Praxis Care

QUEEN'S UNIVERSITY BELFAST

A RAPID EVIDENCE REVIEW

Technology to support staff learning & development in social care

February 2024

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This report can be cited as:

McCartan, C., Davidson, G., Best, P., Webb, P. (2024) Technology to support staff learning and development in social care: a rapid evidence review. Belfast: Praxis Care and Queen's University Belfast.

Glossary

ASD	Autism Spectrum Disorder
CBT	Cognitive Behavioural Therapy
HCPs	Health Care Professionals
IoT	Internet of Things
K	Number of studies included in a review
MDD	Major Depressive Disorder
N	Number of participants
RCT	Randomised Controlled Trial
SMI	Severe mental illness; severe and enduring mental illness e.g. bipolar disorder, psychosis, schizophrenia, personality disorder
VR	Virtual Reality

Contents

1 Background

Social care includes public, not for profit and private sector services, paid carers and unpaid carers, and has been described as multidimensional: (1) as care-providing labour; (2) as a relationship of obligation and responsibility, and; (3) an activity that has both financial and emotional costs that merge public and private boundaries (Daly & Lewis, 2000).

Social care in the UK and Ireland is under significant pressure given the current funding shortfall (Maynard, 2017) as a result of a commissioning model designed primarily around cost and not quality (Dromey & Hochlaf, 2018). The development and implementation of technology in social care has been slower than in health care. There may be a number of reasons for this including: a relative lack of policy level strategy, drivers and support; the largely devolved responsibility of implementing technology; the challenges of translating small pilot schemes into routine services; and the shorter lifespan of general consumer products that aren't subject to the same rigorous testing and research in comparison with those used within healthcare settings (Wright, 2020). On the other hand there are a number of factors which may facilitate the use of technology in social care settings including the adaptation of existing, well-tested technology from other uses, different levels of regulation (compared to health settings), and the development of more strategic and policy-level leadership. With the introduction of a new digital strategy for health and social care in Northern Ireland, it is hoped that services will be transformed to provide "greater visibility, control and personalisation of care" (https://www.health-ni.gov.uk/digitalstrategy) acknowledging the need for business change and training processes that encourage staff to feel confident and competent using new systems and this will require investment in a digital specialist workforce, giving people the time and space to learn, practice and measure their new skills.

The Department of Health and Social Care in England has developed guidance on Digital working in adult social care: What good looks like' (DHSC, 2023) providing a framework for care providers and local authorities in adult social care which sets out seven success measures:

1. Well led
2. Ensure smart foundations
3. Safe practice
4. Support workforce
5. Empower people
6. Improve care
7. Healthy populations

