

Medical Leadership of Emergency Management Systems in Canada: Key Attributes and Competencies

Dr. Denis H.J. Caro

WORKING PAPER
WP.2015.07

August 2015
ISSN 0701-3086

Medical Leadership of Emergency Management Systems in Canada: Key Attributes and Competencies

Denis HJ Caro ^{*1}

^{*}Correspondence: drcaro@uottawa.ca

¹ Professor Denis H.J. Caro, Ph.D. MBA. MHA. CHE. Full Professor Telfer School of Management, University of Ottawa/
Université d' Ottawa, Ottawa, Ontario K1N 6N5 Canada

Abstract

Background: In this 21st century of diverse regional, national and international threats and emergency events, this study explores the unique authentic transformational leadership challenges unique to emergency medical systems. These complex systems respond to a range of critical emergency events, including mass emergencies, disasters and catastrophes and call for medical leadership competencies.

Methods: A qualitative research study based on grounded theory examines the phenomenology of emergency medical systems by deploying triangulation to isolate the particular theoretical underpinnings of authentic transformational leadership models relevant to this domain. Using a key informant approach and a semi-structured confidential questionnaire, the perspectives of 103 emergency leaders of diverse professional backgrounds on the challenges of emergency management systems are presented. The response rate was 83.5 percent from 81 organizations across Canada.

Results: This study underscores the need for authentic transformational leadership and identifies leadership competencies in the domain of emergency medical systems. This qualitative study of diverse emergency system leaders is original in that it has not hitherto been done across Canada nor internationally.

Conclusions: This study underscores the relevance of leadership principles in the extant literature and highlights those that are critical and unique to leaders of emergency medical systems. In so doing, underscores the need for authentic transformation leadership of an order and caliber yet to be fully potentiated to manage future emergency and crisis events in Canada and internationally.

Key words: Emergency medical systems; Key informant study; Medical leadership; Qualitative research.

Background

Emergency medicine is of growing importance as a specialty internationally [1-6]. Moreover, there is an increasing recognition of the importance of emergency medical leadership in diverse areas, such as the critical emergency infrastructures; emergency informatics; emergency preparedness and collaboration emergency response engagement; logistical systems and medical incident command systems [7-18]. The need for such leadership has been highly stressed and emphasized through the creation of professional competency frameworks and skill sets that define appropriate training and credentials regionally, nationally and internationally [19-24]. Emergency medical systems require authentic transformational leadership of an order not yet fully potentiated in Canada. Such systems encompass medical and care processes inherent in three critical events: mass emergencies, disasters and catastrophes. Emergencies are small-scale, common and largely predictable events that are managed with regional resources. Disasters are those that overwhelm regional resources and require multi-regional emergency responses and collaboration. Typically, mortality and morbidity exceed 10 and 100 persons respectively. Catastrophes are extreme disasters that paralyze, or destroy, critical community infrastructures and require multi-regional, national and international responses. The extant literature underscores the critical importance of emergency medical leadership in safeguarding the well-being of individuals and the integrity of communities that remain the core mission of emergency medical systems [25-40].

The extant literature in health care systems underscores the importance of transformational leadership in the quest for greater efficiency, effectiveness and performance excellence [41-50]. Moreover, the literature also stresses the complementary importance of authentic leadership in inspiring and fostering mutual respect, open inter-professional communication, collaborative decision-making all of which motivate a commitment to high quality systems of care [51-55]. Authentic transformational leadership is the backbone of high-performing and highly effective health care systems, as evidenced through quality of care, patient satisfaction, workforce satisfaction, organizational effectiveness, performance and social responsibility [56-57]. Authentic transformational leadership engages and motivates professionals to collaborate in integrating their work horizontally and vertically in emergency medical systems. This leadership is also necessary in bringing about transformational changes within integrated health care delivery systems accountable for the overall positive outcomes that include lower mortality and morbidity rates.

No qualitative research studies on emergency medical systems leadership have been carried out in Canada nor internationally. This is qualitative study that explores the phenomenology of emergency medical leadership, using a grounded theory approach and sought to elicit the perspectives of emergency professionals using a key informant methodology [58-67]. Based on the extant literature, there have been no such studies reported on the perceptions of professionals on emergency leadership challenges in Canada nor internationally. Moreover, this study deploys a triangulation approach, whereby several conceptual leadership and open adaptive complex systems constructs are merged to form the theoretical framework for this key informant study [68-69]. Emergency medical systems are complex adaptive systems that self-organize in response to external environmental stimuli, in the form of small scale, disaster or catastrophic events, all requiring medical intervention [70-77]. Emergency medical systems are in turn composed of five system components, each with specific self-organizing processes, as summarized in Table 1.

Table 1 Emergency medical systems components and processes

Emergency prevention	Emergency preparedness	Emergency medical care	Emergency recovery and rehabilitation	Emergency review and adaptive learning
Issues analysis	Business continuity plans	Care interventions	Community reconstruction	After-action reviews
Primary prevention	Contingency planning	Community responses	Facility care	Comprehensive audits
Risk assessment	Emergency plans	Convergence management	Home care	Hot washes
Scenario analysis	Emergency resources	Diagnosis and treatment	Psychiatric care	Simulations
Secondary prevention	Emergency training	Evacuation	Recovery operations	Virtual education
Stakeholder analysis	Environmental scanning	Incident command centers	Rehabilitation care	
Strategic forecasting	Mitigation planning	Logistics		
	Recovery plans	Information management		
	Response plans	Military command centers		
	Simulation exercises	Primary hospital care		
	Surge capacity planning	Resuscitation/stabilization		
	Threat analysis	Search/rescue operations		
	Vulnerability analysis	Security controls		
		Social media networks		
		Tertiary hospital care		
		Transportation care		
		Triage		

This key informant study points to significant authentic transformational leadership attributes and competencies needed in emergency medical systems.

Methods

The extant leadership literature reports on a competing values framework that suggests the appropriateness of an open systems model of leadership, with its emphasis on external engagement, adaptability, human relations and cohesion in response to emergency events [49]. Both transactional (internal processes) and directive (rational goals) leadership are also relevant and central in emergency medical systems. Moreover, the literature stresses the importance of transformational leadership in organizational effectiveness and change [43]. When merged with adaptive complex and open system models, a theoretical framework emerges that best reflects leadership in the context of emergency medical systems. As shown in Figure 1, authentic transformational leadership mediates between strategic environments (the context of emergency events), value constructs (caring values, visions and compassion), performance effectiveness and the emergency systems (with its self-organizing emergency processes).

