

Digitization in the Emergency Department: Delivering on the promise of Big Data Analytics

Christian LOVIS^{a,b}, Franco APRA^c, Catherine CHRONAKI^{d,b}, Simon de
LUSIGNAN^{e,b}, Lembit PIRN^f, Anne MOEN^{g,b}
^a*University Hospitals of Geneva*, ^b*European Federation of Medical Informatics*
^c*European Society for Emergency Medicine*
^d*HL7 Foundation, Belgium*
^e*University of Surrey, UK*
^f*Health and Welfare Information Systems Center, Estonia*
^g*University of Oslo, Norway*

Abstract. Big Data Analytics promise dramatic quality, efficiency, and safety improvements in the Emergency Department (ED). The digital transformation of the ED is challenged by socio-technical issues such as technological maturity, interoperability, and digital health literacy of the workforce. This panel, organized in collaboration with the European Society of Emergency Medicine (EUSEM) aims to address the role of big data analytics in the digitization of the ED as an opportunity for collaboration and synergies with the European Federation of Medical Informatics.

Keywords. Digital health, big data, predictive analytics

Topic of the Panel

The environment of the emergency department is challenging and every second counts. Having the right information at the right time and in the right form is critical to making correct decisions, as in cases of trauma, acute myocardial infarction, suspected cerebral hemorrhage, or other conditions. Big data analytics in their different forms promise enhanced decision making and management of resources, i.e. safer care delivered timely in a harsh environment.

Indeed, the emergency department is characterized by high decision density, decision fatigue, throughput pressure, wide range of illnesses, diagnostic uncertainty, narrow time windows, interruptions and distractions, including shift work/sleep disruption. The cognitive decline at the end of a shift has been reported at 30% [1]. Thus, errors in judgement are quite frequent in radiology 5%, in missed injuries 12%, cardiovascular conditions 19%, and respiratory problems 30%, for an average of 16% [2,3]. As Dr. Pat Croskerry, noted in Emergency London, “*It’s not about what we know, it’s about how we think!*”

While digital health technology seems promising, most emergency departments do not use advanced technologies and big data in an effective way. There are some

outstanding best practices however, like eAmbulance service of Estonia [4] that reports impressive results from the use of big data analytics.

One of the most difficult challenge in managing ER's is the difficulty to predict workload, thus contributing to high costs in resources while the waiting list usually is little affected. One of the hopes of a dense ecosystem, of Apps and data, associated with participatory approaches of patients and citizens, is to improve the capacity to predict the workload of ERs [5,6].

The panelists will express their views on critical factors and accelerators of digitization in the Emergency Department their position statements. They will debate the question “*Can a synergy between the European Society of Emergency Medicine (EUSEM) and the European Federation of Medical Informatics (EFMI) help accelerate adoption and diffusion of innovation through education and certification? What are the next steps to make that happen?*”

The audience will be invited to ask questions and offer ideas, in the 30 minutes of discussion, which will be assisted with interactive means.

Bios of the Panelists

- **Christian Lovis** is the president of EFMI. Christian Lovis is professor of clinical informatics at the University of Geneva and leads the Division of Medical Information Sciences at the Geneva University Hospitals. He is a medical doctor trained in Internal Medicine with special emphasis on emergency medicine and holds a FHM in Internal Medicine and is graduated in public health from the University of Washington, Seattle, USA, with a mention in community-based health. Christian is the author of a large number of peer-reviewed papers in the field of medical informatics focusing on three pillars: a) Medical semantics, knowledge representation and natural language processing; b) Clinical information systems, architectures, strategy, secondary usage of data for clinical research and c) advanced human-machine interfaces and their evaluation and impacts, human factors.
- **Catherine Chronaki** is there institutional officer of EFMI (2016-2018) and secretary general at the HL7 Foundation. She has contributed in the design, implementation, and evaluation of emergency systems.
- **Professor Simon de Lusignan** general practitioner, professor of primary care and clinical informatics, head of the department of clinical and experimental medicine at university of Surrey, is director of the Royal College of general practitioners research and surveillance centre, member of the BCS Health and Care executive and the UK national representative to EFMI, and the Publications Officer on the EFMI Board
- **Franco Aprà** is with the city of Torino, director of the Medical department ex ASL TO2 and Director of the S.C. Acceptance and Emergency Medicine and Surgery 1 Maria Vittoria Hospital, Head of S.S. Critical Area of the Hospital San Giovanni Bosco in Torino. Franco will reflect on the limitations of studies to evaluate ED activities, describe ED situations or to assess interventions to change them. He will present an evaluation system of ED activities using data from electronic data base, which aims to build an on-line instrument to assess

continuously the ED activity. Information from this system may help change the ED practice and organization, to improve ED performance.

- **Lembit Pirn** is project manager at the Health and Welfare Information Systems Center, Estonia, responsible for the eAmbulance system. Different roles in big information systems development and implementation. Lembit has been involved in medical information systems development since 1992. He participated in national e-health projects as analyst and architect (medical Digital Images, Security Analysis, data warehouse solutions etc.) and developing HL7 standards for national EMR. He has long-term experience in projects such as eDiagnostics, ePrescription, HIS, Estonian EMR, PACS and Estonian Medical ImageBank, RIS of North Estonia Medical Centre.
- **Anne Moen** is RN, PhD, FACMI is professor at the Institute for health and society, Department of Nursing Science, and the director of UiO:eColab. She is adjunct professor at University of Wisconsin-Madison, WI and the University College of South east Norway. Her research activities combine in-depth insights in healthcare with design and deployment of accessible, user-empowering ICT-solutions. She served as President of the European Federation for Medical Informatics (EFMI) 2014 - 2016, and is the current regional EFMI – IMIA Vice President (2016 – 2018). She is member of EU eHealth Stakeholder Group (2016 – 2019), and task leader of subarea “Citizen - Health Data”.

2. Expected Outcome

The panel will be organized as a sequence of brief 5’ minute position statements followed by questions. Then, there will be a second round of comments and interaction with audience. In the closing, key results of the panel will be summarized, and next steps in the collaboration between EUSEM and EFMI will be identified.

References

- [1] Croskerry P. Clinical Decision Making and Diagnostic Error. Emergency London 2014 <https://www.youtube.com/watch?v=GFE6D5460oE>
- [2] Croskerry P. Clinical Decision Making. In: Barach PR, Jacobs JP, Laussen PC, Lipshultz SE (eds). Pediatric and Congenital Cardiac Disease: Outcomes Analysis, Quality Improvement, and Patient Safety. Springer 2014.
- [3] Perry SJ, Wears RL, Croskerry P, Shapiro MJ. Process Improvement and Patient Safety. In Marx J, Hockberger R, Walls R, (Eds.) Rosen’s Emergency Medicine: Concepts and Clinical Practice (8th ed.) 2013; Philadelphia: Elsevier Mosby.
- [4] Lai T, Habicht T, Kahur K, et al. Health systems in Transition, Estonia, Vol. 15 No. 6 2013, European Observatory on Health Systems and Policies.
- [5] <https://www.fondationhubertuor.org/en/projects/infokids-an-interactive-dynamic-application/>
- [6] <https://www.youtube.com/watch?v=y2ZZ7UNGzPc> (in French only)