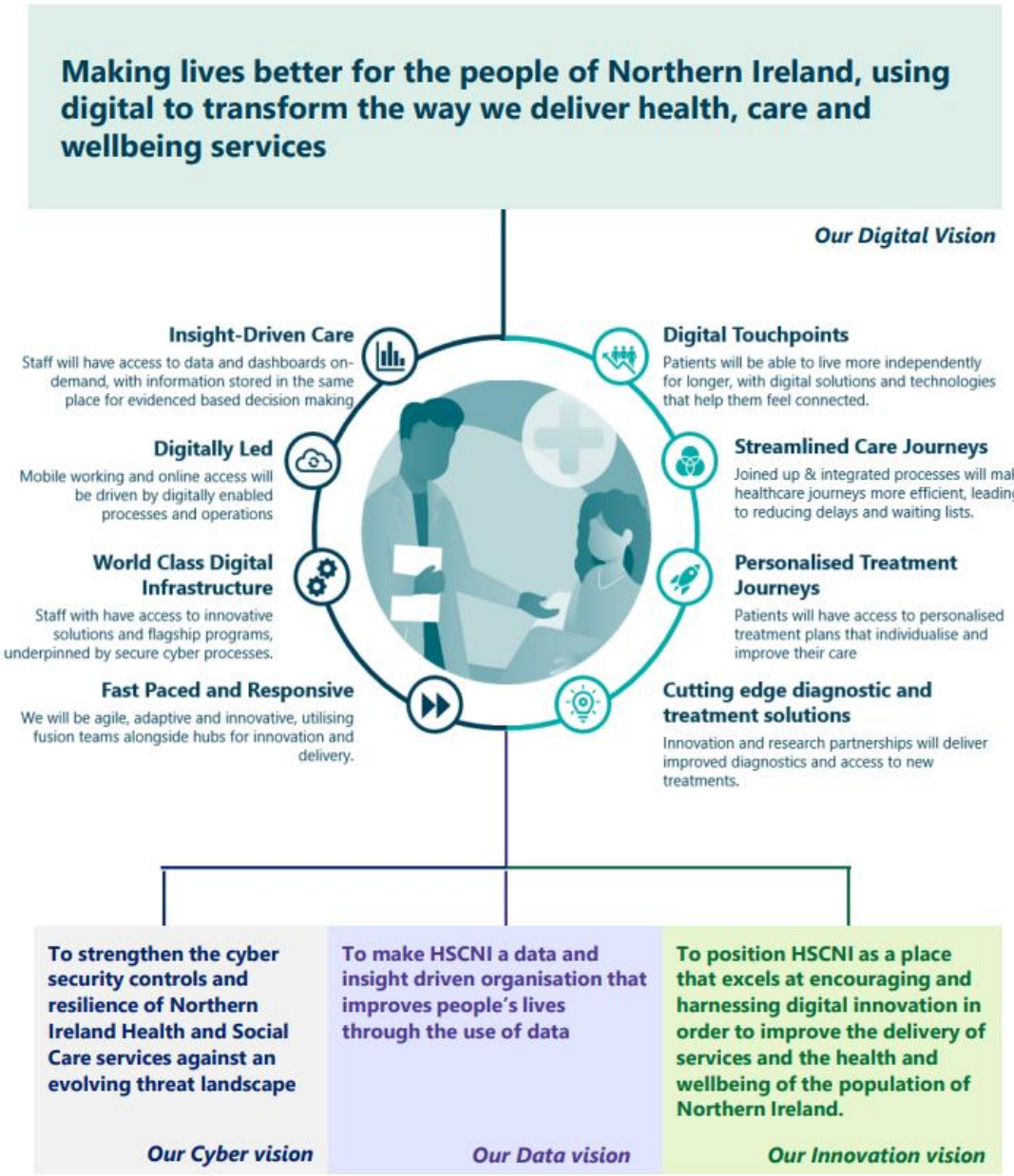
The framework is presented under seven thematic areas, providing baseline and aspirational objectives underpinned by 'knowledge criteria' that help meet these objectives as well as signposting to additional resources/advice in how to achieve them. The themes are:

- Using technology to support person-centred care
- Technical skills for using technology
- Communicating through technology
- Using and managing data
- Being safe and secure online
- Ethical use of technology
- Digital learning, development and wellbeing

Both policy directives reflect discussion and debate in the academic literature and will be explored further in the findings of this review.

Similarly, in the Republic of Ireland, the Health Service Executive have been driving digital reform with the establishment of the HSE Digital Innovation Team to support the rapid adoption of technology to improve patient, staff and system efficiency, effectiveness and experiences (https://www.hsedigitaltransformation.ie/home).

Figure 1. Our digital vision – Digital Strategy Health & Social Care Northern Ireland 2022-2030



One of the challenges for community and voluntary sector organisations delivering social care is assessing the acceptability and cost-effectiveness of adopting innovation, and balancing the required investment in staff and service users to implement change. Low pay and heavy workloads mean that staff turnover can be a significant challenge. Technology alone cannot effectively address all these issues but it does offer huge potential for efficient solutions to support and extend independent living, promote social connections, learn new skills, improve working conditions and reduce the need for some labour intensive activities such as home visits. Data monitoring and artificial intelligence can help track people's health and wellbeing, help manage risks, promote self-care and self-management and ultimately

improve people's quality of life. However in order for digitisation to be successfully implemented, staff need to feel invested in the process, understand the potential benefits and be provided with needs-based training and ongoing support to build confidence, provide reassurance and help develop training and education resources that are fit for purpose.

This scoping review seeks to establish the range of technologies available to train and develop staff working within social care.

2 Methods

The aims of this study are to explore evidence from systematic reviews to establish:

(a) What technology is available?
(b) What are the most effective uses of technology?
(c) What are the facilitators and barriers to the implementation of this technology?
(d) Are there any ethical issues about the use of this technology?
(e) What further research is needed in this area?