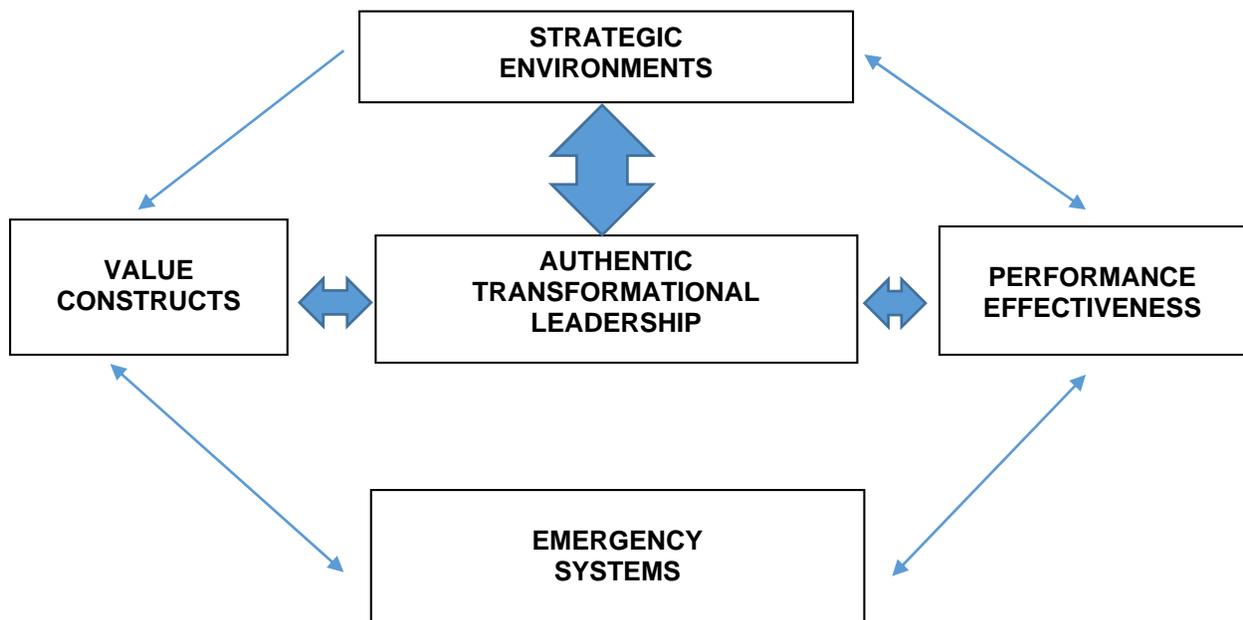


Figure 1: Authentic transformational leadership mediates between strategic environments, value constructs, emergency systems and performance effectiveness.

Emergency medical systems are patient-centric systems that extend well beyond traditional hospital walls to incorporate a diverse range of professional care providers in positive activities focused on reducing mortality and morbidity rates in emergency events. An adaptive systems model of authentic transformational leadership is posited to best approximate emergency medical systems with its focus on, synergistic problem-solving and transformational processes in highly complex, dynamic and uncertain contextual environments. These environments suggest the need for authentic transformational leadership skill sets that emphasize flexibility, vision and foresight, innovation, high-order negotiation and persuasion skills to coalesce and orchestrate the work and performance of diverse stakeholders within a range of organizational coalitions and structures that transcend institutional confines. Such systems require leaders who have regional perspectives of a range of emergency events and forge collaborative networks of diverse care professionals for the benefit of those encumbered by emergency events. Furthermore, authentic transformational leadership requires caring and compassionate values that preserve and uphold health, well-being and communal integrity as crucial.

As in all qualitative studies of human subjects, the study objectives, protocol and research instrument were reviewed, then approved by an institutional research ethics board. Purposive sample size was determined by the six-week response time limit and the study objectives. In addition, chain referral sampling was used whereby professional bodies, such as the Canadian Association of Fire Chiefs, the Canadian Association of Social Workers, the Canadian College of Health Leaders and the Canadian Information Processing Society were points of entry that consented to issue a general invitation to their membership to participate. The key

informant recruitment strategy was voluntary and confidential, as were the responses. Within a six-week limit of the study, professional members were sent a link to a confidential online survey questionnaire in a secure database under the researcher's name with an online cloud-based company. The privacy and confidentiality standards were detailed and each respondent was required to sign an explicit consent statement before proceeding with the questionnaire. Respondents had the option to elect to complete the same questionnaire through a teleconference. There were 26 semi-structured and open-ended questions on perceived leadership attributes and skills, personal emergency experiences, systems performance, future threats, emergency preparedness, technological developments and coalitions.

A total of 103 key informants were sent invitations to participate and complete the research instrument online or, as in seven cases, through a teleconference with the researcher within the six week limit. Seventeen online questionnaires had negligible responses and were dropped from the study. The response rate was 83.5 percent with 86 key informants representing 81 organizations across Canada, including two from the United States. These organizations included: 16 Federal government agencies; 17 Provincial government and regional health authorities; 16 municipal government and first responder units; 14 private sector firms involved with health care; 13 hospital and health care facilities; and five national professional associations. Of the total respondents, 89 percent were senior professionals with ten or more years of experience. Moreover, there were 28 health professionals, 15 government officials, 14 fire and rescue officers, 11 medical care providers, ten military officers, four social workers and four information system professionals— all with relevant emergency management experience. Seven key informants opted to answer the questions by teleconference during which the interviewer made detailed notes of the responses. The interviewer verbally summarized the key points to the interviewee to correct or clarify any points.

The results of all questionnaires were culled, analyzed and summarized into major themes. Through the open-ended online questionnaire format, the key informants espoused, provided and elaborated on textual data descriptions of what they experienced and perceived as leadership challenges in emergency medical systems from their professional perspectives. This open-ended approach evoked responses that were meaningful and particularly salient to each key informant and produced an array of results that were explanatory, textually rich and unanticipated. Consonant with a grounded theory approach, qualitative data was collected with repeated ideas, concepts and elements as tagged codes and part of the substantive coding. Theoretical memoing identified the first concept and continued right through the comparative analytical processes of the text data. The tagged codes were grouped and integrated into concepts and constructs. The theoretical base that emerged was that of authentic transformational leadership operating within an open-system context that was at once adaptive, complex and dynamic. The validity of this approach was underscored by the high degree to which evoked concepts fit with the text data and echoed the concerns the key informants. The emerging concept of authentic transformational leadership showed how problems are resolved and was adaptable in that new data could lead to changes to the model. The results suggested the importance of accountable and caring emergency leadership, adaptive organizational cultures, knowledge management, systems transformation and performance outcomes defined in terms of mortality, morbidity and community integrity.

