VRHealthLeaders

IO1 Report

Erasmus+ Programme

2014-2020

Key Action 2: Strategic Partnership

A Multifaceted VR Learning Platform for Future Healthcare Leaders (2021-2023)

Agreement N° 2020-1-CY01-KA226-HE-082726

IO1 Background and Curriculum Report

October 2021

VR Health Leaders
International Network for Health Workforce Education
PROLEPSIS INSTITUTE
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Introduction

Project Overview

The VRHealthLeaders project uses virtual reality to increase the leadership capabilities of future healthcare managers and policy makers using public health crises as the key theme of the training programme. A key premise of the project is that digital solutions have the potential to radically transform education. Using virtual reality as a primary tool for leadership training can improve healthcare systems by broadening the experiences of healthcare leaders thus providing better outcomes, services and quality to patients across the EU. Virtual reality simulation offers educators the chance to provide students with experiential learning that would otherwise be unavailable to them. Health professionals are dealing with constant changes to both the systems they work in and the patients they serve. Equipping the health workforce with the skills to deal with this change is of pressing importance for educators, researchers, and policy makers.

The project will:

- develop a multifaceted toolkit to support healthcare educators teach leadership to healthcare professionals across Europe;
- test and implement innovative virtual reality practices in healthcare leadership education;
- develop a leadership curriculum that can be used for online, blended and distance teaching and learning;
- develop a 'train the trainers' e-learning platform that supports teachers and trainers in adapting their leadership courses to online and distance learning;
- test, evaluate and peer review the toolkit in multiple EU countries.

Intellectual Output 1

The intellectual output has developed a number of scenarios which make up the simulated aspects of the Leadership Academy toolkit (IO5). The scenarios are crucial for building the training materials that form part of the simulated experience. Background research has been undertaken to select six scenarios that provide the necessary situation for healthcare professionals to test their leadership skills. The scenarios have been chosen for their ability to:

- practice and develop communication skills required of leaders in public services;
- evaluate the decision-making process and critique methods in making decisions;
- analyse the need for prioritisation of tasks;
- understand the requirements of system and multi-disciplinary working as a mechanism to achieve a common purpose;
- practice delivering and defending the actions taken at a global press briefing.

Background Research

Methodology

The project consortium used a mixed methodology approach to ensure sufficient academic research and grey literature supported the development of a comprehensive training curriculum to support healthcare educators increase the leadership capabilities of future healthcare managers and policy makers during global health crises. The consortium used their extensive professional knowledge along with a modification of Booth's (2013) triple plus search strategy to conduct a scoping review. A scoping review method was used to explore literature sources in relation to the aim outlined above. This method has become an increasingly popular approach for identifying and collating research evidence in a specific field of interest (Pham et al, 2014; Sucharew and Macaluso, 2019). It is suited to examining both the breadth and depth of literature available in terms of volume, nature and characteristics in order to present a narrative or descriptive overview (as outlined below). It has become an increasingly common approach for mapping broad topics (Arksey and O'Malley, 2005) and while it does not seek to evaluate the quality of studies or research findings, it does follow the principles of systematic reviews in that reviews should be robust and sufficiently detailed (Arksey and O'Malley, 2005; Grant, 2009; Munn et al, 2018). The review found a total of 55 suitable publications with the findings outlined below.

Findings

The research findings from the scoping review broadly identified two key areas. Firstly, the subject matter or competency areas which should form part of the curriculum and, secondly, the method of training suitable to deliver the curriculum.

This project will use virtual reality and other media sources as tools to create a curriculum that increases leadership capabilities in future healthcare practitioners. This is often referred to as situated learning which requires the integration of familiar **context** that is easily recognised by the learner (McGrath et al, 2017). It is important that such context is provided within the boundaries of participants' professional discipline, personal expertise, and within a relevant healthcare setting (Motola et al 2013). The absence of such contextual information within a training scenario impacts the accuracy of learning outcomes (Salas et al, 2013). Sørensen et al (2015) explain further that "the rationale behind this idea on the authenticity of simulation is the assumption that the closer the learning context is to the context of practice, the better the learning". Furthermore, situativity theory argues that knowledge, thinking and learning are situated in the specific context and experience of the learner.

