

Chapter 25

Journeys into Becoming a Digital Health Specialist



Urooj R. Khan, Leanna Woods, Gerardo Luis C. Dimaguila,
Mohamed Khalifa, Elizabeth Schoff, Greig Russell, and Saswata Ray

Abstract Digital health specialists are by definition a pluralistic heterogeneous professional group; their career pathways are neither straight nor smooth. This chapter contains seven narratives of professionals, their journeys into becoming digital health specialists, their aspirations, and their career prospects. These narratives speak of identity, impact, and innovation and illustrate how diverse career pathways out of clinical and technological careers have converged to define roles in digital health. These narratives have important implications for how this specialised workforce needs to be trained, identified, and retained, to meet the growing needs of digital health in patient care, health system planning, and policy making.

Keywords Case study · Doctoral degree · Fellowship · Training · Mentorship

U. R. Khan (✉)

La Trobe University, Bundoora, VIC, Australia

e-mail: u.razakhan@latrobe.edu.au

L. Woods

The University of Queensland, Brisbane, QLD, Australia

e-mail: lee.woods@uq.edu.au

G. L. C. Dimaguila

Murdoch Children's Research Institute, Parkville, VIC, Australia

e-mail: gerardoluis.dimaguil@mcri.edu.au

M. Khalifa

Macquarie University, Sydney, NSW, Australia

e-mail: Mohamed.khalifa@mq.edu.au

E. Schoff · S. Ray

University of Auckland, Auckland, New Zealand

e-mail: liz@pleioneconsulting.com; saswata.ray@auckland.ac.nz

G. Russell

Massey University, Palmerston North, New Zealand

e-mail: greig.russell@russellhealth.org

Introduction

The potential of digital technologies to benefit healthcare has been evident in recent years, but implementation has encountered challenges at various levels; the effort required to deliver on significant digital health investments is often underestimated and the workforce required is often invisible (Gray et al. 2019). Technology is not a panacea, and theories of technology adoption put the focus on workflow, process, task-fitness, and other user-related factors that indicate the cultural shift needed to use technologies effectively in complex and sensitive healthcare environments (Raza Khan et al. 2019). Such use of digital technologies requires a multidisciplinary approach (Smith et al. 2011), specifically the development of a specialist workforce that understands both the technical and clinical aspects of a digital health program (Parry et al. 2013; Whetton 2005). Digital health specialists are critical in the digital transformation of health (Butler-Henderson and Gray 2019), in two key roles: creating and managing clinical information from raw patient data and delivering it to the point of care; and acting as the bridge between the work cultures of clinical and technical teams across the health organisation. Technical, clinical, and other communities within the broad health environment often resemble tribes, looking within to define who they are to themselves and others (Mannion and Davies 2018). But digital health specialists exist to enable the binding and integrating of health workforce tribes. Some of them choose to keep one foot in their tribe of origin, and one foot in a self-defined digital health tribe (Dave et al. 2008), and maybe this is why they are hard to perceive distinctly. Some reports indicate that the current specialist workforce is ageing and consequently the future productivity of the health sector is at risk (Butler-Henderson and Gray 2018); the COVID-19 pandemic resulted in rapid adoption of virtual care and other related digital health technologies, indicating a rising need for such specialised professionals (Sarbadhikari et al. 2020). However digital health specialist career structures are unclear—how someone lands into this space, gains professional recognition, finds pathways forward. Building capacity—through workforce planning, developing specialist qualifications, training programs, and career pathways—is essential to satisfy the growing demand for such roles (Butler-Henderson et al. 2020). This chapter explores the stories of seven clinical and technology professionals to trace common threads in their profiles, their motivations and trajectory in becoming digital health specialists, and to relate their reflections to the concepts of workforce identity, impact, and innovation.

Urooj Raza Khan: “I wanted my health records anywhere anytime.”

