: How can data-based decision support facilitate digital transformation of Healthcare?

by Daniel J. Power

and Ciara Heavin

Disentangling the Gordian Knot associated with Digital Transformation of Healthcare remains challenging and seemingly intractable. Healthcare organizations seem to be lagging behind digital transformation first mover organizations, but recent increases in expenditures for digital technologies in healthcare organizations is changing how services are provided in many countries. Information technologists and systems designers have offered some creative ideas related to personal health records (PHR) and electronic health records (EHR), to healthcare analytics, and to decision support and artificial intelligence, but healthcare is yet to be transformed. Rather IT professionals and healthcare managers have been digitizing existing healthcare processes, i.e., "paving the cow paths". This approach is inadequate. Digital transformation requires 1) a reexamination of processes in terms of need, efficiency, and effectiveness, 2) a data-based decision making perspective and culture, 3) a "smarter", "better" set of integrated information technologies, and 4) education and training for key stakeholders, i.e. healthcare professionals, patients, and administrators.

What is a Health information systems (HIS)? The Pacific Health Information Network defines Health information systems (HIS) as "any system that captures, stores, manages or transmits information related to the health of individuals or the activities of organisations that work within the health sector." According to Janczewski and Xinli Shi (2002) HIS Includes all the elements that facilitate the capture, storage, processing, communication, security, and presentation of computer-based patient record information. While other researchers characterise a HIS as “a comprehensive, integrated information system designed to manage the administrative, financial and clinical aspects of a hospital which encompasses paper-based information processing as well as computerised data processing” (Ismail et al., 2010, p.16).

Healthcare First (https://www.healthcarefirst.com), a software and services company for home health and hospice agencies, identifies many different types of healthcare information systems, including:

1) Operational and tactical systems for easy classification of information,

2) Clinical and administrative systems for managing patient details on an administrative level,

3) Subject and task based systems such as Electronic Medical Records (EMRs) or Electronic Health Records (EHRs) or Patient Health Records (PHR), and

4) Financial systems for tracking revenue and managing billing submissions.

In addition to these four types of Health Information Systems, there are many technologies that should be improved and integrated as part of healthcare digital transformation. Some additional well-known and widely used digital technologies in healthcare include: 1) Clinical Decision Support System (CDSS), 2) Computerised Physician Order Entry (CPOE), 3) Critical Test Result Management (CTRM), 4) ePrescription systems (eRx), 5) Medical and Patient Scheduling Software (MPSS), 6) Picture Archiving and Communication System (PACS), 7) Patient Portals (PP), 8) Real Time Location System (RTLS), and 9) Telehealth/Telemedicine (TH/TM) systems.

Combined with analytics and decision support, these disparate system can be integrated to provide a comprehensive software solution, cf., www.healthcarefirst.com/blog/4-types-healthcare-information-systems/. Moving towards the digital transformation of healthcare enables a unified view of individual patient health, care pathways, and an opportunity to leverage “big health data”. Thus providing data-based decision support to medical experts and healthcare professionals in areas such as individual patient health, population health and wellness, and the delivery of healthcare services. Data-based decision support and decision-making will ultimately transform healthcare.

Agarwal et al. (2010) argued "As the United States expends extraordinary efforts toward the digitization of its health-care system, and as policy makers across the globe look to information technology (IT) as a means of making health-care systems safer, more affordable, and more accessible, a rare and remarkable opportunity has emerged for the information systems research community to leverage its in-depth knowledge to both advance theory and influence practice and policy. Although health IT (HIT) has tremendous potential to improve quality and reduce costs in healthcare, significant challenges need to be overcome to fully realize this potential." Ten years of effort and billions of dollars invested in HIT have not transformed health care. In the United States, healthcare remains an expanded and more expensive version of the system circa 2009.

According to Haux (2006) "Comparing the world in 1984 and in 2004, we have to recognize that we imperceptibly, stepwise arrived at a new world. HIS have become one of the most challenging and promising fields of research, education and practice for medical informatics, with significant benefits to medicine and health care in general." The "new world" of HIS/HIT in 2019 is much different, with genomics, new digital devices, and lots of data. In some ways the HIT of 2019 has the potential of creating a "brave new world" of artificial intelligence (AI) diagnostics, robotic processes, and continuous patient monitoring.

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Digital technologies support more distributed healthcare in remote clinics and in the home of a patient. The modern hospital is adapting with decentralization and the addition of remote specialized outpatient surgeries and clinics. A hospital is no longer the primary, only or basic place of care for the sick. Hospitals are becoming centers for acute care, for performing complex procedures, and for medical innovation and discovery, A modern hospital is the digital hub for patient care and a focal point for the education and training of healthcare professionals.

Key benefits of Healthcare Analytics and Cloud storage and processing include rapid sharing of data, faster data aggregation and information creation, more metadata and greater transparency of information origins, timely emergency/preventive care, greater ease in managing a growing volume of data, and cost efficiencies.