Results

This qualitative study produced a diverse and rich range of perspectives of key informants on emergency experiences, emergency leadership, emergency preparedness, performance management, perceived threats, private and public sector coalitions and relevant technological developments - all of which were duly tagged, coded and analyzed. Table 2 highlights the salient highlights that emerged from the first stage of theoretical memoing of the key informant perspectives on emergency leadership challenges in the future.

Table 2 Salient highlights of key informant study of leadership of emergency medical systems

Threats and vulnerability analysis

Compounding and escalation of regional, national and international threats
Continuous monitoring and situational awareness of environmental threats
Risk mitigation strategies

Systemic integration of emergency management systems

Community and social recovery
Ecology of emergencies
Emergency medicine
Emergency preparedness
Incident command centers
Interoperability of telecommunication systems
Physical, mental and social rehabilitation processes
Primary and secondary prevention strategies
Professional burnout and post-traumatic stress disorder

Collaborative network communities and coalitions

Cogent and stable collaboration through mutual trust and professional respect
Community group support
Critical role of military command
Engagement of regional, national and international governance organizations
Stakeholder identification and analysis

Equanimity, composure and control in the face of horrors and tragic events

Ambiguity with great uncertainty in the face of fluid situations

Courage and humility
Decisiveness under conditions of informational and sensory overload and stress
Objectivity, while maintaining compassion
Personal integrity
Prior emergency and clinical experiences
Understanding human and socio-political limitations

Performance management

Ability to identify <mudas> (wastages) through <gemba> walks (walking through the frontlines)
Adaptive learning culture
Lean engineering to leverage efficiency
Metrics to assess performance outcomes
Metrics to monitor operational and response efficiencies
Outcome-orientation that focuses on saving lives and reducing morbidities
Performance analysis of emergency management components
Promulgating a culture of continuous learning

Vision of future technological innovations

Autonomic support to complement human perception and understanding
Big data support of unstructured to create meaningful cognitive pictures
Bringing the ER and surgical suite to the field
Change management strategies
Drones monitoring of emergency scenes
Robotic deployments
Ubiquitous embedded sensor and tracking technologies

Coopting and engagement of private sector

Ability to bridge the different paradigms
Collaboration in business continuity, emergency preparedness and recovery planning
Innovation and implementation of information, communication and transportation technologies
Private sector recognition of and actualization of social responsibilities

Through subsequent processes of theoretical memoing, four interrelated significant constructs emerged that point to particular competencies for leadership of emergency medical systems, including: (1) strategic leadership attributes, (2) emergency preparedness, (3) technological coalitions, and (4) performance management. These are presented below with a sample of salient perspectives, as expressed by the key informants.

Strategic leadership attributes

A (recently retired) hospital administrator stated: "We need someone with the qualities of a General Eisenhower, or a General Patton to take command of implementing IT [Information Technology] collaboration. This leader will need legislative authority so that they can deal appropriately with naysayers and foot-draggers. The command and control structure of the military...Nothing short of that will work!"

Key informants confirmed the extant literature by emphasizing the central importance of leadership attributes, including: astuteness; integrity; interpersonal influence; networking ability; personality traits; perspicacity; political skills; social competencies, all of which promote confidence, respect and trust. They also espoused that leaders should have a cogent knowledge and proven expertise in all emergency medical systems, grounded in a solid understanding of the legal and sociopolitical contexts. Cognitive skills, such as strategic and systems thinking in the face of complexity and pressing uncertainty, were also deemed important. Key informants repeatedly stressed the need for emergency medical leadership in forging collaborating networks and coalitions of diverse professionals and community stakeholders through relationships, based on mutual professional respect and trust. Change management, conflict resolution, innovative decision-making and negotiation skills were also highlighted. Highly-developed communication and interpersonal skills were deemed important, as were emotional intelligence and professional competence. Leadership competencies also included analytical abilities and performance management. Also underscored were key leadership attributes such as accountability, discipline, empathy, a high tolerance for stress and uncertainty, personal integrity and professional ethics. Repeatedly, the key informants underscored the importance of adaptability, courage, discipline, equanimity, initiative and tenacity in the heat of battle. Situational awareness and self-awareness of personal limitations, as well as the ability to delegate authority, were also deemed important. Key informants felt that emergency medical leaders had duties and responsibilities to work closely with all levels of governing authorities to encourage cogent, proactive and visible approaches to emergency management. Some key informants believed that leaders had an important responsibility to militate and lobby for pertinent legislation and regulations that would facilitate systems interoperability and effective inter-organizational collaboration and coalitions in emergency management. Some of the key informants were of the view that those with military background had the greatest chance of having the composite range of leadership attributes to be effective in the heat of emergency situations.

Emergency preparedness

A senior military officer in health care responded: "Create a sense of urgency. All parties must understand that it is crucial to recognize, prepare for, plan and understand what faces them."

One provincial government official commented: "It [the local disaster] was beyond anyone's experience and came on unexpectedly and viciously. The organization of communication was a significant challenge. As always, politics came into play and some key leaders were not visible to those having to make decisions at the front line. It seemed the leaders were jockeying for more "air time", than concerned about [emergency] effectiveness. Roles and responsibilities were not clear. We were flying by the seats of our pants. There was no one stepping up to the plate."

Key informants underscored the importance of competencies in risk management and threat analysis. Table 3 summarizes five categories of emergency threat categories and examples. It also highlights the direct front line emergency experiences of 46 key informants, as well as what they perceived to be the major future threat categories in Canada. Here it would appear that emergency leaders view technological, biological and sociogenic threats as the most important source of future emergencies, accounting for over 70 per cent, in Canada. This is followed up by meteorological and topological sources of future threats. The key informants emphasized that identifying and articulating clear and specific threats with probability estimations would be helpful in streamlining effective emergency management strategies.

