

Innovation in emergency medicine; a perspective from a low middle income country, Pakistan

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Abstract

Creativity and innovation are essential life skills in the 21st century. These skills are even more important in the healthcare sector of a resource limited country like Pakistan. The acquisition and implementation of innovation is necessary in the field of emergency medicine in Pakistan to troubleshoot challenges like rising emergency room visits while facing lack of resources. This article highlights the need of innovation in the field of emergency medicine and some of the activities that took place in our local context to bring innovation to the surface.

Keywords: Creativity, Healthcare, Hackathon, Innovation, Low Middle Income Countries, Medical Innovation, Emergency Medicine.

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In today's world, creativity and innovation are an essential part of almost every aspect of life. From art to health care, creativity and innovation play an integral role. Even in our everyday lives, we employ creative and innovative measures to trouble shoot different hindrances.

Unfortunately, no single agreed-upon definition for creativity exists. The more commonly advocated description claims creativity is "to come up with something novel and useful". Innovation, on the other hand, has been clearly defined as "something new, or perceived new by the population experiencing innovation that has the potential to drive change and redefine healthcare's economic and/or social potential."¹ Creativity and innovation usually go hand in hand and we believe that creativity is considered to be the process of developing or coming up with an end product, which is ultimately labeled as "innovation."

In a low — middle income country like Pakistan, quality health care is a scarcity. With a population exceeding the 200 million,² health care faces one of its biggest

challenges with limited resources. This, in turn, is responsible for lack of primary health care, EMS (Emergency Medical Services and Transport), maternal and neonatal health, poor nursing and rehabilitation services, as well as fragile and low quality tertiary healthcare. Additionally, financial constraints are a major hurdle to tackle the rising burden of emergencies in Pakistan. Importing technology from developing countries is not economically feasible.³ In this situation, innovation becomes a need of the hour. This not only includes cost effective new advances, but also, older innovations that could be adapted to be made more accessible and easily implementable in countries such as Pakistan. Quantitatively, a study by Brody et al. revealed that Emergency Department (ED) visits increased by nearly twice the expected rate; based on population growth estimates, between 1997 and 2007, in the United States of America.⁴ Interestingly enough, EDs in Pakistan have also observed a similar exponential rise in visits quoting up to 70,000 emergencies per year in Pakistan, indicating that the burden of healthcare has been on the rise.⁵

The process of innovation in emergency medicine starts from where we are and takes us to where we may want to be. In terms of scientific literature, leadership, team work, culture and demand have been identified as the main ingredients of innovation.⁶⁻⁸ The emphasis is on "how to think", as opposed to conventional "what to think". Using data imaginatively, critically and creatively could potentially liberate us from tunnel vision of today, and allow us to envision a utopic emergency health care setting. Development and effective implementation of creativity and innovation in the current emergency care systems in Pakistan could potentially enable resolution of some, if not all, problems that emergency medicine specifically and overall healthcare system generally face in this country.

Realizing this need, a medical and nursing student-based group at the Aga Khan University was formed. This group, officially titled Critical Creative Innovative Forum (or CCIT), has been involved in promoting innovation, creativity and entrepreneurship. Housed in a large quaternary care teaching hospital in Karachi, a

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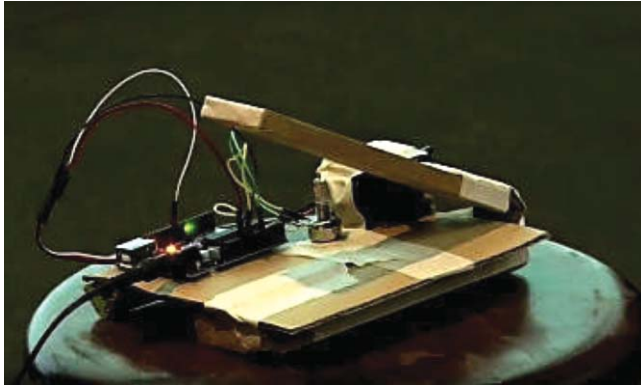


Figure: A prototype of "Low cost automated bagging system" for patients who are intubated and need mechanical ventilation.

metropolitan city home to more than sixteen million people of Pakistan,² the CCIT forum has been involved in organizing multiple innovative events in an attempt to facilitate growth of emergency medicine, along with promoting innovation in other medical and surgical disciplines.