Sometimes a moment can change your life aims. It was such a moment for me in August 2012, lying in the operating theatre, nearly unconscious after going through immense pain from a ruptured ectopic pregnancy, thinking that I am in a technology

era in a developed country that has a world-class health system... there must be a way to inform these clinicians, when I can't speak, about my chronic illness, sensitivities and its effects on me....before I could think anything else, I was asleep. The background to this incident is that I relocated from the city to the countryside in 2012 and was trying to transfer my health records from a general practice in Melbourne to a new one in regional Victoria; after the initial consultation with my new GP, I kept my next check-ups on hold for some time, thinking I would follow up once my health records were transferred. Thus I came out of hospital frustrated, sad, and angry, wondering how it is possible in today's world that I am unable to inform clinicians about my condition in an emergency or how can take so long to transfer GP records? My career as a technologist with 12 years of experience in IT business systems implementation and management of various electronic record systems, eGovernment and eCommerce solutions, made it impossible for me to comprehend the situation in the health sector. Dealing with post-natal depression, I was encouraged to use my disappointment and energy positively, so I started investigating any technological solutions that could ease health records transfer among clinicians and enable health record accessibility by clinicians when one is unable to speak. My mantra was "there has to be a better way!".

I learnt there was such a solution, which could store my health records and make them accessible to clinicians and myself easily, Australia's Personally Controlled Electronic Health Record (PCEHR). I conducted a Master of Science research project investigating PCEHR adoption in regional Victoria and realised its teething issues. Not satisfied with my findings, I pursued doctoral research about MyHealthRecord (the new name for PCEHR) adoption in general practices. I started with curiosity, thinking I was exploring technology issues. Soon I learnt that there were process- and people-related socio-technical challenges, limited provisions for change management and cultural shift, significantly delaying system adoption. I investigated the problems with ten general practices and developed a framework for improving the integration of the MyHealthRecord system into their workflow.

After one of my industry supervisors directed me to the field of health informatics, I was accepted in a fellowship training program that extended my professional development into digital health. During my associated work placement, I was involved in planning and initiating various innovative digital health projects. I discovered the real-world challenges of fragmented health data and its silos. I also learnt not only that digital health is surrounded by numerous challenges related to data, technology, organisations and people, but also that technology implementation is handled very differently by various disciplines. Even when people are motivated to progress in digital health with all good intentions, their journey is protracted as they learn new dimensions of each other's knowledge and communication conventions.

To date, I am unable to find a satisfactory answer to the question, why is it so difficult to have our health records accessible anytime, anywhere? The legacy of my own hospital emergency episode now seems like a lifetime reminder; it has given me a purpose to do more so that no one else should have to go through what I have suffered. It leads me on to explore my opportunities to make an impact in digital health through projects, education and research: in 2020, I joined La Trobe

University as a senior lecturer. In this role, I am involved to coordinate, develop, and teach postgraduate courses in digital health. I am also leading a community of practice to mentor students and interns who are conducting various virtual care related industry research projects (in collaboration with Australia's Digital Health Cooperative Research Centre). I feel this is my calling now, to make a difference and make a contribution to a better healthcare system. I believe my journey entails much more learning about digital health, and many further opportunities to find answers. Bring it on!

Leanna (Lee) Woods: “Administration should not absorb one third of my time as a nurse.”

It was 2 o'clock in the morning at the nurses' station, when I realised something was dramatically inefficient with the way healthcare was delivered. With 8 years of clinical practice behind me, I had seen advances in biomedical science—so how could it be that I was writing my new patient's admission weight, with pen on paper, four times, across the various admission documents? Tired and frustrated, I placed multiple admission paperwork pages for a single patient end-to-end on the floor, lay down alongside these, and measured their length, amused at its relation to my own. Administration would absorb some 30% of my time as a nurse, pulling me away from the bedside where my patients lay afraid, confused or in pain. I made the decision to get qualified, be heard and make a difference on a larger scale than six patients I cared for in a single shift. I knew it was time to make my contribution to the digital transformation of healthcare.

Six years later, I have a two post graduate certificates, a research honours degree and Doctor of Philosophy which span the fields of clinical nursing, research, and digital health. My doctorate investigated clinician-led innovation, mobile health, and patient empowerment. Following this I undertook the requirements of the Fellowship by Training program with the Australasian Institute of Digital Health, affording me the opportunity to complete coursework in digital health topics and learn from experts across industry, health, and research. The highlight was contributing to national policy development in a 12-month work placement with a federal government department.