Table 3 Threat categories, examples, key informant experiences and future threat probabilities

Threat categories	Threat examples	Key informant experiences	Future threat probabilities
Biological	Biological agents and attacks Cardiovascular emergencies Epidemics and pandemics Food /water contamination Food and/or water shortages Immunity to antibiotics Infectious diseases Pandemic Psychiatric disorders Sports injuries and falls Suicidal ideation and behaviors	Cardiovascular emergencies H1N1 epidemic Public venue suicide SARS outbreak Sudden deaths on public venues Suicidal crisis intervention	26%
Meteorological	Blizzards Heat emergencies Hurricanes Ice storms Tornados Wind storms	Hurricane Katrina restoration Tornados in rural Ontario	15%
Sociogenic	Border emergencies Criminal violence Cyberattacks Explosive devices Gang and tribal conflicts Homicides Infrastructural destruction International conflicts Public health system collapse Social unrest and anarchy Terrorist violence Violence Wars	911 command center operations G8 and G10 emergency operations Family homicidal incident Suicide bomber in hospital emergency unit Olympics 2010 emergency preparation War injuries and casualties in Afghanistan Public venue suicide Suicidality	18%

Technological	Airline accidents Conflagrations and firestorms Chemical and gas explosions Electrical grid failures Environmental accidents Facility and plant fires HAZMAT accidents Home and farm accidents Industrial/ workplace accidents Infrastructure collapse Loss of energy, power and water resources Marine accidents and disasters Motor vehicle accidents (MVA) Nuclear accidents Oil and toxic spills Pedestrian accidents Rail accidents Recreational/sports accidents Space accidents Structural accidents Transportation accidents	Plant fire and toxic fumes plume Bicycle/MVA collision Bus accident with pediatric emergencies Bus/semi-tractor trailer collision HAZMAT response to ammonia leak Chemical explosion and conflagration Chemical recycling plant explosion Collapse of public structures Commercial building fire Ferry boat sinking Hospital fires Motorcycle accidents Multi-automobile collisions Oil refinery explosion Pedestrian/automobile collision Pediatric MVA Rail transport collisions Recreational burn accident Residential complex fire Residential house fires Rural All-Terrain Vehicle (ATV) accident Small aircraft crash Swiss Air 111 tragedy Train/pediatric accident Transport truck tumbles off a bridge into a dry river bed	29%
Topological	Droughts and water shortages Earthquakes Catastrophic floods Forest and grassland fires Landslides and sinkholes Sinkholes Space weather (solar flares) Tsunamis	Catastrophic flooding Earthquake disaster Haiti Forest wildfires	12%

Key informants stressed that emergency medical leaders must engage individuals, organizations and communities in emergency preparedness as a social responsibility. This remains the vital core of planning and the praxis of the emergency management. Resilience depends on engaging and creating a social consciousness and motivation to help others. Without effective business continuity, emergency response and recovery plans, individuals, organizations, and communities are far less able to effectively respond, cope and fully recover. Forty-five per cent of respondents reported that updated business continuity, emergency preparedness and disaster recovery plans were in place in their organizations; 33 per cent had one or two of these in place; 21 per cent had none or did not respond. Key informants perceived emergency preparedness as not just the domain of the trained emergency professionals, but central to all who are concerned with the lives and well-being of people and the integrity of organizations and communities. Emergency systems performance ultimately depends upon emergency preparedness and its integration as a social responsibility organizationally, regionally, nationally and internationally. Yet some key informants stressed that even with effective planning and exercising of those plans, actual emergency events have a shock quality to them that can temporarily paralyze proactive responses.

Technological Coalitions

An emergency social worker reflected: "Partnerships and integration of vision and processes between IT professionals and health care staff in emergency rooms, police, paramedics and home care services are the key ingredients to the successful delivery of medical care to patients. IT plays a key support role for linking these services together by assuring clear and effective communication by all parties who are delivering the care to the patient."

A (untimely decedent) hospital CEO stated: "Time!"

The key informants concurred that technological innovations and deployments are crucial in emergency management. From advanced transportation technologies, such as drones and driverless vehicles, to autonomic computers, massive terabyte storage capacities, nanotechnology, robotics and ubiquitous sensor technologies- all will have the potential to save lives and decrease injuries in the future. This optimism was tempered with the realization that the deployment of innovations is and will continue to be diffuse and inexorably slow in the light of sociopolitical and financial realities in Canada. The effectiveness of emergency management systems above all depends on reliable and secure telecommunications between critical organizations that comply with interoperability standards. Key informants stressed that the lack of systems interoperability was one of the single greatest barriers to effective

emergency systems. Moreover, they underscored that these barriers were sociopolitical in nature and not technological ones. Nor were key informants hopeful that coalitions with the private sector would bear fruit and be instrumental in the diffusion of key advanced technologies. Respondents stressed that differences in mission, perceptions and values between the sectors militated against cogent and stable partnerships. However, they did think that cooperation and engagement of the private sector as key stakeholders was deemed important in three critical areas, including: supply chain medical networks, particularly in disaster recovery; joint emergency preparedness efforts; and technological innovations and diffusion.

Performance management

As a national health leader noted: "The health system normally operates at close to 100% capacity and there is little slack, other than reducing elective work to create capacity. A major disaster, serious pandemic or a destabilizing terrorist threat would all have the potential to collapse the system."

A senior provincial government official stated: "The greatest barrier is one of [sectorial] culture. In the private sector, poor performance is not tolerated. In the public sector, poor performance is. Very few were dismissed for poor performance during a [major] epidemic that cost [the city] approximately \$1 billion in lost revenue. If a business in the private sector lost \$1 billion, there would be significant accountability implications."

Performance management is predicated on emergency efficiency (response, transport and discharge rates) and effectiveness (mortality, morbidity, recovery, professional burnout and patient/family satisfaction rates). Most key informants reported that emergency response systems performed as well, or better, than expected, even if there was a 100% mortality rate, due to the catastrophic nature of the emergency event. Two key informants reported that despite excellent emergency response and care provided, professionals suffered from burnout and long-term post-traumatic stress disorder for which there was little recognition of, nor support for. This underscored the importance of emergency professionals who themselves are potential victims in the course of their exercise of their duties and responsibilities. Comments by the key informants also raise the question of cost-effectiveness and over-capacity in normative situations- both of which are central to the issues of performance management in emergency management.

Discussion

This qualitative study based on grounded theory underscored the need for authentic transformational leadership of emergency medical systems. Integral to this leadership are a number of important competencies and skill sets that are specific to this domain. These fall into four categories: (1) shared caring values, vision and compassion, (2) strategic thinking and foresight, (3) strategic engagement and coalitions, and (4) strategic pursuit of performance excellence.

Shared caring values, visions and compassion

A senior emergency planner postulated: "Leading by example from the front means that a visible champion is required with sufficient authority and power to make things happen with and outside their particular sphere of influence. They must wield enough influence to challenge and convince others to follow suit. They must have vision and perseverance."