One example of such events organized by CCIT are Hackathons; these are integrative events, typically lasting several days, where people collaboratively "hack" towards achieving viable solutions to existing problems through either a disruptive or a non-disruptive innovation.³ Health Hackathons have not only gained significant attention as a source of global innovation but also have become annual features in resource limited settings like India and Uganda to address health discrepancies by developing cost effective medical technologies that could deliver high quality health in an affordable and sustainable way.^{3,9} An Emergency Medicine themed Hackathon was organized by CCIT at the Aga Khan University in August 2016.¹⁰ Eleven teams developed products that were then showcased on the final day. The winning ideas included a low cost mechanical device to ventilate patients with respiratory distress/arrest in case of non-availability of mechanical ventilators (Figure), an electronic medical card with an accessible medical record to any ED and an intuitive patient jacket with ECG ports sewn into it. Similarly the latest Paediatric Medicine themed Hackathon (*Hackpeds*) came up with some very innovative Emergency Medicine relevant ideas like "Smart-ER" a mobile- app that helps the parents decide if their child needs immediate emergency care. Similarly ideas like "Stealth" and "Nap Cuff" worked around developing vital signs monitoring instruments, which are both accurate and child friendly in the ED.¹¹

CCIT has also organized multiple "Ignite" sessions that are auto-timed, 5-minutes fast paced presentations. Ideas like creating a satellite emergency response system, training community by-standers (bystanders are usually lay persons near a victim of cardiac arrest) in Cardiopulmonary Resuscitation (CPR), and a mobile phone application for children with respiratory distress are some of the innovative ideas pertinent to emergency medicine, which have developed through these events.

Having established a small pool of innovative ideas, CCIT now aims to develop and sustain the concept of a healthcare startup incubator in the upcoming future.

These activities endorsed the concept that bringing innovation and creativity especially in the current emergency healthcare system in Pakistan might become the first step in finding solutions to some if not all challenges that traditional emergency healthcare systems are facing in this country today.

Creativity is not what you see but the way you see things. It's all about converting challenges or problems into questions and finding answers for them and bringing this culture in any healthcare system could revolutionize the system as a whole especially in a third world country like Pakistan.

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References

1. Weberg D. Innovation in Healthcare: A Concept Analysis. *Nurs Adm Q.* 2009; 33:227-37.
2. Pakistan Bureau of Statistics, Government of Pakistan. Provisional Summary Results of 6th Population and Housing Census. 2017. [Online] [Cited 2020 March 03]. Available from: http://pbs.gov.pk/sites/default/files//DISTRICT_WISE_CENSUS_RESULT_S_CENSUS_2017.pdf
3. Farooqi W, Subhani F, Mian A. Pediatrics innovation in Pakistan: our experience and a call to action. *Arch Dis Child.* 2017; 102:963-7.
4. Brody A, Murphy E, Flack J, Levy P. Primary Care in the Emergency Department – An Untapped Resource for Public Health Research and Innovation. *West Indian Med J.* 2014; 63:234-7.
5. Mir M, Bachani AM, Khawaja H, Afridi S, Ali S, Khan M, et al. The Pakistan National Emergency Department Surveillance Study (Pak-NEDS): Introducing a pilot surveillance. *BMC Emerg Med.* 2015; 15:S1.
6. Untershuetz C, Hughes P, Nienhauser D, Weberg D, Jackson L. Caring for innovation and caring for the innovator. *Nurs Adm Q.* 2008; 32:133-44.
7. Porter-O'Grady T, Malloch M. Quantum Leadership. In: Porter-O'Grady T, Malloch M, eds. *A Textbook of New Leadership.* 2nd

- ed. Sudbury, MA: Jones and Bartlett, 2007; pp 57-79.
8. Berkun S. The Myths of Innovation. Paris, France: O'Reilly, 2007.
 9. Mantzavinou A, Ranger BJ, Gudapakkam S, Broach H, Bailey E, Olson KR. Health Hackathons Drive Affordable Medical Technology Innovation Through Community Engagement. In: Hostettler S, Najih B, Bolay JC, eds. Technologies for Development. UNESCO: Springer Cham, 2016; pp 87-95.
 10. Berger E. Karachi hackathon takes on emergency medicine challenges. *Ann Emerg Med.* 2017; 69: A17-20.
 11. Madhani S, Farooqi W, Mian A. Stimulating innovation through the hackathon concept in paediatrics: our experience at the Aga Khan University. *Arch Dis Child.* 2017; 102:994.
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