At the heart of digital transformation in healthcare is deciding upon what processes and services should be digitized first. This overriding question can be resolved when healthcare professionals and managers agree on a list of priorities, formalize how they should work together to achieve them, and then make data-based decisions. Decision makers may quickly reject and throw away some technology solutions, keeping or modifying others. Managers need to continually evaluate success and failure and know when new is better than existing. Technology "waste" is part of the excitement of rapid technology change. Gathering data, getting facts, and data-based decision support provides the means for digital transformation of healthcare and the improvement of patient outcomes. Incremental, goal-directed improvement decisions can lead to digital transformation.

References and Bibliography

Aarts, J., Ash, J., & Berg, M. (2007). Extending the understanding of computerized physician order entry: implications for professional collaboration, workflow and quality of care. International journal of medical informatics, 76, S4-S13

Agarwal, R., G. Gao, C. DesRoches, A. K. Jha, "Research Commentary---The Digital Transformation of Healthcare: Current Status and the Road Ahead," Information Systems Research, Volume 21 Issue 4, December 2010 , Pages 796-809 doi>10.1287/isre.1100.0327

Byrne, C. M., Mercincavage, L. M., Pan, E. C., Vincent, A. G., Johnston, D. S., & Middleton, B. (2010). The value from investments in health information technology at the US Department of Veterans Affairs. Health Affairs, 29(4), 629-638.

Cartwright, C., Wade, R., & Shaw, K. (2011). The Impact of Telehealth and Telecare on Clients of the Transition Care Program (TCP): Southern Cross University-Aged Services Learning & Research Collaboration. Available at: http://www.cartwrightconsultingaustralia.com.au/library/The%20Impact%20of%20Telehealth%20and%20Telecare%20on%20Clients%20of%20the%20Transition%20Care%20Program%20Report%20-%20May%202011.pdf [accessed on 02/03/2016]

Choplin, R., (1992). Picture archiving and communication systems: an overview. Radiographics January 1992 12:127-129.

Cusack, C. M. (2008). Electronic health records and electronic prescribing: promise and pitfalls. Obstetrics and gynecology clinics of North America, 35(1), 63-79.
Duncan, T. (2015). An Examination of Physician Resistance Related to Electronic Medical Records Adoption.

Dykstra, R. H., Ash, J. S., Campbell, E., Sittig, D. F., Guappone, K., Carpenter, J., . . . McMullen, C. (2009). Persistent paper: the myth of “going paperless”. Paper presented at the AMIA Annual Symposium Proceedings.

Emont, S. (2011). Measuring the impact of patient portals. California Healthcare Foundation, 1-20.

Haux, R., "Hospital information systems—Past, present, future,"
International Journal of Medical Informatics, Volume 75, Issues 3–4, March–April 2006, Pages 282-299 https://doi.org/10.1016/j.ijmedinf.2005.08.002

Ismail A., Jamil A., Fareed AR., Abu Bakar JM., Saad NM., Saadi H (2010). The implementation of hospital information system (HIS) in tertiary hospitals in Malaysia: A qualitative study. Malaysian Journal of Public Health Medicine, Vol. 10(2):16-24.

Kilbridge, P., Gladysheva, K., Foundation, C. H., & Group, F. C. (2001). E-prescribing: California HealthCare Foundation.

Janczewski, L. and F. Xinli Shi (2002). Development of Information Security Baselines for Healthcare Information Systems in New Zealand. Computers & Security, 21(2), 172-192.

Lobach, D., Sanders, G. D., Bright, T. J., Wong, A., Dhurjati, R., Bristow, E., Hasselblad, V. (2012). Enabling health care decisionmaking through clinical decision support and knowledge management.

MedicExchange (2015). Available at: http://www.medicexchange.com/health-it.html [accessed 02/03/2016]

Musen, M.A., Shahar, Y., Shortliffe, E.H.(2001) Clinical Decision Support Systems. In: Shortliffe EH, Perreault LE, Wiederhold G, Fagan LM, editors. Medical Informatics. Computer Applications in Health Care and Biomedicine. 2 ed: Springer-Verlag; 2001. p. 573-609.

O'Connor, Y. and Heavin. C. (2019). Defining and Characterizing the Landscape of E-Health, Advanced Methodologies and Technologies in Medicine and Healthcare, IGI Global, p.377-390.

Pacific Health Information Network http://phinnetwork.org/resources/health-information-systems-his/

Richards, R. J., Prybutok, V. R., & Ryan, S. D. (2012). Electronic medical records: tools for competitive advantage. International Journal of Quality and Service Sciences, 4(2), 120-136.

Sorensen, L., Shaw, R., & Casey, E. (2009). Patient portals: survey of nursing informaticists. Connecting Health and Humans. Proceedings of Nursing Informatics 2009.

Strickland, N. H. (2000). PACS (picture archiving and communication systems): filmless radiology. Archives of Disease in Childhood, 83(1), 82-86.
Thrall, J. H., & Boland, G. (1998). Telemedicine in practice. Paper presented at the Seminars in nuclear medicine.

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