A common theme identified within public health emergency literature was the initial management of such emergencies. Numerous articles identified the need for **control room** training and outlined the various leadership skills required for personal effectiveness in complex environments (Vilkinas & Cartan, 2001). A hospital emergency control room is certainly a complex environment containing communications channels and other systems needed for accurately implementing fast decisions. These could include, but are not limited to, the following: management information systems, data charts, communication hotlines, and news on television screens (Kausar et al, 2017). One training simulation by Hopkins & Jennings (2021) used national pandemic prediction models and identified the need to increase inpatient bed capacity threefold. This required students undertaking the simulation to identify space, refit rooms for patient occupancy, procure beds, and acquire needed equipment and supplies within a control room setting. During a pandemic it is imperative to reduce in-hospital transmission as much as possible. Shen et al, (2020) state that their experience suggests "that prompt actions should be taken immediately to decrease or eliminate potential in-hospital transmission".

Hospital control rooms would play a vital role in identifying and managing such actions. This information would then be communicated to the appropriate resource bases resulting in their implementation (Hawe et al, 2015).

Healthcare leaders' skill gaps were also uncovered during the background research task. Throughout the Covid-19 pandemic healthcare practitioners and leaders are using both traditional and non-traditional **media** to relay communication to the wider public. In the wake of this pandemic, we have witnessed a massive infodemic with the public being bombarded with vast quantities of information, much of which is not scientifically correct (Naeem & Bhatti, 2020). Communication and media training are often missing from health leadership education. However, timely and credible health information is critical for improving public health outcomes (McNabb, 2009) while the general public regard mass media as their main source of information on health issues (Chapman et al, 2017). Additionally, non-traditional and social media have become increasingly common sources of public information during pandemics. Online misinformation regarding COVID-19 has undermined public health efforts to control the novel coronavirus (Chou et al, 2021). There are many factors driving misinformation sharing and acceptance in the context of the COVID-19 pandemic, such as emotions, distrust, cognitive biases, racism, and xenophobia. These factors both make individuals more vulnerable to certain types of misinformation and also make them impervious to future correction attempts (Chou et al, 2021). How to address these issues in both traditional and social media is the source of intense debate and as there is yet no consensus on the complexities of ensuring healthcare professionalism and communication in the digital age (Mayer et al, 2012).

A key area of competency for healthcare leaders is **operational management**. Healthcare leaders can come from any profession and often have to navigate multi- or interprofessional wards where staff can sometimes work in silos. There is a need for healthcare managers and leaders to amalgamate the skills and knowledge of medical, nursing, and public health practitioners (Negandhi et al, 2015) while also dealing with operational issues and needing to find solutions to complex logistical problems. The management of patients must be at the centre of healthcare systems; to optimise patient management the monitoring of patients, staff, and medical facilities forms a central function of healthcare management (Moore & Sharma, 2013). There are also workforce issues that must be dealt with which can be especially pertinent in a pandemic. For example, the COVID-19 pandemic has placed considerable strain on healthcare workers showing high rates of stress and mental health problems (Giordano et al, 2021). It has also created increased workload demands (While & Clark, 2021) caused by burnout and staff isolation. Actions are needed to mitigate the impacts of pandemics by protecting and promoting the psychological wellbeing of healthcare workers (Blake et al, 2020 and Dincer & Inangil, 2021 and Murat et al, 2020). Organisations such as the Kings Fund (2020) have created content on managing oneself, working with others and learning from experiences to help mitigate burnout, stress and other associated issues.