Emergency medical leaders must have foresight and vision informed by deep compassion. Foresight and a compelling caring vision that inspires and motivates others are hallmarks of emergency medical leaders. Leaders must have an intuitive understanding of the interrelatedness of environments and organizations. The ability to effectively communicate that vision and inspire others to collaborate and integrate emergency efforts is crucial. Deep empathy for others and compassion must inform that vision. Yet at the same time, leaders know and understand human and socio-political behaviour and limitations. Emergency medical leaders have the humility to know that the forces at work may at times be beyond human comprehension and control. Leaders are neither omnipotent nor are they deities. Yet even with that, foresight and vision must still see the day and inspire others in the continuous struggle of not only saving lives, but also increasing the quality of lives.

Strategic thinking and foresight

A senior military health official posited: "The Canadian Forces own the 14th health system that exists in Canada. As we must maintain a pan-Canadian perspective in all we do, I have to define my community as the Canadian Forces geographically located across Canada and throughout the world. Communication of clear concise direction that can be interpreted and applied at a regional level, attention to regionally specific issues and respect and value of the input of multiple health care providers are critical to the success of our system."

Strategic thinking and foresight subsume the need for a systems thinking, proactive precognition skills and astute situation awareness. Strategic thinking and foresight points to the need for emergency medical leaders look beyond the bounds and walls of their institutions and adapt a regional systems approach to the delivery of emergency care. Leadership competencies point to an understanding of the panopoly of emergency organizations, financing, governance and functioning of emergency management systems. Strategic thinking underscores the need for proactive precognition skills. Emergency medical leaders must think of the "unthinkable". Emergencies often incubate silently and mask dangerous warning signals, latent problems and potential failures. Denial of red flags of smoldering crises continues to be one of the greatest challenges in emergency medical and that remain political and psychological by nature. On an individual level, the consequences of denial are shock, disbelief, paralysis, panic and even disregard. On an organizational level, failure to pay attention to warning signals leads to systemic paralysis, reactive responses, chaos and undue delays that often prove disastrous for individuals, organizations and communities. Emergencies challenge set beliefs, expectations, perceptions and

understanding of reality. Emergencies are rarely only visual assaults. They also engage auditory, tactile and olfactory senses that shock and paralyze the psyche. They often challenge the normalized view of ordered entities of reality and convolute them into the unthinkable. Prior experiences with emergencies and high level training remain important as they are instrumental in overcoming the cognitive shock and information overload in actual emergencies. These cognitive skills allows authentic transformational leaders to maintain equanimity and decisiveness in the exercise of their duties and responsibilities to save lives, reduce physical and psychological injuries and maintain organizational and communal integrity.

Strategic foresight subsumes the need for astute situation awareness. Emergency medical leaders must analyze threats and vulnerabilities faced regionally, nationally and internationally. This points to the need for high-order environmental perception and situational awareness of the risks, threats, vulnerabilities and potentially needed resources. Moreover, leaders understand that threats always have the potential to compound and to escalate posing further risks- all of which need to be prepared for. Mitigating risks include: closing socioeconomic gaps; community resilience; emergency preparedness; health promotion; integrating critical emergency infrastructures, medical care and recovery systems regionally, nationally, and internationally; judicious land use planning; and strengthening the public health and safety legislation. None of these happen without the development and exercise of cogent emergency medical leadership skills.

Strategic engagement and coalitions

A senior fire chief stated: "High level emergency public sector managers should take ownership of these [emergency] issues stressing the necessity for such programs. The public is generally complacent about emergency medical and require a trusted individual to get the message out."

An official with blood services management stated: "The lack of integration and standardization of emergency planning between federal, provincial and local government results in higher costs and ongoing difficulty in creating an integrated emergency system at all levels of government."

Strategic engagement includes skills in collaborative networking and the development of coalitions and emergency preparedness. Emergency medical leaders must forge effective collaborative networks and coalitions of diverse stakeholders across a wide spectrum of professionals and communities. The survivability of individuals and viability of organizations and communities ultimately depend on them. Effective collaboration leads to information and resource sharing and systems interoperability that underpin effective emergency responses. The importance of identifying and engaging multiple stakeholders in emergency management through such networks remains paramount. Diverse stakeholders not only include the gamut of emergency professionals and care providers, but also advocacy and community groups, the military, non-governmental organizations and the private sector. Such collaborative engagements are crucial in building understanding, trust and resilience. Effective collaboration requires cogent inter-organizational linkages and coalitions across multiple political and jurisdictional authorities regionally, nationally and internationally.

Strategic pursuit of performance excellence

As an emergency physician pointed out: "Getting the right patient to the right location is important. On occasions air ambulance services will often increase transfer times and the critically ill take longer to contact a receiving physician. A smart system looks at getting patients to where they need to be not just the closest hospital."

A hospital administrator maintained: "Emergency management is essentially a logistics problem and needs to be treated as such. We can learn a lot from airlines and aviation authorities. But none of this will solve the people issues, of course! That needs people working together regularly and getting to know one another, before all hell breaks loose."

Performance excellence points to the need for high-reliability emergency organizations. This underscores the need for competencies in emergency informatics, strategic logistics and systems engineering. The knowledge of emergency informatics, including the development and implementation and management of technological systems in the emergency systems domain. This would include an understanding of telecommunications and the imposing issues of systems interoperability. Emergency medical leaders must leverage innovative technologies to transform emergency medical systems. The potential to transform emergency medical through a panoply of technological innovations that are on the horizon is massive. Such technologies include advanced global communication and tracking systems, autonomic and intelligent systems, big-data storage systems, cloud-computing, driverless vehicles, drone technology, holographic applications, intelligent grid technologies, robotics, sensor nanotechnology, simulation learning systems, telemedicine, tele-surgery, and virtual incident command centers. Emergency leaders must pave the way through transformative changes in emergency medical in collaboration with diverse stakeholders, including those from the private sector. Leaders must be technologically knowledgeable and able to effect positive deployments of innovations through systems and change medical skills and strategies.

Strategic logistics implies the emergency medical leaders must have competencies in logistical planning and strategy formulation to assure effective access to supply chain networks, before they are needed. Deploying critical personnel, resources and supplies in place efficiently, harmoniously and effectively is of paramount importance, particularly in disaster and catastrophic situations. Forging strong linkages with military infrastructures with chains of command together with well-developed and secure transportation networks are key to effective delivery of emergency resources and relief. Moreover, leaders have to assure that logistical plans include access to effective supply chain networks through governance, military, non-governmental and private sector organizations.