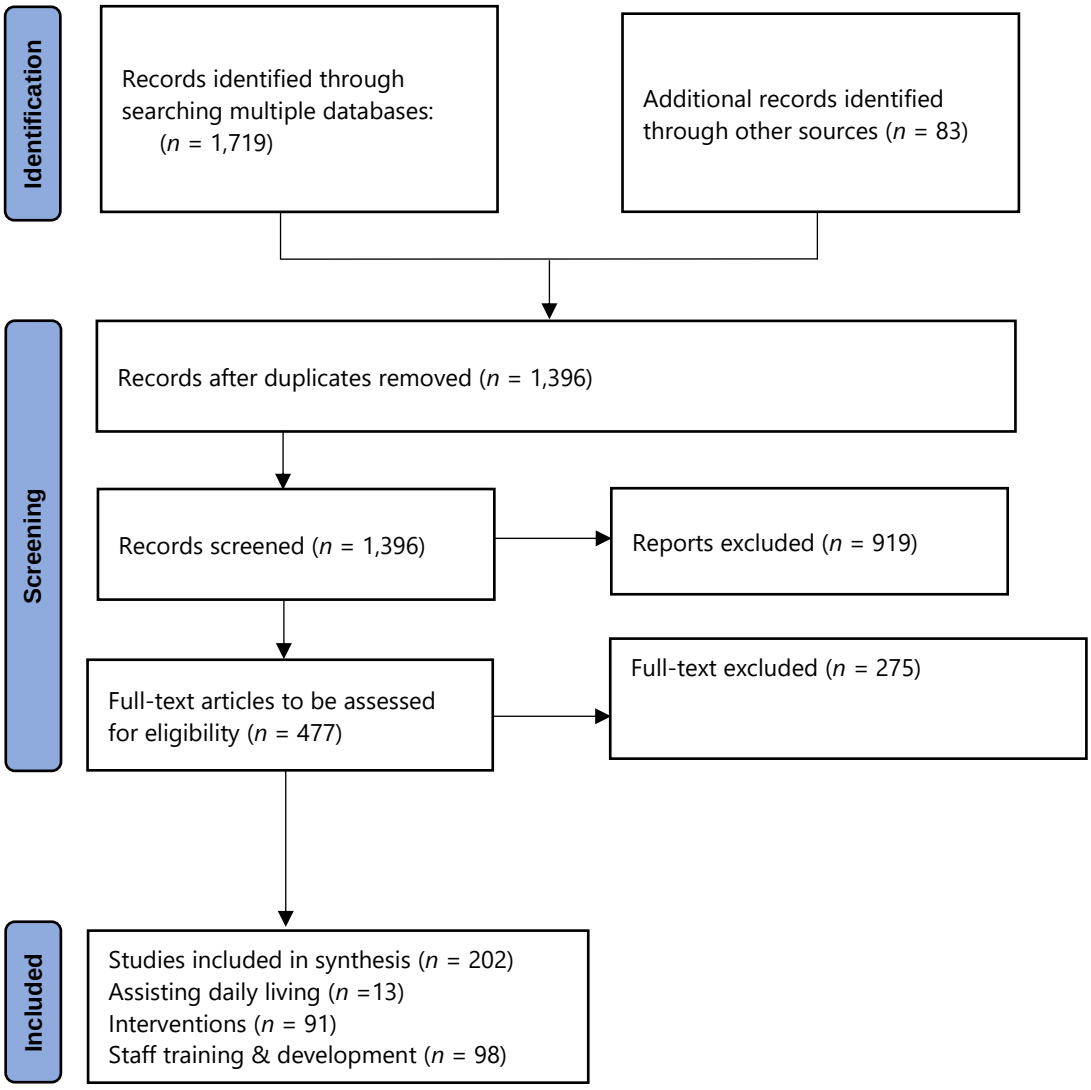
This review is one of three examining the role of digital technology in social care. This paper focuses on the use of technology for staff training and development, and the two other reviews report on: assisting daily living and; digital therapeutic or psychological interventions. Searches were conducted to cover all three topic areas. Recommended scoping review methods (Arksey & O'Malley, 2005; Levac et al., 2010) were used and results are reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for scoping reviews guidelines (PRISMA_ScR; Tricco et al., 2018). Studies were eligible for inclusion if they were published in the English language and focused on digital technology for (a) assisting daily living, (b) staff training and development, (c) therapeutic interventions to support service users with mental health problems, Autism Spectrum Disorder (ASD), intellectual/learning disability, or dementia. As this is a fast-changing environment, results were limited to systematic reviews, narrative reviews, and qualitative evidence syntheses published between 1 January 2015 and 28 February 2023. Reviews that were published outside these dates or in a language other than English were excluded.