During pandemics collaboration between multiple health and non-healthcare related organisations is important to ensure sufficient public health coverage for the wider population**. Inter-organisational** collaboration is increasingly prominent within contemporary healthcare systems (Aunger et al, 2021). Schou (2021) outlines that when the COVID-19 pandemic began, health leaders had to rethink operations and priorities, both internally and externally with community leaders and organizations. Hospitals had to respond quickly and effectively to ensure the availability of healthcare systems, processes and professionals to care for ill patients (Walker et al, 2021). Inter-organisational meetings and networks are important to increase healthcare system capacity, meet the needs of specific vulnerable populations, increasing equity in testing access, and expanding public health analytics and research capacity (Sadasivaiah et al, 2021). Negandhi et al (2015) identified interdisciplinary

leadership competencies as “self-awareness, vision, self-regulation, motivation, decisiveness, integrity, interpersonal communication skills, strategic planning, team building, innovation, and being an effective change agent”. Such competencies are usually required during inter-organisational network meetings where competing interests are at play for each organisational representative present. Meanwhile, amid the global COVID-19 pandemic, adaptation of healthcare systems, with strong medical leadership, has been integral to coping with the ever-changing situation (Warraich et al, 2021).

Lastly, in the context of virus induced pandemics, **vaccine hesitancy** is a growing and threatening trend. It is increasing the risk of disease outbreaks and potentially defeating health authorities' strategies (Stahl et al, 2016). The rapid pace of vaccine development, misinformation in popular and social media, the polarized socio-political environment, and the inherent complexities of large-scale vaccination efforts may undermine vaccination confidence and increase complacency about COVID-19 vaccination (Rutten et al, 2020). Overall, healthcare leaders need more support to manage the quickly evolving vaccine environment as well as changing public perception (Paterson et al, 2016 and Dror et al, 2020). Dubé et al’s (2013) conceptual model of Vaccine Hesitancy is the seminal framework for understanding the underlying causes of vaccine hesitancy:

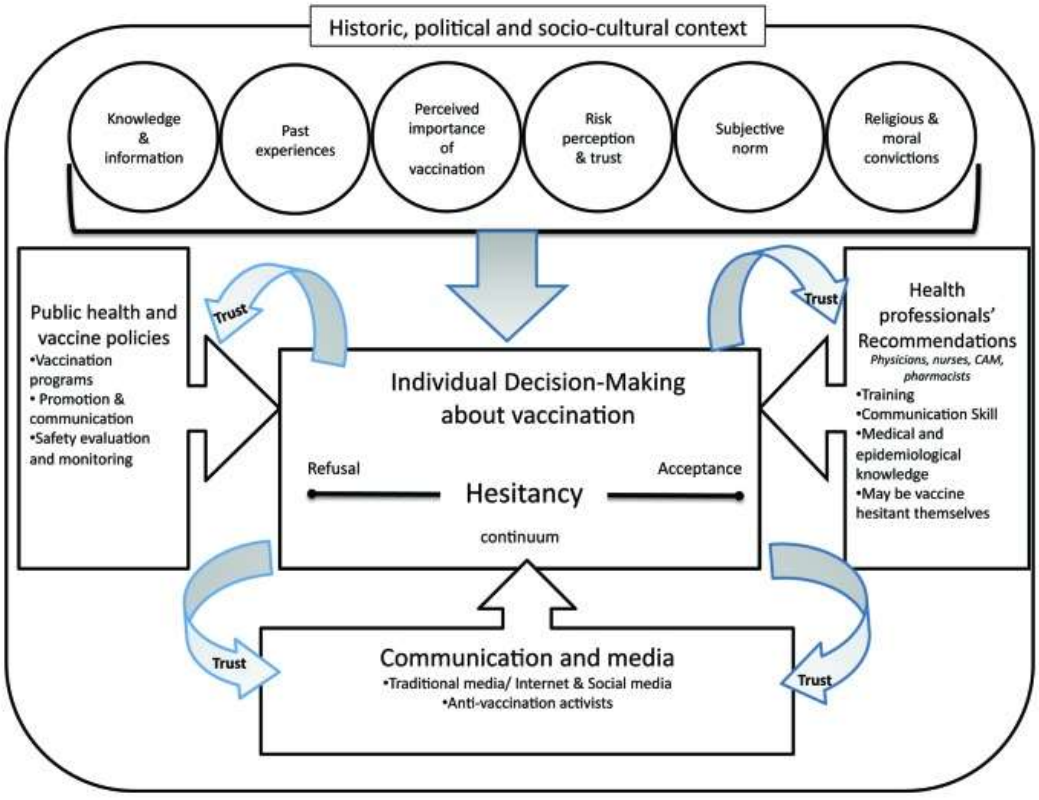

Figure 1: Vaccine hesitancy model by Dubé et al (2013)

