

DIGITAL ADVANCE

A future model of physiotherapy is likely to be heavily supported by digital technology. Dr Mark Merolli APAM discusses where such innovations might sit in the clinical context.

The landmark *InPractice 2025* and *InPublic 2025* reports produced by the APA both aptly recognise (among other things) the increasing role technology is playing and will play in future models of physio. If the last 40-50 years have taught us anything, it's that technology moves at a rapid pace. The world went from welcoming the communication satellite in the '50s, all the way through to the first mobile phones, email and internet, and today we are beginning to talk about artificial intelligence. Some technologies seem more conceivable than others, but let's focus on a few worthy of examination in physiotherapy. Some you would know and already interact with; others may seem foreign.



Mobile applications: consider exercise/rehab management apps, symptom-tracking diaries, gamified rehab programs or clinical tools, such as digital goniometry.



Self-quantification devices: self-monitoring using activity trackers and wireless wearable sensors.



Smart clothing: similar to self-monitoring devices, expect to see greater utility of sensor technology embedded in everyday clothing.



Augmented reality: recently popularised thanks, in part, to the Pokémon Go craze, it uses your phone's camera and geospatial capabilities to merge digital representations with real life.



Virtual reality: we might expect to see this play a more active role in rehab programs, and in university teaching labs, allowing students to navigate their way through the human body using digital 3D representations and models.



Artificial intelligence: this is an area that's still relatively abstract to many, but consider the world of advanced analytics and computers that think and learn like humans. (I suggest you google 'IBM Watson' if you haven't already done so.)



Augmented human capabilities: robotic-assisted exoskeletons are taking shape to provide individuals with neurological compromise, such as spinal cord injury, the opportunity to ambulate.

As we can see, there is an array of technologies that we can expect to see expand within a physio-therapeutic context over the coming years. However, the more pertinent question we may wish to ask is where, in fact, does technology sit within a clinical context? What might technologically supported models of care look like in 2025? To explore this, let's examine the patient journey.

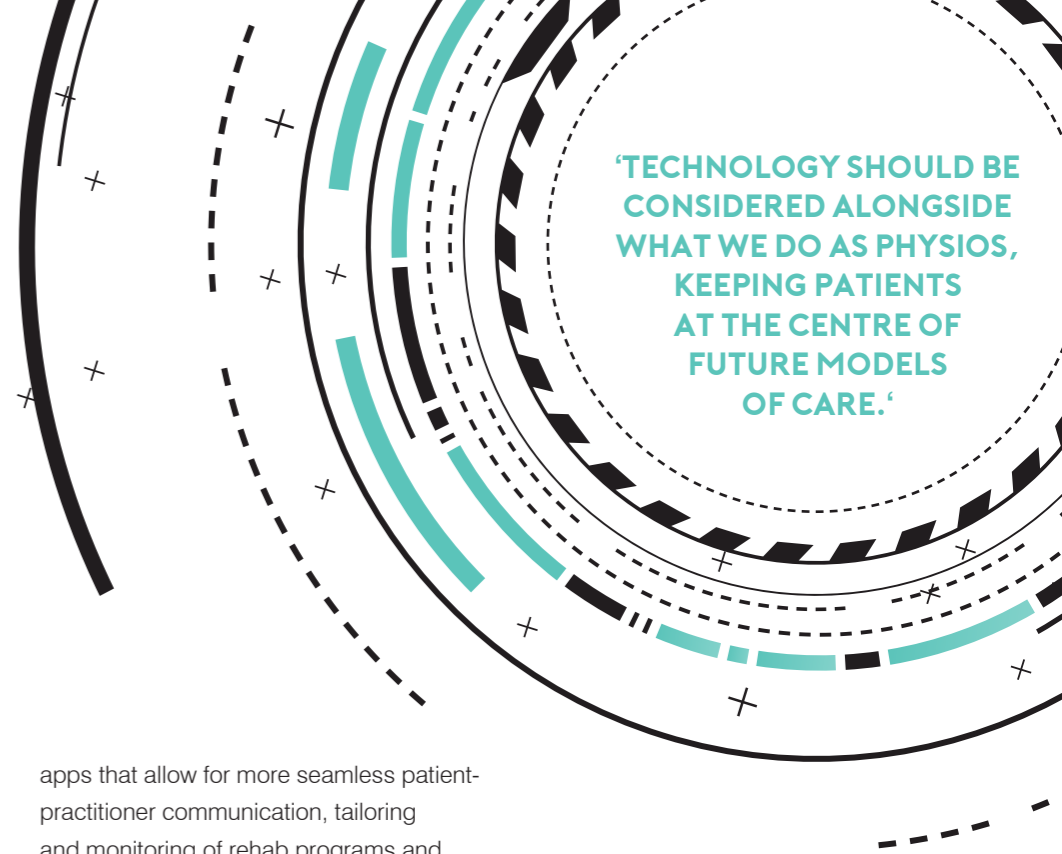
The example I use here is quite general, but whether you are a musculoskeletal, cardiorespiratory or neurological physio, you will hopefully be able to relate it to your own practice context. The primary underpinning to be aware of is healthcare consumerism. Whether that be because of technology or otherwise, the healthcare-consuming public/patients are shaping a movement resting upon empowerment and greater shared decision-making in their own health management. Access to resources and information is greater than it's ever been and people are tapping into this opportunity; thus, the moniker of 'participatory health'. The notion of patients being engaged in their own care is not news—many physios have always relished the opportunity to work more closely with their patients—but when combined with the potential of technology to augment this, we get a more accurate picture.

