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Collaborative SCA Survival Project: Cardiac Arrest Survival is a Mess

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Abstract

Systems diagnoses have been effectively used to understand many complex organizational systems within healthcare, government, military, and global corporate enterprises. Systems methodologies have been effectively used to change the direction and improve the outcomes of complex organizational systems. We feel that framing cardiac arrest survival as a systems problem and applying a systems methodology is innovative, practical, and essential if we are to make significant and sustainable impact.

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COLLABORATIVE SCA SURVIVAL PROJECT:
CARDIAC ARREST SURVIVAL IS A MESS[1]

Sudden cardiac arrest (SCA) causes over 300,000 deaths per year in the United States (US), more than breast cancer, lung cancer, and AIDS/HIV combined. In most of the US, a person experiencing a witnessed SCA due to ventricular fibrillation has about a 4% chance of surviving. In King County (Seattle), WA, however, the survival rate is closer to 40%, approximately ten times higher than the national average. What accounts for this difference? Is the 40% survival rate in King County the best that can be expected in a community? Why do more than 95% of those who experience SCA elsewhere not survive? What are all the forces that contribute to SCA survival, how do they interact, and why is so little evidence-based data available? For several months, our research group has been discussing these and similar questions in the Russell L. Ackoff Systems Thinking Library at the University of Pennsylvania. We believe that the current state of SCA survival across the US is a mess.

A "mess" - also called a "wicked problem" - is a management science term that describes a special category of ***complex problem*** characterized by strongly interacting forces that co-produce confusions, conflicts, and failures within large organizations, communities, and environments. A complex organizational problem cannot be solved by standard analytical means, ie, by reducing the problem into a series of smaller parts or sections. Approaches that rely on reduction analysis are not well suited to addressing problems where the key components are people, organizations and professional societies who make choices based on self-interests and how the behavior and interests of others influence them. In other words, examining people or groups as independent elements fails to account for the meanings and behaviors that emerge when they interact. Relationships among stakeholders and other organizational parts of the problem are not static; they undergo continuous changes in technology, economics, society, and the cultural environment. A complex problem can only be understood and rendered nonrecurring, ie, ***dissolved*** rather than merely solved only to recur, by using a systems framework and a systems methodology. We believe that framing SCA survival as a complex organizational problem and applying complex systems strategies from management science is a creative and worthwhile pathway to improve SCA outcomes.

In responding to a cardiac arrest, the traditional "chain of survival" begins when a bystander recognizes the emergency. These events include calling 911, starting CPR, shocking the heart with a defibrillator, providing EMS, and hospital emergency department

care. Indeed, Nichol, Thomas, Callaway, et al[2] noted, “it seems likely that the differences (in survival) reflect, in part, regional differences in the availability of…bystander CPR…lay responder defibrillation programs…EMS factors…or treatments available at receiving hospitals…but, no analysis (has been able to detect) the independent contributions of these factors.” We believe the failure continues because the problem is not analytic so the traditional approach of only trying to improve individual links in the chain of events, ie, the parts, is an inadequate methodology. SCA survival is the kind of complex problem where even significant improvements in one or two parts will not significantly increase survival.

Our approach is different and follows strategies used with complex organizational problems. If bystanders, EMS responders, and healthcare professionals are components of a complex system, we ask how communications including feedback and learning should be coordinated between people before, during and following an emergency. Since in every organizational system, each individual has personal interests that can conflict with job performance, we ask how stress reactions, personality, organization and family culture, and other characteristics and obstructions influence performance and SCA survival. Also, because all organizational systems are influenced by the social, economic, and regulatory environment, we ask how economic and financial forces, technology, politics, and a host of other events affect overall patient survival.

The first step required to understand a complex problem such as SCA survival is to perform a system diagnosis using an iterative and cumulative process of six activities: (1) detect; (2) focus; (3) search; (4) represent systematically; (5) diagnose; and (6) present. We begin by trying to find clues regarding the situation in which the patients exist and to identify the critical characteristics and properties of the system that promote and that interfere with SCA survival. The assumption is that the overall design of the system is critically flawed even if some areas are able to operate successfully. Therefore, finding how and where the organization system is failing, or worse - actually destroying itself - constitutes the formulation. "Finding out" is a heuristic approach in the form of a search process.

The steps of (1) detection, (3) search and (5) diagnosis consist of a series of quantitative and qualitative studies designed to uncover the most significant facts. An attempt is also made to describe (4) the systemic view of the current state, including the elements and their interactions. These systemic characteristics can then be summarized (in

stage 6) in the form of a "rich picture," "perception of present situation" or "picture of the current reality." The investigative focus is on the root causes rather than on the symptoms produced by these root causes. The entire current state and its processes can be represented by the use of models and diagrams which show the relationships among the elements to allow one to see and understand how and why the people, groups, and events in the entire system operate both successfully and unsuccessfully. A diagnosis representing the system within the United States that we select for study can be completed in 9 –12 months.

The systems diagnoses that we have been performing for over 50 years have been effectively used to understand complex organizational systems within healthcare, government, education, and global corporate enterprises. Once understood, systems methodologies have been effectively used to change the direction, redesign, and to realign interests, and to improve outcomes. Indeed, these methods are currently being used in "the most ambitious, comprehensive and intentionally funded national initiative to improve healthcare quality in the world… the transformation of the English National Health Service (NHS)."[3]

We feel that applying this organizational systems approach to SCA survival is innovative, practical, and essential if we are to make significant and sustainable impact on patient outcomes. In order to carry out the systems diagnosis for this project, funding is required. Organizations open to discussion about financial support – whether in part or the whole – are encouraged to contact us.

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