The literature also identified methods of how to develop a curriculum for the VRhealthLeaders project. The project will use **screen-based simulation** where the graphics, sound, and navigation emphasize the 3D nature of the environment to enhance learning outcomes (McGrath et al, 2017). **Virtual reality** is one of many applications to increase the efficacy of screen-based simulation. VR offers benefits for learners and educators, delivering cost-effective, repeatable, standardised training on demand. A large body of evidence supports VR simulation in all industries, including healthcare, and it is a powerful educational tool for defined learning objectives and implementation that is growing

worldwide (Pottle, 2019). Additionally, **gamification** of education is increasing in use for health care training and assessment (McGrath et al, 2017) due to its interactive nature.

Conclusion

The background research literature review identified a number of necessary components for teaching healthcare leadership to future health professionals within the context of a major public health incident or pandemic. The most recent Covid-19 pandemic provided much of the current material and provided valuable recent experience which provides context for the learner. Other learning areas should be focused on data gathering within control rooms, media training, operational management on the hospital ward, inter-organisational cooperation and vaccine hesitancy. Finally, the curriculum will be designed around the foundations of screen-based simulation, virtual reality and gamification.

Curriculum Development

Developmental Approach

To develop the VRHealthLeader project the flow of development was used as outlined in Figure 2.

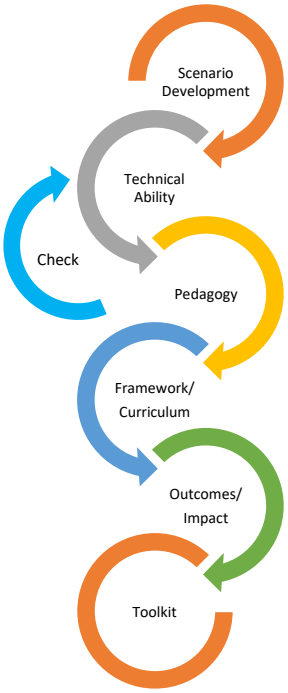

Figure 2: Conceptual framework of the project development

Competencies

The following competencies of learners are to be assessed throughout the curriculum:

- Communication
- Assertiveness
- Emotional Resilience
- Conflict Resolution
- Teamwork
- Emotional Values
- Decision-Making
- Leadership

Leadership Dimensions

The pedagogical approach to leadership dimensions and qualities correspond to the Healthcare Leadership Domains developed by Storey and Holti (2013). These domains include:

- Inspiring shared purpose
- Leading with care
- Evaluating information
- Connecting our service
- Sharing the vision
- Engaging the team
- Holding to account
- Developing capability
- Influencing for results

Curriculum and Teaching Content

Scenario	Description	Competencies	Leadership Domains	Technology*
S1 Context / Scene Setting	This scenario sets the scene for the following five scenarios. From a pedagogical point of view it is important to provide students with context of the curriculum, the tasks that are involved, and the situational circumstances that this simulation is recreating. The scenario starts from the point-of-view (POV) of someone in their own home. They receive a text on their mobile phone which tells them to switch on the TV. The video plays TV news footage of an emerging pandemic caused by an unknown virus. Further information is provided via a pop-up window. The pop-up window explains what role the student is playing in the simulation (e.g. healthcare leader in a large teaching hospital with responsibility on an emergency planning board). The scenario ends with a phone call from the hospital CEO asking all senior leadership staff to attend the emergency control room at the hospital.	N/A	N/A	*Interactive 360 Photo (with embedded video)*
S2 Emergency Control Room	In this scenario students experience the pressures of an emergency control room. All hospitals and public services have such control rooms which are used in high level emergencies to provide a space for leadership during public health incidents. This stage of the simulation is used as an 'initiation module' where all information pertaining to the crisis is shown to the learner. For example, data on the incident is provided on the computer monitors, on papers left on the desk and via simulated workers within the room. This data must be collected, collated and understood by the student in a time sensitive manner and the student is provided with some conflicting information which needs to be checked in later scenarios. The simulation is concluded by a test on the data provided, enabling the educator to assess whether the student has gathered all available data and is able to think critically and strategically about possible next steps.	*Communication, Conflict Resolution*	*Evaluating Information*	*Computer Generated VR Simulation*