Emergency medical leaders must strive to create high reliability organizations in emergency management through the deployment of a range of innovative technologies. Continuous learning and improvement and adaptability are the hallmarks of such organizations that mitigate the impact of, if not prevent, emergencies in environments efficiently and effectively. Creating and sustaining such

organizations remains a challenge in the absence of effective and reliable telecommunications and advanced decision support systems. Systems interoperability is the basis for data and resource sharability between organizations. Inter-regional commonality in information technology standards, policies, processes and procedures strengthens the effectiveness of critical emergency medical infrastructures. Germane to high-reliability organizations is the knowledge of and deployment of systems engineering techniques, such as benchmarking, Kaizen (continuous improvement), lean methodologies, root cause analysis, simulations and total quality medical in the pursuit of greater efficiency and positive outcomes in emergency medical systems.

In summary, authentic leadership implies core competencies that include strategic thinking and precognition skills with core values of caring. Transformational leadership includes the ability to engage communities of professionals and stakeholders to collaborate towards the common vision of performance excellence in emergency management systems. Authentic transformational emergency leadership is essential in reducing the scourges of emergency events from small scale mass emergencies to disasters to catastrophes.

Conclusion

A mental health social worker cited a case of suicidality: "An individual with intent to complete suicide was assessed and taken to the hospital. The hospital refused the patient. The system did not work. Trust and communication were lacking. Professional respect was not in existence. The hospital reacted to its perceived resource shortage and not to the needs of the patient. A community development approach that enlists the professional in the development of the process is needed, rather than having the process presented to them at the time of an emergency. This will require more training and involvement than currently in place."

The universe of emergency medicine is fraught with complex and competing health care priorities and challenges. As with emergency medical leaders must also look beyond the institutions and adapt a systems and regional approach to the delivery of care. Moreover, authentic transformational leadership with its emphasis on guiding transformational change, while maintaining strong caring values is paramount is relevant for emergency physicians. The importance of emergency preparedness, collaborating with regional health authorities and proactively recognizing the potential threats to communities underscore that hospitals must ever be at the ready. Whereas governing authorities assess and the institutional performance, it is the public themselves who will judge medical performance and their leaders come the time of the ultimate test of mass emergencies, disasters or catastrophes. They must not be found wanting. Emergencies never end at the door of emergency departments, but rather when victims, care providers and communities have fully recovered from and emotionally accepted the ordeals experienced. The magnitude and frequency of regional, national and global emergencies, disasters and catastrophes will undoubtedly increase in the face of growing populations exposed to increasing threats in vulnerable environments in the 21st century. Authentic transformational leadership in emergency medical systems will be crucial in the future evolution of effective emergency critical infrastructures nationally and internationally. In the face of financial and resource constraints and given limited political will and public support, effective and sustainable emergency systems will continue to require strong and cogent authentic transformational leadership. In the quest to forge continuous collaboration and integration of emergency medical systems, authentic transformational leadership will be crucial. Moreover, such leadership will be the catalyst that will create integrated virtual organizations through the deployment of advanced technologies that will interoperate regionally, nationally and internationally. Authentic transformational leadership that seeks to harmonize of emergency medical policies and strategies with the regional, national and global governments and communities will actualize this future for the common good.

Limitations

Other invited associations, including the Canadian Association of Chiefs of Police, the Paramedic Chiefs of Canada and the Canadian Nurses Association, did not respond within the given four-week limit. The perspectives of their membership would have been interesting. Nevertheless, the membership in the Canadian College of Health Leaders provided access to diverse public safety and care professionals across the spectrum of emergency medical systems in Canada.

Acknowledgements

The author is deeply appreciative of the time and support of all the participants in this key informant study. He would also like to especially thank the Canadian College of Health Leaders, the Association of Fire Chiefs of Canada, the Association of Social Workers of Canada and the Canadian Information Processing Society for their kind cooperation and assistance.

References

1. Anderson P, Hegedus A, Ohlen G, Holliman CJ, Williams D, Suter R. Worldwide growth of Emergency Medicine as a recognized medical specialty. *Acad Emerg Med* 2011, 18(5):S22-S23.
2. Arbelaez C, Patiño A. State of emergency medicine in Colombia. *Int J Emerg Med* 2015, 8:9. <http://dx.doi.org/10.1186/s12245-015-0057-4>.
3. Hodkinson PW, Wallis LA. Emergency medicine in the developing world: a Delphi study. *Acad Emerg Med*. 2010; 17(7):765-74.
4. Holliman J, Mulligan TM, Suter RE, Cameron P, Wallis L, Anderson PD, Clem K. The efficacy and value of emergency medicine: A supportive literature review. *Int J Emerg Med* 2011, 4:44. <http://dx.doi.org/10.1186/1865-1380-4-44>.
5. Hsia R, Razzak J, Tsa AC, Hirshon JM. Placing emergency care on the global agenda. *Ann Emerg Med* 2010, 56:142-149.
6. Mayglothling JA, Gunnerson KJ, Huang DT. Current practice demographics and trends of critical care trained emergency physicians in the United States. *Acad Emerg Med* 2010, 17:325-329.
7. Amram O, Scuuman N, Hedley N, Hameed SM. A web-based model to support patient-to-hospital allocation in mass casualty incidents. *J Trauma Acute Care Surg*. 2012; 72(5):1323-8.

