical emergency medical services: An emerging subspecialty of emergency medicine. *Ann Emerg Med*. 1994;23(4):778-85.
17. McArdle DQ, Rasumoff D, Kolman J. Integration of emergency medical services and special weapons and tactics teams: The emergence of the tactically trained medic. *Prehospital Disaster Med*. 1991;7(3):285-8.
18. Hunt E, Mininni N, DeVita M. "Simulation training programs for rapid response or medical emergency teams." In: Riley R, editor. *Manual of Simulation in Healthcare*. New York: Oxford UP USA, 2008.
19. Capella J, Smith S, Philp A, Putnam T, Gilbert C, Harvey A, et al. Teamwork training improves the clinical care of trauma patients. *J SurgEduc*. 2010;67(6):439-43.