Searches were conducted in MEDLINE, PsycINFO, Social Sciences Citation Index (SSCI) and Social Care Online. Searches were derived from key terms (See Appendix 1) and tailored for each database. Search results were exported to EndNote and titles and abstracts of the results were screened to be considered for full text review. Ten per cent of the search results were double screened. Disagreements on inclusion at full text review were resolved through team discussion. Data were extracted from included studies including: author information; study design; sample characteristics; the type and range of technology used; its effectiveness and acceptability; facilitators and barriers; ethical considerations; and recommendations for future research. Results were summarised and reported using a narrative synthesis approach. Key findings from studies were then compared, contrasted and synthesised to illuminate important themes.

3 Results

The searches retrieved 1,802 studies, 406 duplicates were removed. 1,396 titles and abstracts were screened and 919 were excluded at this stage. 477 were considered for full text review and 275 were excluded because the focus was not relevant to social care, did not include the population of interest, did not meet the aims of the review or did not meet the methodological inclusion criteria. The PRISMA diagram format for scoping reviews (ScR) is provided in Figure 1. Details of the 98 studies included in the review are provided in Table 1. A narrative synthesis of review results is detailed below.

Figure 2. PRISMA-ScR Diagram



Narrative analysis identified the following themes:

- Attitudes to technology
- Types of technology
- Digital training needs of staff
- Training approaches
- Organisational change
- Measuring effectiveness

It is also important to note that most of the literature relates to healthcare settings and medical and allied health professions rather than social care however many of the skills and training needs will be similar.

3 Findings

Available technology

In order to consider the training and development needs of social care staff, we first need to consider the types of technology that are routinely being introduced within care settings and anticipate the direction of digital travel. The World Health Organization has classified digital health interventions and those aimed at health professionals as follows:

- Patient identification and registration
- Patient health records
- Health professional decision support
- Telemedicine
- Health professional communication
- Referral co-ordination
- Health worker activity planning and scheduling
- Health professional training
- Prescription and medication management
- Laboratory and diagnostics imaging management

The interfaces vary across platforms however the main developments include e-health/smart phone apps, the Internet of Things (IoT), patient portals, digital interventions.

E-health/mobile apps

The range of technology in health and social care settings varies widely, offering e- and mobile health technology that can help people with everyday living, monitor complex health conditions, facilitate closer links with Health Care Professionals (HCPs), reduce waste and improve cost effectiveness, and aid decision-making with the ultimate aim of improving quality of life for service users.

Apps can offer a number of different functions, from monitoring mood and symptoms, to providing prompts for medication. Legislation in most countries do not require apps to comply with medical device regulations (Grundy et al., 2016), there are no recognised international quality standards or regulations (Azad-Khaneghah et al., 2021) and as a result many have not been tested for safety or effectiveness (Bindhim et al., 2014) which leads to variability in function and utility. Azad-Khaneghah and colleagues (2021) reviewed rating scales used to evaluate the usability and quality of mobile health apps and concluded that these scales are targeted at professionals and not the end users. There was evidence that HCPs need greater support to evaluate and appraise apps to identify those which are most beneficial to their practice.

Bernard et al. (Bernard et al., 2022) studied the implementation of occupational e-Mental health interventions delivered online, by smartphone, telephone or email. They concluded

that urgent research is required to better inform implementation strategies, including the need to engage decision-makers to improve the reach and effectiveness of interventions.