Digital health offers powerful ways to connect information to people when and where it is needed, to keep the patient at the centre of their health. Unless digital health is used to its full potential, there is a missed opportunity to better health outcomes both at an individual and population level. Nurses are innovative, adaptable, and committed to people, yet the data we generate, correct, and use is stored in paper records in vaults under hospitals. As the largest workforce in health, nurses advocate for safe, quality patient care across a great number of settings, however nursing leadership in senior positions in the health, education and government sector is less than proportionate to the numbers in the workforce. I now have a seat at

the table to make positive change, because of the pre- and post-nominals I have earned and the professional network I am developing.

My becoming a specialist has been based on my mission to focus on the humans behind the technology, to enable the realisation of digital health technologies in practice. My pursuit of learning and impact has continued with my return to academic research, in collaboration with a State health system, to advance the connection of patient information across the healthcare journey. Digital health specialists are fearless optimists from a variety of backgrounds working on the same goal but from different angles.

Gerardo Luis (Ikee) Dimaguila: “...passionate about patient empowerment and bridging healthcare gaps through technological innovation.”

When I finished my bachelor’s degree in Computer Science in the Philippines, I didn’t know what to do next. I loved my degree, but I didn’t want to work as a full-time programmer. I was driven by curiosity and the desire to contribute positively, and in the university, I spent a significant amount of time constantly finding ways to be involved in volunteering activities and community organisations. I was fortunate to be accepted as the consultant and designer of a project to develop the first national registry of child neurological diseases. In my role, I had to understand and implement data documentation and reporting using the ICD-10 standard. I was not even aware of any health standard at the time! I had to learn about the standard so we could integrate it into the database. I also had my first taste of digital health challenges, such as how some terminologies used by neurology practices may not be directly mappable to the ICD codes; and how data collection processes and resources available at different clinics across the country could vary. Through successive consultations, my team established processes for nationwide neurological data collection and management, and a feedback loop so varying terminologies could be flagged, and consensus reached. My first dip into digital health was a relative success, but I felt that there were many things I could have done better—but I was not sure what, or how.

Serendipitously, a new Master of IT degree with a health specialisation launched at the University of Melbourne around the same time as the registry project ended. I enrolled in this degree and secured an Australian government Endeavour scholarship. I learned that the challenges I had encountered in designing and developing the registry were quite common, and that digital health frameworks, principles, and methods could have guided me then. I became passionate about patient empowerment and bridging healthcare gaps through technological innovation and digital health expertise, and I researched and published an evaluation of the possible challenges facing mobile health technologies in under-resourced settings. To merge my digital health interests, I decided to pursue a PhD in digital health. I developed a novel framework enabling people to report their health effects and outcomes, when they use the data

that they generate from engaging with health information technologies, and I disseminated my research through six publications in high-quality journals.

In digital health one does not have to look far to find meaningful work. In our State's vaccine safety service, I work closely with clinicians and epidemiologists so data and information guide government policies on Covid vaccine roll outs. I also hope to learn and look for ways to bridge healthcare access gaps, especially in under-resourced settings, through critical and thoughtful use of digital health design and evaluation frameworks and principles. I am excited to be in a field that continually challenges its practitioners and experts to ask: What can I do best, and better; where are my skills needed now and in the future?

Mohamed Khalifa: "I could add greater value in population health through informatics, as compared to treating individual patients."

My childhood was spent closely connected to computers, however, I studied medicine and graduated in 2001 as a medical doctor. Based on the slowness and inefficiency of healthcare processes that I experienced shortly thereafter, I decided to use my computer skills to improve the clinical outcomes of patients. I believed technology could save time and provide more accurate results. In 2002 I had the opportunity to implement a health information system to run the oncology medical centre where I worked, which resulted in improvements in our services to patients.