Consider the traditional patient flow through the care pathway in private practice. Initiation is likely to commence with discussions among friends or family about an injury or condition. This is likely to be coupled with recommendations for which practitioner to see. Today, this might also involve googling symptoms, searching for practitioners online or crowd-sourcing one's social networks for treatment recommendations or practitioners. Skipping ahead to the clinical appointment, the patient will be assessed by their physio, have a discussion around the likely causes of injury and a management plan will be generated. The challenging question here is, what are some of our barriers to care? The most obvious that come

to mind are adherence/engagement, quality and safety of performance of rehab, ongoing communication between care episodes, provision of ongoing care resources/information and, finally, being able to accurately correlate one's rehab and management plan to the progression of a condition. The overarching discussion is that while we certainly have a communication issue, there's an equally important, if not more important, issue surrounding information—a vortex or black hole of missing data. Granted, we do already collect meaningful data and make some sense of it.

Louise Schaper (CEO of the Health Informatics Society of Australia) presented during the same session as me at the recent Business and Leadership Conference in Darwin. She made the comment that most clinically important data exists outside of the traditional clinic environment, and I would have to agree. The rough calculation I have used to demonstrate this point is that, based on a typical patient journey through managing a single-episode injury, over the course of a handful of clinical appointments, clinicians have less than 0.1 per cent face-to-face contact time with the patient over the course of their waking year. Even if this figure is quintupled, physical contact time is still miniscule. The key message at the centre of this is that there is so much clinically relevant information (so many touch points) missed. The question is, therefore, how can we model future physio practice to increase these touch points and collect more clinical data to not only improve care but enhance self-management and drive positive health behaviours? Technology might unlock some of that potential.

What's changing or has already changed in physio? Some providers have already started to make headway towards shrinking the information black hole. For instance, if we jump back into the clinical management scenario, one of the technologies I mentioned earlier was mobile applications. Envisage patient-management mobile



apps that allow for more seamless patient-practitioner communication, tailoring and monitoring of rehab programs and, thus, make information richer to improve clinical decision-making. Opportunities for communication increase, and we have greater opportunity for advanced analytics of rehab progression data. Again, that black hole shrinks a little bit more.

In a similar fashion, consider what is being done with gamified rehab programs. These are generally enabled through wearable or remote-monitoring sensors that wirelessly connect up to a smartphone or TV. The patient can perform rehab anywhere, again providing feedback and data based on performance and movement quality. Sensors are not new—these are already seeing widespread use in professional sport, for example.

INTERNET OF THINGS

The real consideration for the future is, how do we connect the dots? After all, apps, smartphones, wireless devices, sensors, et cetera, are all present today. The question is how might this landscape look in the next 10 years? The answer to that lies loosely in the notion of 'the internet of things'. The imagination of this is to ponder that we will be connected to our environment and devices fluidly—ubiquitous connectivity, flowing like electricity. Viewed from the physiotherapist's perspective, think about

gait aids that will have embedded sensors that continually monitor ground reaction force, cadence, step length, helping to reduce fall risk. Or picture smart clothing—fabric with sensors that can electrostatically monitor skin conductivity. Contemplate socks that can do similar things for fall prevention, or sensors for occupational physio that can monitor posture or alert to dangerous loads and angles placed on the body before injury can occur.

These are obviously just a few facets of the role digital technology can play in physiotherapy. As this arena continues to take shape over the next few years, we would be wise to take stock and consider the broader implications of their place in practice. Areas such as privacy/security, reliability, quality, access, necessity and efficacy will all need to be a part of the discussion. The final comment to make on the subject for now is that if there's one thing that working in digital health in physio practice is teaching me, it's that we should not have tunnel vision when it comes to technology and be too consumed by what channel or tools are out there. Technology should be considered alongside what we do as physios, keeping patients at the centre of future models of care.