In a Cochrane qualitative evidence synthesis (Odendaal et al., 2020), mHealth initiatives were reported to be useful in providing care, improving how health workers worked with each other but having to rely on variable network coverage could impede their utility. Despite this, there is clear acknowledgement that how care is being delivered is in a period of adjustment and change and e- and M-health allows people to take on new tasks, work flexibly and ultimately reach out to harder to access populations. Decision-making software was considered useful by some however others felt it was a threat towards their clinical skills. Health workers wanted training, technical support, user-friendly devices, and systems that were integrated into existing electronic health systems.

Internet of things

Internet of things (IoT) technology enables things (e.g. devices, cars, people, animals) to communicate with each other and users over the internet using technology including Radio Frequency Identification (RFID) (wireless system of tags and readers), sensor technology, nanotechnology and embedded intelligence technology (Al-Rawashdeh et al., 2022). IoT in healthcare settings can also include Healthcare of Medical Things (IoMT).

What are the advantages of IoT in the literature?

- Cost savings – being able to meet and assess patients remotely reduces the cost of in-person visits
- Measuring treatment outcomes – these can be consistent, continuous and automated and can be monitored by a doctor on a regular basis also ensuring fidelity to treatment
- Disease management – creates opportunity for earlier intervention/prevention
- Error reduction – reduces the effect of human error
- Patient satisfaction – timely monitoring can encourage active participation
- Medication management – more precise with less waste

Despite these recognisable advantages, a recent systematic review (k = 22) reported that the adoption of IoT technology in healthcare settings was low partly due to challenges with healthcare professionals themselves (Al-Rawashdeh et al., 2022). Other studies had also identified the slow adoption of IoT with systems lacking integration with current systems (Alkhaldi et al., 2023; Christie et al., 2019). Alkhaldi et al. (2023) conducted a systematic review to classify and evaluate interventions aimed at encouraging HCPs to prescribe mHealth apps. The most commonly reported outcomes as a result of the interventions were reported improvements in knowledge, confidence and self-efficacy.

What factors influence healthcare professionals to adopt IoT?

- Professionals need to perceive that the technology will be useful and easy to use.
- Concerns about cost, privacy, security are considered barriers.

- Concerns about the safety and confidentiality of data captured and what happens if the device is stolen.
- HCPs need to know how to select the right tool for their needs – recommendations for an approved list of apps should be made available, people should be trained to appraise apps for their use, and investment made in training (e.g. videos, workshops, one-to-one, and champion support).

Patient portals

Patient portals are secure websites that offer patients access to information and can also enable reciprocal communication between HCPs and service users through secure electronic messaging for example (Laukka et al., 2020). They are designed primarily to improve patient self-management (Voruganti et al., 2017) by increasing a patient's knowledge and understanding of their care, reducing hospital visits and increasing trust and confidence in their care provider. These benefits are possible as long as any concerns about safety and confidentiality are allayed.

Laukka et al. (2020) systematically reviewed qualitative studies that explored HCPs' positive and negative experiences of patient-professional communication via patient portals. While greater understanding of the patient experience was facilitated using the technology and efficiencies were apparent once the system was established, some HCPs reported increased workload (by the creation of additional steps in the care process), and fear and discomfort trusting the technology. HCPs could also be challenged by the level of expertise required and had to rely on others to respond to patient queries via the portal. Deficiencies in the quality of communication was also criticised in some of the included studies, and in some circumstances lacked sensitivity and empathy, overlooking patient cues of distress. Examples were given where communication exchanges were deliberately suspended or removed preventing patients from replying to message threads. HCPs complained that they didn't always have all of the information that they needed to respond in detail to service users, potentially affecting the quality of care.

Professionals used to working with technology may view innovations more positively, but additional support and training should be made available to those who feel less confident as they may struggle with the communication requirements of this platform and only with appropriate training and support will behaviour change be fostered. Laukka's research also identified differences in how organisations support staff to use technology, including variation in the time and resources allocated.