This experience changed my mindset: I realised that I could add a greater value in population health through informatics, as compared to treating individual patients. I took a full-time job as a medical IT consultant, developing and implementing health information systems. For my professional development in this field, I studied healthcare management at the American University in Cairo. It brought me an opportunity to teaching health informatics to doctors. I continued my studies from 2009 to 2012 in a Master of Science in Health Informatics at the University of Edinburgh, and I became a member of the Royal College of Surgeons of Edinburgh. I also became a HIMSS Certified Professional in Healthcare Information & Management Systems.

In 2012, I moved to a major tertiary care hospital to lead the Health Informatics and Performance Improvement departments. Over 5 years, I led diverse teams of healthcare and IT professionals to use health informatics in improving patient safety, effectiveness, efficiency, and timeliness of healthcare services. I worked on reducing waiting times, improving productivity, streamlining discharge processes, and reducing unnecessary lab tests. I also worked on reducing avoidable hospital admissions and frequent non-urgent emergency visits. I developed key performance indicators, operational dashboards, and strategic scorecards to improve services. I published over 30 papers documenting my projects and sharing my experience with colleagues worldwide.

I moved to Australia in 2017, as a distinguished talent permanent resident, and joined the PhD in Health Innovation at Macquarie University, after I had been awarded a Commonwealth government funded PhD scholarship. I developed an evidence-based framework for grading and assessment of clinical predictive tools—the GRASP framework. In 2018, I was granted my first innovation patent from IP Australia for my framework. In 2020, my core published PhD paper was selected by the International Medical Informatics Association as best paper worldwide in medical informatics, and appeared in the IMIA 2020 Yearbook.

Over 20 years I have developed a global career as a consultant and director in health informatics, business intelligence, and digital health, and I have engaged from three main perspectives: business development and implementation, professional hospital operation and utilisation, and academic research and training. Going forward, I am interested in investing in my skills, knowledge, and experience to contribute to the continuing digital transformation of the Australian healthcare system.

Greig Russell: “The daylight is slowly creeping in.”

Describing myself as a health informaticist and getting the newly created sole full-time role in my hospital felt akin to telling people something socially stigmatising about myself. My friends said they had known all along but did not want to say anything. I was instantly demoted to a second-class citizen in the professional pecking order in the hospital, but I was happy! Paying my way through medical school as a software developer for actuarial software might have given some clues. My honours thesis was in health informatics, rebadged of course. Still, once I became a doctor, everyone let me put my sordid IT past behind me and start again: my mother was so proud of her son the real doctor.

So my double life started, working as a clinician by day, and at night using health information to improve clinical outcomes. This study evolved into studying extramurally at the local university, but always on the quiet. Many colleagues looked the other way, though a few were incredibly supportive. Slowly my health informatics skillset grew, in computer science, statistics, clinical coding and classification systems, as well as health systems theory. I moved from solving a specific problem through ad hoc learning to the broader joined-up knowledge base, one course, one book, one video at a time, with lots of mistakes and many blind alleys.

Slowly, various doors started to open as I worked on shared problems with new colleagues, particularly from the local university. The statisticians and philosophers in particular welcomed me into the most fascinating and exhilarating conversations of my life. Transactional medicine was getting in the way of my secret academic life; my desire grew to use health informatics to contribute to population health outcomes and optimisation of health system management to support clinicians. However, when I seized the chance for my dream job, as a health informaticist, this triggered new challenges. In my mind, I am still a clinician, but I just use different tools and have a population health focus; the snag is that there is no recognised

health informatics speciality in medicine. Growing as a practitioner is no problem, thanks to the internet, Amazon and the fantastic Rstats community around the world, but getting this learning recognised as clinical activity is not straightforward. I have included my health informatics study into my clinical speciality continuing medical education system, and hoped for the best, and so far everyone has looked the other way, and it has worked out—but a vehicle for professional recognition is badly needed. I quickly discovered that my academic knowledge and practical experience were not the reason I was hired for my dream job, nor are these valued greatly in the digital health business culture of personalities and events—I have a presence in that world though still not a much of a voice. I hope and believe that a new day is dawning, however slowly, on professional recognition and respect for the role of the health informaticist.

Elizabeth (Liz) Schoff: “Technology has changed, but people are still key to leveraging its value.”