S3 Media	Meeting the media is important for any healthcare leader. It is often not something that healthcare practitioners who have moved into leadership roles have experienced or received training on. The scenario takes place via a Zoom style news conference. With multiple news correspondents asking challenging questions of the student. The questions have a link with and to the data that students have been presented with (via the control room simulation) before the scenario. The scenario uses a branching video aspect to add interactivity e.g. multiple choice questions after each news correspondent asks a question. The response to each question/answer triggers further questions/follow ups. A 'public satisfaction' and 'political satisfaction' score based on the student's response to questions will be given at the end.	*Leadership, Assertiveness, Communication, Decision Making*	*Inspiring shared purpose, Engaging the team, Influencing for results, Sharing the vision*	*Branching Video*
S4 Hospital Ward	Healthcare leaders have to work closely with healthcare practitioners to effectively make decisions that support healthcare professionals in dealing with patients. This 360 degree simulation encourages students to engage with practitioners to better understand the needs of the patient, professionals and ward in general. The student moves around the room and speaks with health professionals, the professionals will provide information and answer questions. A score is provided at the end of the simulation which will show the student if the asked the appropriate questions and provide feedback on their responses and decision making.	*Emotional Resilience, Conflict Resolution, Decision Making, Leadership*	*Inspiring shared purpose, Evaluating information, Developing capability, Engaging the team, Leading with Care*	*360 VR Simulation*
S5 Inter-Organisational Policy Meeting	A regional policy meeting is called with representatives from other organisations present. The relevant authorities (local councils etc) along with other health providers (ambulance service, care homes etc) attend the meeting which is chaired by the student. Issues such as policy, health workforce, planning and forecasting and inter-organisational cooperation etc, are on the agenda and discussed. Instead of a test, the views of current healthcare professionals in leadership positions as provided as to how they would handle such a meeting. This gives students real world examples of the difficulties of such meetings and ensures that all organisations work well together in the future.	*Leadership, Teamwork, Decision Making, Conflict Resolution*	*Sharing the vision, Inspiring shared purpose, Influencing for results, Connecting our service, Holding to account, Leading with Care*	*Branching Video*

S6 Vaccine Hesitancy	A number of interviews with members of the public who display signs of vaccine hesitancy are shown to the student. After each interview extra information will be provided and students are asked to identify the correct policy implementation which would enable them to reduce or eliminate the risk of vaccine hesitancy in such demographics. The policy implementations is aimed at micro, meso, and macro levels (e.g. one-on-one consultation, hospital level and country wide). A conceptual model of Vaccine Hesitancy (above) has been used to show interviews that highlight the importance of the following contexts: knowledge & information, past experiences, perceived importance of vaccination, risk perception, subjective norms, religious & cultural beliefs.	*Ethical Values, Decision Making*	*Influencing for results, Connecting our service, Holding to account, Leading with Care*	*Interactive Video*

*Further information on each technology used can be found in Appendix A

References

Aunger, J.A., Millar, R., Greenhalgh, J. et al. Why do some inter-organisational collaborations in healthcare work when others do not? A realist review. Syst Rev 10, 82 (2021)

Blake H, Bermingham F, Johnson G, Tabner A. Mitigating the Psychological Impact of COVID-19 on Healthcare Workers: A Digital Learning Package. International Journal of Environmental Research and Public Health. 2020; 17(9):2997

Brand SL, Thompson Coon J, Fleming LE, Carroll L, Bethel A, Wyatt K (2017) Whole-system approaches to improving the health and wellbeing of healthcare workers: A systematic review. PLoS ONE 12(12)

Chapman, B. Shankar, R. Palmer, J. & Laugharne, R. Mental health professionals and media professionals: a survey of attitudes towards one another, Journal of Mental Health, 2017 26:5, 464-470

Clements C, Barsamian J, Burnham N, Cruz C, Darcy AMG, Duphiney L, FitzGerald J, Holland S, Joyce C, DeSanto-Madeya S. Supporting Frontline Staff During the COVID-19 Pandemic. Am J Nurs. 2021 Sep 1;121(9):46-55

Chou WS, Gaysynsky A, Vanderpool RC. The COVID-19 Misinfodemic: Moving Beyond Fact-Checking. Health Educ Behav. 2021 Feb;48(1):9-13.