Digital mental health interventions

Although research suggests that online interventions can be as effective as face to face treatment, concerns have been raised about their scalability due to shortages of professional

staff. Leung et al. (2022) reviewed the evidence for delegating guidance tasks to paraprofessionals (peer supporters, technicians, lay counsellors or other non-clinicians). Interventions guided by non-clinical staff reported higher post-treatment effectiveness outcomes compared to control programmes (e.g. online psychoeducation, monitored attention control) or wait-list controls (k=7, Hedges g=–0.73; 95% CI –1.08 to –0.38). There were also significant differences between non-clinician-guided interventions and unguided interventions (k=6, Hedges g=–0.17; 95% CI –0.23 to –0.11). Non-clinician-guided interventions did not differ in effectiveness from clinician-guided interventions (k=3, Hedges g=0.08; 95% CI –0.01 to 0.17). The authors conclude that integrating paraprofessionals and non-clinical staff to deliver guided digital mental health interventions can improve mental health outcomes and may enhance adherence outcomes regardless of the qualifications of the individual performing the intervention. The research shows that non-clinician guides improve effectiveness outcomes compared to having no guide.

The literature on task-sharing initiatives in low- and middle-income countries (LMICs) has demonstrated the effectiveness of non-specialist health workers co-delivering mental health care (Hoeft et al., 2018; Kroenke & Unutzer, 2017). Digital interventions have been successfully developed to offer digital training to develop knowledge, skills and competencies, to support mental health care delivery but also to facilitate supervision and promote staff retention (Naslund et al., 2019). Naslund and colleagues' narrative review described seven different examples from six different LMICs to demonstrate how technology has been used to develop the role of non-specialist health workers namely via improving connections and support to patients, creating new opportunities and access to training and skills development, receive supervision and support from more specialized providers, and improve data collection and care co-ordination. The authors recommend engaging in coproducing digital tools with non-specialist health workers who can provide greater insight and cultural sensitivity to help develop resources that are relevant and useful.

Attitudes to digital technology

While many health care professionals are receptive to adopting technology in training and treatment, there remain barriers and concerns around its implementation and fears that it may negatively impact the service user relationship on a number of different levels (Gagnon et al., 2016). In order for people to be encouraged to adapt their practice, technology must be perceived as easy to use, useful and not seen as a cheaper and lesser alternative to good quality care (Garavand et al., 2017). Professionals want reassurance that they can trust the available technology (Shinners et al., 2020). Comprehensive training and ongoing help and support will also help implementation.

Qualitative research examining HCPs' attitudes to sensory networks for remote monitoring (Basholli et al., 2018) found that while people were willing to use advanced technologies and recognised the benefits of using technology to collect robust data, sensory networks for remote monitoring also facilitated better decision making and ultimately contributed to the delivery of improved care and quality of life for the patient. The importance of good quality training prior to implementation improved adoption of the new technology. Age was not a barrier to implementation.

Frontline staff views (N = 48) in an early intervention psychosis service in the North of England were explored in a qualitative study by Bucci and colleagues (2019). Staff working in the service found digital tools acceptable but raised a number of concerns about the implementation of the technology. Barriers were identified at both staff and service level:

- Resources should be invested in staff training rather than technology designed to replace clinical skills – this threat was considered a barrier to staff adopting or recommending digital approaches.
- Staff lacked confidence in their own skills and abilities to use the technology being introduced, hence the proper investment required to train and provide ongoing support where required.
- The age gap was also considered to be a problem for some in adopting new technology in their day-to-day life however others, who may not have been very confident in their skills, were willing to embrace the inevitable changes happening.
- Staff also had low expectations and confidence in the tools developed by the NHS based on previous negative experiences of both small- and large-scale IT projects.
- Level of staff burden was another concern given current time constraints and pressures. There was a preference for making systems easy to use which would complement current practice.
- Concerns about data safety and security remained.

Additional barriers at service user level were also raised by participants:

- Lack of affordability of smart phone technology.
- Poor literacy or communication skills.

- Not having English as a first language.
- Concerns that smart phones could exacerbate symptoms e.g. delusional beliefs associated with the internet in psychosis, fear of being watched/monitored.
- Introduction of technology will depend at what stage of the illness individuals are.
- There was also some anxiety around how the therapeutic relationship which is so important for recovery might be affected using technology. Digital approaches were considered robotic and depersonalised and unable to respond to non-verbal cues and para-language and reinforcing social avoidance responses, "*saying that they're fine and they're still in their bedclothes that they've been wearing for three days … IT [information technology] would never tell me that* (Participant 31, Group 4)."