My journey into the world of health informatics started from a completely unrelated life situation and I had no idea where it would lead me. I’m a techie—not the geeky kind, but instead the people kind. I love working with people who are having trouble understanding when technology can help and how. I’m also the first person to wave a banner when technology is not the answer. My journey into health informatics started while I supported my mother in her final years. As we travelled from doctor to doctor, I would listen to her recount her medical history to each newly acquired specialist, gently correcting and prompting her when she left out major medical events or conditions, or confused dates and people. I tried to help by creating (what I now know!) her medical record—a spread sheet of her medications and medication history and a chronological (e.g. longitudinal) health record.

Fast forward a couple of years, I had relocated from California to New Zealand, and was looking for a job that would allow me to stay. Because of my technology and management skills, I landed a job heading Northern Region Professional Services at the healthcare software vendor, Orion Health. During my interviews, I leaned on my personal experience creating my mother’s medical record. Working at Orion Health and with the Northern Region healthcare providers, I realised I had fallen into a world that fit me—people who wanted to help people, but who didn’t have the right fit, or sometimes any fit, for the technology that would make a difference. This was an opportunity to build into systems, the constant need to balance people, process and technology—a three-legged stool that would surely topple if one leg grew too long.

I needed more training. I signed up for a Master of Science degree at the University of Auckland’s School of Population Health, focusing on health informatics. I was often the only techie in classes of nurses, doctors, and researchers. Listening to the discussions of those who had come from the clinical world really

broadened my empathy for the challenges that technology has brought to health-care. I wanted more involvement. I joined Health Informatics New Zealand (HINZ), then joined the Executive Committee, and moved into a lead role to restructure the HINZ organisation. This time, I was working to balance the perspectives of clinical, academic, and commercial stakeholders; again, it was all about the balance.

Through all this, I have continued to work in hospitals and healthcare related entities. Technology has changed, as has our cultural acceptance of technology, but people are still key to leveraging its value. Now I focus on cybersecurity, where we look at how people, process, and technology work together to keep our electronic health information under our own control, secure and private, as it should be.

Saswata (Sas) Ray: “Some beautiful paths can’t be discovered without getting lost.” (Erol Ozan)

I certainly don’t want to get lost on my career path, but I feel this quote has something to do with my career decisions, maybe something to do with my subconscious performing silent tricks on my conscious, before my conscious being typed a search into Google, ‘digital health’.

I was in Mumbai, India, working for the number one healthcare service provider in the country. I had worked in clinical operations, medical writing, pharmacovigilance, and clinical research data management over a span of 8 years. Life was sorted out almost perfectly, but I felt a push from inside to do something that was not written in a ‘protocol’ and that would allow me to leave a digital footprint (by writing a thesis). Thus I landed in Aotearoa, New Zealand, to do a PhD at the University of Auckland. My PhD is exploring how social media may influence food decisions for young adults. The urge to find a research topic outside clinical research grew after I wrote a review paper on social media and clinical research. As a professional I was attracted to research that had the potential to influence our daily lives in health related ways, and I became fascinated with the power of the virtual world to affect us in so many ways. I am excited that my PhD topic is the first national study of its kind at this point, and this helps me to keep going.

Moving on from clinical trials to embark on a new path was not an easy choice, but when I made the decision, I banked on my skills being transferable in an informatics role. Working in all domains of clinical research had given me a positive mindset about being able to traverse new domains, to rise to a challenge and to shift from one stream of healthcare research to another. In addition I imagined the fun and satisfaction in contributing to a project that could improve patient outcomes. As I gain more exposure to the field of health informatics I am feeling more confident to meet other professionals and have conversations about fascinating topics, and I am getting to know more about different roles and requirements. Given an opportunity, I would like to work as a clinical business analyst who knows what happens in the clinical field and is able to translate the needs to a software developer.