Dincer B, Inangil D. The effect of Emotional Freedom Techniques on nurses' stress, anxiety, and burnout levels during the COVID-19 pandemic: A randomized controlled trial. Explore (NY). 2021 Mar-Apr;17(2):109-114. doi: 10.1016/j.explore.2020.11.012. Epub 2020 Dec 3

Dubé, E. Laberge, C. Guay, M. Bramadat, P. Roy, R & Bettinger, B. Vaccine hesitancy, Human Vaccines & Immunotherapeutics, 2013 9:8, 1763-1773,

Dror AA, Eisenbach N, Taiber S, Morozov NG, Mizrachi M, Zigron A, Srouji S, Sela E. Vaccine hesitancy: the next challenge in the fight against COVID-19. Eur J Epidemiol. 2020 Aug;35(8):775-779.

Fisak, J. Turner, B. Shepard, K. Convoy, S. Care, B., a Peer-to-Peer Intervention: A Pilot Quality Improvement Project to Decrease Occupational Stress Among an Overseas Military Population, Military Medicine, Volume 185, Issue 9-10, September-October 2020, Pages e1428–e1434

Folkman AK, Tveit B, Sverdrup S. Leadership in interprofessional collaboration in health care. J Multidiscip Healthc. 2019 Jan 30;12:97-107

Finney Rutten LJ, Zhu X, Leppin AL, Ridgeway JL, Swift MD, Griffin JM, St Sauver JL, Virk A, Jacobson RM. Evidence-Based Strategies for Clinical Organizations to Address COVID-19 Vaccine Hesitancy. Mayo Clin Proc. 2021 Mar;96(3):699-707

Glenn I. Haw, E. Graham, B. Coates, D. Duncan, T. Wilson, R. Crouch, S., Agent-based simulation of emergency response to plan the allocation of resources for a hypothetical two-site major incident

Engineering Applications of Artificial Intelligence, Volume 46, Part B, November 2015, Pages 336-345

Gerada C. Reflections on leadership during the Covid pandemic. Postgrad Med. 2021 Sep;133(7):717-720

Giordano, F., Cipolla, A., & Ungar, M. (2021). Building resilience for healthcare professionals working in an Italian red zone during the COVID-19 outbreak: A pilot study. Stress and Health, 1– 15

Hopkinson, S. and Jennings, B., Nurse Leader Expertise for Pandemic Management: Highlighting the Essentials, Military Medicine, Volume 186, Issue Supplement 2, September-October 2021, Pages 9–14

Kaplan, B.G., Connor, A., Ferranti, E.P., Holmes, L. and Spencer, L. (2012), Use of an Emergency Preparedness Disaster Simulation With Undergraduate Nursing Students. Public Health Nursing, 29: 44-51

Kai Shu, Deepak Mahudeswaran, Suhang Wang, Dongwon Lee, and Huan Liu. FakeNewsNet: A Data Repository with News Content, Social Context, and Spatiotemporal Information for Studying Fake News on Social Media. Big Data. Jun 2020.171-188

Kings Fund, Leading through Covid-19: supporting health and care leaders in unprecedented times 2020. Available: https://www.kingsfund.org.uk/projects/leading-through-covid-19?gclid=Cj0KCQjws4aKBhDPARIsAIWH0JXcEmAj5on7DKhylp75OZF1aTEMyjTRHrYvMKbhNny5CCrgad5TJoQaAtigEALw_wcB

Lavorgna L, De Stefano M, Sparaco M, Moccia M, Abbadessa G, Montella P, Buonanno D, Esposito S, Clerico M, Cenci C, Trojsi F, Lanzillo R, Rosa L, Morra VB, Ippolito D, Maniscalco G, Bisecco A, Tedeschi G, Bonavita S. Fake news, influencers and health-related professional participation on the Web: A pilot study on a social-network of people with Multiple Sclerosis. Mult Scler Relat Disord. 2018 Oct;25:175-178