8. Mbanjumucyo G*, DeVos E, Pulfrey S, Epino HM. State of emergency medicine in Rwanda 2015: An innovative trainee and trainer model. *Int J Emerg Med* 2015; 8:20-23. <http://dx.doi.org/10.1186/s12245-015-0067-2>.
9. Carron P-M, Reigner P, Vallotton L, Clouet J-G, Danzeisen C, Zürcher M et al. Implementation of a medical command and control team in Switzerland. *Disasters* 2014; 38(2):434-50.
10. Donaldson RI, Hasson T, Aziz S, Ansari W, Evans G. The development of civilian emergency medical care during an insurgency: Current status and future outlook in Iraq. *Ann Emerg Med*. 2010; 56(2):172-7.
11. Kruger AJ, Skogvoll E, Castren M, Kurola J, Lossius HM. ScandDoc phase 1a study group: Scandinavian pre-hospital physician-manned emergency medical services—same concept across borders? *Resuscitation* 2010; 81:427-433.
12. Murphy RR. A national initiative in emergency informatics. *Computing Community Consortium* 2010.
13. Norum J, Elsbak TM: Air ambulance services in the Arctic 1999–2009: A Norwegian study. *Int J Emerg Med* 2011; 4:1.
14. Ogedegbe C, Nyirenda T, DelMoro G, Yamin E, Feldman J. Health care workers and disaster preparedness: Barriers to and facilitators of willingness to respond. *Int J Emerg Med* 2012; 5:29. <http://dx.doi.org/10.1186/1865-1380-5-29>.
15. Rashid L, Afzali E, Donaldson R, Lazar P, Bundesmann R, Rashid S. Structured assessment of emergency and acute care providers in Afghanistan during the current conflict. *Int J Emerg Med* 2015; 8:21 <http://dx.doi.org/10.1186/s12245-015-0069-0>.
16. Rauner MS, Scaffhauser-Linzatti MM, Niessner H. Resource planning for ambulance services in mass casualty incidents: A DES-based policy model. *Health Care Manag Sci* 2012; 15(3):254-68.
17. Rimstad R, Sollid SMJ. A retrospective observational study of medical incident command and decision-making in the 2011 Oslo bombing *Int J Emerg Med* 2015; 8:4. <http://dx.doi.org/10.1186/s12245-015-0052-9>.
18. Sollid SJM, Rimstad R, Rehn M, Nakstad AR, Tomlinson AL, Strand T, Heimdal HJ, Nilsen JE, Sandberg M. Oslo government district bombing and Utøya island shooting July 22, 2011: the immediate prehospital emergency medical service response. *Scand J Trauma Resusc Emerg Med* 2012; 20:3. <http://dx.doi.org/10.1186/1757-7241-20-3>.
19. Caro, DHJ. Code red: Towards authentic transformational leadership of emergency management systems. *JHA* 2015; 4(5):1-12. <http://dx.doi.org/10.5430/jha.v4n5p>.
20. Dath D, Chan M-K, Abbott C. *CanMEDS 2015: From manager to leader*. Ottawa: The Royal College of Physicians and Surgeons of Canada; 2015 March: 1-9.
21. Till A, Jones P, McKimm J. Medical leadership and management: An international revolution. *J Health Spec* 2015; 3(3):139-143.
22. Fattah S, Krüger AJ, Andersen JE, Vigerust T, Rehn M. Major incident preparedness and on-site work among Norwegian rescue personnel – a cross-sectional study. *Int J Emerg Med* 2012; 5:40. <http://dx.doi.org/10.1186/1865-1380-5-40>.
23. Fernandez AR, Studnek JR, Margolis GS, Mac Crawford J, Bentley MA, Marcozzi D. Disaster preparedness of nationally certified emergency medical services professionals. *Acad Emerg Med* 2011; 18:403-412.
24. Warren OJ, Carnall R. Medical leadership: Why it's important, what is required, and how we develop it. *Postgrad Med J* 2011; 87:27-32.
25. Cheng SS. Crisis communication failure: A case study of typhoon Morakot. *Asian Soc Sci* 2013; 9(3): 18-32.
26. Eshghi, K, Larson RC. Disasters: Lessons from the past 105 years. *Disaster Prev Manage* 2008; 17(1), 62-82. <http://dx.doi.org/10.1108/09653560810855883>.
27. Henstra D. Evaluating local government emergency management programs: What framework should public managers adopt? *Publ. Admin. Rev* 2010; 70(2): 236-46.
28. Ibrahim MS. An overview on the technological disasters. *Disaster Prev Manage* 2007; 16(3): 380-90. <http://dx.doi.org/10.1108/09653560710758332>.
29. Ilhan AM. The humanitarian relief chain. *SEast Eur J Econ Bus* 2011; 6 (2): 45-54.
30. Kapucu N, Arslan T, Demiroz F. Collaborative emergency management and national emergency management network. *Disaster Prev Manage* 2010; 19(4): 452-68. <http://dx.doi.org/10.1108/09653561011070376>.
31. Kumar S. Managing risks in a relief supply chain in the wake of an adverse event. *OR Insight* 2011; 24(2): 131-57. <http://dx.doi.org/10.1057/ori.2011.4>.
32. McEntire D. Understanding and reducing vulnerability: From the approach of liabilities and capabilities. *Disaster Prev Manage* 2011; 20(3): 294-313. <http://dx.doi.org/10.1108/09653561111141736>.
33. McGuire M, Silvia C. The effect of problem severity, managerial and organizational capacity, and agency structure on intergovernmental collaboration: Evidence from local emergency management. *Publ Admin Rev* 2010; 70(2): 279-88.
34. Shughart WFII. Disaster relief as bad public policy. *Indep Rev* 2011; 15(4): 519-39.
35. Simpson NC, Hancock PG. Fifty years of operational research and emergency response. *J Oper Res Soc* 2009; 60 (05): S126-139. <http://dx.doi.org/10.1057/jors.2009.3>.
36. Van de Vactor JD. Cognizant healthcare logistics management: Ensuring resilience during crisis. *IJDRBE* 2011; 2(3): 245-55. <http://dx.doi.org/10.1108/17595901111167114>.
37. Van De Walle B, Turoff M. Decision support for emergency situations. *ISeB* 2008; 6(3): 295-316. <http://dx.doi.org/10.1007/s10257-008-0087-z>.
38. Xu K, Li W. An ethical stakeholder approach to crisis communication: A case study of Foxconn's 2010 employee suicide crisis. *J Bus Ethics* 2013; 117(2): 371-86. <http://dx.doi.org/10.1007/s10551-012-1522-0>.
39. Ash J, Smallman C. A case study of decision making in emergencies. *Risk Manage* 2010; 12(3):185-207.
40. Van den Heuvel C, Alison L, Crego J. How uncertainty and accountability can derail strategic 'save life' decisions in counter-terrorism simulations: A descriptive model of choice deferral and omission bias. *J Behav Decis Mak* 2012; 25:165-87.
41. Aaron GA. Transformational and transactional leadership: Association with attitudes toward evidence-based practice. *Psychiatr Serv* 2006; 57(8): 1162-1169. <http://dx.doi.org/10.1176/ps.2006.57.8.1162>.
42. Brown TM, Holland J, Bokowy KL, Horblyuk R. "Can transformational programs aimed at improving hospital management, leadership, and productivity systems affect financial performance?" *JHA* 2013; 2(4): 111-119. <http://dx.doi.org/10.5430/jha.v2n4p111>.
43. Burke WW, Litwin GH. A causal model of organizational performance and change. *J Manage* 1992; 18 (3): 523-545. <http://dx.doi.org/10.1177/014920639201800306>.
44. Caro DHJ. Towards systemic sustainable performance of TBI care systems: Emergency leadership frontiers. *Int J Emerg Med* 2010; 3 (4): 357-65. <http://dx.doi.org/10.1007/s12245-010-0252-2>.