Discussion and Conclusion

The case studies in this chapter tell of passionate professionals with various information sciences and health sciences backgrounds and pivotal life and work experiences. Urooj, Liz, and Ikee worked through multiple roles in the technology industry whereas Khalifa, Lee, Greig, and Sas worked in clinical positions. They observed and experienced problems in patient care, health records inaccessibility and fragmentation, technology adoption resistance, and systems inefficiencies. They realised how digital technologies can help the healthcare industry deal with these challenges and became determined to explore how to contribute to improve efficiency, effectiveness, and safety of health technology design, development, and evaluation. A personal drive sustained the momentum in each of them, as they proceeded through the indeterminate nature of the digital health profession. Their stories illustrate the lack of a formal pathway to enter and advance in the field. Greig and Liz were able to find their way into digital health through years of work experience. Others followed PhD pathways, and some undertook a fellowship training program as well. All navigated different routes to come to identify themselves as digital health specialists. Coming through such individualised experiences has made them resilient; in them, the digital health workforce has dedicated emotionally intelligent real-world problem solvers, likely to have significant impact through work in academia, in applied research, and in the digital health industry. They will view challenges through diverse lenses and develop multidisciplinary solutions using outside-the-box thinking and evidence-based approaches. Each one brings something unique to the evolution of the health care system.

The healthcare industry is often tribal (Dave et al. 2008), and such a culture can be the source of harm and conflict, but it is also possible that culture can be a source of remedy, as can technology. Health information ideally is a force multiplier, reducing the stress on staff and improving both patient experiences and clinical outcomes. Digital health specialists are a pluralistic heterogeneous professional group that builds information and communication bridges between the technical and the clinical tribes. Their work is translational and holistic; more than merely having expertise in dual disciplines, the whole of their skillset is greater than the sum of the parts, and they can make key contributions once they find their voice and assert their ability. Imagine how much more powerful these individuals' contributions could be if they had a firm base of professional recognition from which to build! In concluding, this chapter shares their experiences to frame a call for the health sector: to raise awareness of the exciting possibilities to work as a digital health specialist; to provide high-quality specialist learning and training options; to encourage consistent specialist identification and affiliation; and to formally recognise the value of this specialist workforce. Innovations in these aspects of workforce culture will widen and deepen understanding of the need for change in healthcare and of the positive transformation that is possible through digital health.

References

- Butler-Henderson K, Gray K. Australia's Health Information Workforce: Census Summary Report. Launceston, Australia: University of Tasmania; 2018.
- Butler-Henderson K, Gray K. A Glimpse at the Australian Health Information Workforce: findings from the First Australian Census. *Stud Health Technol Inform*. 2019;264:1145–9.
- Butler-Henderson K, Gray K, Day K, Grainger R, editors. Defining the Health Information Technology discipline: results from the 2018 Australian and New Zealand censuses. Proceedings of the Australasian Computer Science Week Multiconference. 2020.
- Dave L, John K, Halee F-W. Tribal leadership. Aurora: HR.COM; 2008. 4 p
- Gray K, Gilbert C, Butler-Henderson K, Day K, Pritchard S. Ghosts in the machine: identifying the digital health information workforce. *Stud Health Technol Inform*. 2019;257:146–51.
- Mannion R, Davies H. Understanding organisational culture for healthcare quality improvement. *BMJ*. 2018;363:k4907.
- Parry D, Hunter I, Honey M, Holt A, Day K, Kirk R, Cullen R. Building an educated health informatics workforce—the New Zealand experience. In: Grain H, Schaper L, editors. Health informatics: digital health service delivery—the future is now!: Selected Papers from the 21st Australian National Health Informatics Conference (HIC 2013). IOS Press; 2013.
- Raza Khan U, Zia T, Perera K, Pearce C. User acceptance of MyHealthRecord system in general practices. *Int J Cyber-Physical Syst IJCPs*. 2019;1(1).
- Sarbadhikari SN, Pradhan KBJS, Work Ha. The need for developing technology-enabled, safe, and ethical workforce for healthcare delivery. 2020.
- Smith SE, Drake LE, Harris J-GB, Watson K, Pohlner PG. Clinical informatics: a workforce priority for 21st century healthcare. *JAHR*. 2011;35(2):130–5.
- Whetton S, editor. Health informatics workforce skills: technology is king, time for a consort? HINZ: Proceedings. 2005.