Mayer, M. Leis, A. Mayer, A. Rodriguez-Gonzalez, A. Studies in Health Technology and Informatics. 2012, Pages 853 – 857

McGrath, J. Taekman, M. Dev, P. Danforth, D. Mohan, D. Kman, N. Crichlow, A. Bond, W., Simulation Environments to Assess Competence for Emergency Medicine Learners, Academic Emergency Medicine 2018, 25: 186–195

Murat, M., Köse, S. and Savaşer, S. (2021), Determination of stress, depression and burnout levels of front-line nurses during the COVID-19 pandemic. Int. J. Mental Health Nurs., 30: 533-543.

Motola I, Devine LA, Chung HS, Sullivan JE, Issenberg SB. Simulation in healthcare education: a best evidence practical guide. AMEE Guide No. 82. Med Teach. 2013 Oct;35(10):e1511-30

Moore, P., & Sharma, M. (2013). Enhanced Patient Management in a Hospital Setting.

Moorhead SA, Hazlett DE, Harrison L, Carroll JK, Irwin A, Hoving C. A New Dimension of Health Care: Systematic Review of the Uses, Benefits, and Limitations of Social Media for Health Communication

J Med Internet Res 2013;15(4):e85

Naeem, S.B. and Bhatti, R. (2020), The Covid-19 'infodemic': a new front for information professionals. Health Info Libr J, 37: 233-239

Negandhi P, Negandhi H, Tiwari R, Sharma K, Zodpey SP, Quazi Z, Gaidhane A, Jayalakshmi N, Gijare M, Yeravdekar R. Building Interdisciplinary Leadership Skills among Health Practitioners in the Twenty-First Century: An Innovative Training Model. Front Public Health. 2015 Oct 7;3:221

NHS Leadership Academy (2013), The Healthcare Leadership Model, version 1.0, Leeds: NHS Leadership Academy

Nicola M, Sohrabi C, Mathew G, et al. Health policy and leadership models during the COVID-19 pandemic: A review. Int J Surg. 2020;81:122-129. doi:10.1016/j.ijsu.2020.07.026

Paterson P, Meurice F, Stanberry LR, Glismann S, Rosenthal SL, Larson HJ. Vaccine hesitancy and healthcare providers. Vaccine. 2016 Dec 20;34(52):6700-6706

Pottle J. Virtual reality and the transformation of medical education. Future Healthc J. 2019 Oct;6(3):181-185

Raudenská J, Steinerová V, Javůrková A, Urits I, Kaye AD, Viswanath O, Varrassi G. Occupational burnout syndrome and post-traumatic stress among healthcare professionals during the novel coronavirus disease 2019 (COVID-19) pandemic. Best Pract Res Clin Anaesthesiol. 2020 Sep;34(3):553-560

Round J, Conradi E, Poulton T. Training staff to create simple interactive virtual patients: the impact on a medical and healthcare institution. Med Teach. 2009 Aug;31(8):764-9

Romundstad L, Sundnes KO, Pillgram-Larsen J, Røste GK, Gilbert M. Challenges of major incident management when excess resources are allocated: experiences from a mass casualty incident after roof collapse of a military command center. Prehosp Disaster Med. 2004 Apr-Jun;19(2):179-84

Salas E, T Paige J, Rosen MA. BMJ Qual Saf 2013; 22:449–452.

Sadasivaiah, S. Shaffer, E. Enanoria, E. Su, G. Goldman, S. Scarafia, J. Lee, T. Yu, A. Goldman, L. Ratanawongsa, N. Informatics response to address the COVID-19 pandemic in a safety net healthcare system, JAMIA Open, Volume 4, Issue 3, July 2021

Schou PM. Critical Access Hospital Leaders Beat Challenges to Support Their Communities and Staffs. Front Health Serv Manage. 2021 Oct 1;38(1):27-31

Sørensen JL, Navne LE, Martin HM, Ottesen B, Albrecthsen CK, Pedersen BW, Kjærgaard H, van der Vleuten C. Clarifying the learning experiences of healthcare professionals with in situ and off-site simulation-based medical education: a qualitative study. BMJ Open. 2015 Oct 6;5(10):e008345

Sharma D, Siddharth V, Singh AR, Kausar M, Ranjan R. Hospital Administration Control Room: An Effective Concept for Managing Hospital Operation Issues: A Study in Tertiary Care Public Sector Hospital. Int J Res Foundation Hosp Healthc Adm 2018; 6 (2):82-90.