45. Coon CD, Bokowy KL, Horblyuk R, Zisman RS, McLeod LD, Brown TM. The development and initial assessment of the strategy and leadership systems capability evaluation survey. *Health Care Manage R* 2012; 31(4):332-41.
46. Goonan KJ, Stoltz PK. Leadership and management principles for outcomes-oriented organizations. *Med Care* 2004; 42(4Suppl):III31-38. PMID: 15026669.
47. Melo RCCP, Neves DS. Leadership and nurses' satisfaction with supervision. *JHA* 2015; 4(4):57-83.
48. Phipps STA, Prieto LC. The influence of personality factors on transformational leadership: Exploring the moderating role of political skill. *JLS* 2011; 6(3):430-447.
49. Quinn R, Rohrbaugh J. A spatial model of effectiveness criteria: towards a competing values approach to organizational analysis. *Manage Sci* 1983; 3(29):363-377. <http://dx.doi.org/10.1287/mnsc.29.3.363>.
50. Wyld, DC. Transformation leadership: When is it redundant? *AMP* 2013 ; 27(2):1-2. <http://dx.doi.org/10.5465/amop.2013.0064>.
51. Avolio BJ, Gardner WL. Authentic leadership development: Getting to the root of positive forms of leadership. *Leadership Quart* 2005; 16: 315-338. <http://dx.doi.org/10.1016/j.leaqua.2005.03.001>.
52. Bommer WH, Rubin RS, Baldwin TT. Setting the stage for effective leadership: Antecedents of transformational leadership behavior. *Leadership Quart* 2004; 15 (2004): 195-210. <http://dx.doi.org/10.1016/j.leaqua.2004.02.012>.
53. Fairchild R, Ferng SF, Zwerner R. Authentic leadership practices informed by a rural hospital study. *JHA* 2015; 4(2): 54- 63. <http://dx.doi.org/10.5430/jha.v4n2p54>.
54. Hayes PAJ, Omodei, MM. Managing emergencies: Key competencies for incident management teams. *Aust N Zeal J Organ Psych* 2011; 4(April 1):1-10. <http://dx.doi.org/10.1375/ajop.4.1.1>.
55. Stock GN, McFadden KL, Gowen CR. Organizational culture, knowledge management, and patient safety in U.S. hospitals. *Qual Manage J* 2010; 17(2): 7-26.
56. Bass BM, Steidlmeier P. Ethics, character and authentic transformational leadership behaviour. *Leadership Quart* 1999; 10(2), 181-217.
57. Hearld, LR, Alexander JA, Fraser I, Jiang HJ. Review: How do hospital organizational structure and processes affect quality of care? : A critical review of research methods. *Med Care Res Rev* 2008; 65(3): 259-299. <http://dx.doi.org/10.1177/1077558707309613>.
58. Beck TE, Plowman DA. Temporary, emergent interorganizational collaboration in unexpected circumstances: A study of the Columbia space shuttle response effort. *Organ Sci* 2014; 25(4):1234-1252.
59. Caro, DHJ. Strategic leadership in emergency management systems. *Optim Online: J Public Sector Manage* 2015; 45(2):30-37.
60. Hede S. Lull after the storm? Municipal leaders reflect on multiple crisis experience. *Disaster Prev Manage* 2011; 20(3):281-293.
61. Nilakant V, Walker B, Van Heugten K, Baird R, De Vries H. Research note: Conceptualising adaptive resilience using grounded theory. *New Zeal J Employment Relat (Online)* 2014; 39(1):79-86.
62. Nilsson S, Sjöberg M, Larsson G. A civil contingencies agency management system for disaster aid: a theoretical model. *Int J Organ Anal* 2010; 18(4):412-429.
63. Seidel S., Urquhart C. On emergence and forcing in information systems grounded theory studies: The case of Strauss and Corbin. *J Info Tech* 2013; 28(3), 237-260. <http://dx.doi.org/10.1057/jit.2013.17>.
64. Sjöberg M, Wallenius C, Larsson G. Leadership in complex, stressful rescue operations. *Disaster Prev Manage* 2011; 20(2):199-212.
65. Di Ruggiero E, Cohen JE, Cole, DC. The politics of agenda setting at the global level: Key informant interviews regarding the International Labour Organization decent work agenda. *Global Health* 2014; 10 (1): 56. <http://dx.doi.org/10.1186/1744-8603-10-56>.
66. Gamboa-Maldonado T, Marshak HH, Sinclair R, Montgomery S, Dyjack D. Building capacity for community disaster preparedness: A call for collaboration between public environmental health and emergency preparedness and response programs. *J Environ Health* 2012; 75(2), 24-9.
67. Morison S, McMullan C. Preparing for the future: Challenges and opportunities for management and leadership skills. *Br Dent J* 2013; 214(1): E2. <http://dx.doi.org/10.1038/sj.bdj.2012.1177>.
68. Halcomb EJ, Andrews S. Triangulation as a method of contemporary nursing research. *Nurs Res* 2005; 13 (2): 71-82.
69. Hussein, A. The use of triangulation in social sciences research: Can qualitative and quantitative methods be combined? *J Comp Soc Work* 2009; 1:1 -12.
70. Anyika, EN. Challenges of implementing sustainable health care delivery in Nigeria under environmental uncertainty *JHA* 2014; 3(6): 113-126. <http://dx.doi.org/10.5430/jha.v3n6p113>.
71. deMattos PC, Miller DM, Park EH. Decision making in trauma centers from the standpoint of complex adaptive systems. *Manage Decis* 2012; 50(9):1549-1569.
72. Deninson DR, Hooijberg R, Quinn R. Paradox and performance: Toward a theory of behavioural complexity in managerial leadership. *Organ Sci* 1995; 6 (5): 524-540. <http://dx.doi.org/10.1287/orsc.6.5.524>.
73. Junior VM, Pascucci L, Murphy JP. Implementing strategies in complex systems: Lessons from Brazilian hospitals. *Braz Admin Rev* 2012; 5(9):19-37.
74. Moerschell L, Lao TM. Igniting the leadership spark: An exploration of decision making and punctuated change. *Emerg: Complexity Organ* 2012; 14(2):54-68.
75. Penprase B, Norris D. What nurse leaders should know about complex adaptive systems theory. *Nurs Leadersh Forum* 2005; 9(3):127-32.
76. Thomas CW, Corso L, Monroe JA, The value of the "system" in public health services and systems research. *Am J Public Health* 2015 04; 105:S147-S149.
77. Zukowski RS. The impact of adaptive capacity on disaster response and recovery: Evidence supporting core community capabilities. *Prehosp Disaster Med* 2014 08; 29(4):380-7.