Stahl JP, Cohen R, Denis F, Gaudelus J, Martinot A, Lery T, Lepetit H. The impact of the web and social networks on vaccination. New challenges and opportunities offered to fight against vaccine hesitancy. Med Mal Infect. 2016 May;46(3):117-22. doi: 10.1016/j.medmal.2016.02.002

Storey, J. and Holti, R. Towards a New Model of Leadership for the NHS. 2013. NHS Leadership Academy

Swire-Thompson, B. and Lazer, D., Public Health and Online Misinformation: Challenges and Recommendations, Annual Review of Public Health 2020 41:1, 433-451

Shen Y, Cui Y, Li N, Tian C, Chen M, Zhang YW, Huang YZ, Chen H, Kong QF, Zhang Q, Teng GJ. Emergency Responses to Covid-19 Outbreak: Experiences and Lessons from a General Hospital in Nanjing, China. Cardiovasc Intervent Radiol. 2020 Jun;43(6):810-819. doi: 10.1007/s00270-020-02474-w. Epub 2020 Apr 27. PMID: 32342164; PMCID: PMC7184943.

Taylor S, Landry CA, Paluszek MM, Groenewoud R, Rachor GS and Asmundson GJG (2020) A Proactive Approach for Managing COVID-19: The Importance of Understanding the Motivational Roots of Vaccination Hesitancy for SARS-CoV2. Front. Psychol. 11:575950

Washington KT, Oliver DP, Gage LA, Albright DL, Demiris G. A multimethod analysis of shared decision-making in hospice interdisciplinary team meetings including family caregivers. Palliat Med. 2016 Mar;30(3):270-8

Waugh, W.L., Jr. and Streib, G. (2006), Collaboration and Leadership for Effective Emergency Management. Public Administration Review, 66: 131-140

While AE, Clark LL. Management of work stress and burnout among community nurses arising from the COVID-19 pandemic. Br J Community Nurs. 2021 Aug 2;26(8):384-389

Walker LAS, Pontefract AJ, Bournes DA. Health Professional Redeployment and Cross-Training in Response to the COVID-19 Pandemic. Healthc Q. 2021 Jul;24(2):27-32

Wang Y, McKee M, Torbica A, Stuckler D. Systematic Literature Review on the Spread of Health-related Misinformation on Social Media. Soc Sci Med. 2019 Nov;240:112552.

Warraich S, Olabi B, Azhar B, Tanzeem SF, Fischer M. Medical leadership in the NHS during the COVID-19 pandemic. Br J Hosp Med (Lond). 2020 Jun 2;81(6):1-3

Vilkinas, T. and Cartan, G. (2001), "The behavioural control room for managers: the integrator role", Leadership & Organization Development Journal, Vol. 22 No. 4, pp. 175-185.

Appendix A: Glossary of Technology

Technology	Description
Branching Video	Branching Scenario is a flexible content type that enables authors to present a variety of rich interactive content and choices to learners. Learners make choices that determine the content they will see.
Interactive Video	Videos may be enriched with interactivities like explanations, extra pictures, tables, Fill in the Blank and multiple choice questions. Quiz questions support adaptivity, meaning that you can jump to another part of the video based on the user's input. Interactive summaries can be added at the end of the video.
Interactive 360 Photo	360 (equirectangular) and normal images may be enriched with interactivities like explanations, videos, sounds, and interactive questions. The images may also be linked together to give the user an impression of moving between environments or between different viewpoints within the same environment.
Virtual Reality (360 Degree Video and Computer Generated)	Immersive VR technologies are ideal for educational purposes and for scientific data visualization providing a variety of benefits beyond the traditional “desktop” approaches . Depth cues and the 360° views offered by computer generated environments in VR allow for more didactic possibilities than a 2D desktop screen, especially by non-trained individuals.