On the positive side, smart phone technology was considered to be easily accessible for those who could afford it, and they wouldn't have to wait until they logged on to a computer when they got back home. The ubiquity of smart phone apps were considered non-stigmatising as long as the app could be accessed discretely. Other interviewees considered the technology as empowering as they did not need to rely on staff to provide support – "*they can use it in their own time as and when they feel…*". Other positive aspects were the choice technology offered and the sense of ownership over their own data. The conclusion of staff was that technology should be an adjunct to, and not a replacement for, face-to-face contact, that could be useful for homework between sessions and help monitor mood and symptoms.

Positive outcomes were reported in a systematic review of patient and provider experiences of video consultation treatment for depression in older adults and concluded that it was a useful alternative when face-to-face sessions were not possible (Christensen et al., 2020).

A recent scoping review reported several barriers impeding the use of touchscreen tablets in dementia care settings, including staff's limited knowledge of how to use the technology, lack of Wi-Fi or connectivity and the physical accessibility of the devices (Hung et al., 2021).

Off-the-shelf gaming technology has been used successfully to support wellbeing in dementia but is rarely used within dementia care settings. Focus groups with care home workers across the south of England (N = 39) explored practitioners perceptions of barriers and facilitators of gaming technology (Hicks et al., 2022). Care workers felt reluctant to take on board new training in an area they felt incompetent in and were resistant to changing their job roles. Negative attitudes towards gaming devices were associated with a defeatist attitude, leaving them less likely to persevere with learning how to use them. The need to create time and space and opportunities within their working day to learn and practice was considered important. It was also articulated that some people had more negative attitudes towards residents' capabilities for adopting new technology, with an assumption that people with dementia would not be able to learn new things or engage with the virtual environment. One participant said, '*We mostly have people with dementia (in the care home) and I don't want to be rude, but they are already in a different world and I think it would be too much*

stimulation for them'. (FG3, P2) (Hicks et al., 2022, p. 1546). Failure to promote the use of the technology was associated with wider institutional barriers and the need for inclusive training for care staff in how to integrate gaming technology in their practice. Learning that could be "*communicated and championed through their peers*" (Hicks et al., 2022, p. 1546) would be more effective at changing attitudes and, in turn, improve care.

Training needs

Commentary provided by Wong et al. (2021) highlights the need for capacity building within educational settings and curricula but also to pay attention to the opportunities presented through interdisciplinary learning. Students also need opportunities to meaningfully engage in decision-making processes, including practical experiences in order to apply this knowledge. A further neglected element of these developments are the ethical considerations around the use of digital technology (Wong et al., 2021).

What skills do HCPs need to deliver digital care?

Jimenez et al.'s (2020) scoping review of digital health competencies for primary healthcare professionals found a dated evidence base and knowledge gaps. Most studies were aimed at GPs or primary care doctors and improving knowledge of information technology, medical informatics, electronic care records and basic IT literacy, but less information available on digital health education, curriculum integration and evaluating the impact of technology on service delivery and implementing change. The range and scale of digital health competencies needs further research to update and reflect a diverse and changing workforce and increase technology at a clinical and organisational level to ultimately improve care outcomes (Longhini et al., 2022).

Konttila et al. (2019) took a different approach to assess HCPs competence in digitalisation, reviewing the qualitative and quantitative evidence. Having digital technology knowledge and skills were considered important, but also the value of social and communication skills were highlighted and the ability to make ethical decisions about using technology to support patient care. Findings also identified the need for HCPs to be motivated and willing to adapt their practice to accumulate experience and skills in their professional context. Many digital interventions focus on promoting capability. However motivation should also be targeted to improve engagement and promote behaviour change (Virtanen et al., 2021).

Organisational and collegiate support were also considered crucial for helping to build a positive learning environment. Creating a safe and supportive team environment to promote participation was rated as very important, promoting a safe working environment, providing support to help make decisions and creating motivation to undertake specific tasks. Practical support and appropriate resourcing were also considered key.

Kuek and Hakkennes (2020) issued a staff survey to measure confidence levels and attitudes towards the implementation of a new electronic health record system. While the majority of the 407 survey respondents felt confident (70-80%) about the new technology, 20% felt anxious about using it. They concluded that targeted education and training directed at staff with lower digital literacy levels and/or confidence would benefit implementation strategies.

Greater evidence for the effectiveness of digital training has been raised multiple times (Nicoll et al., 2018).

Appraisal skills

Although technology has the potential to improve the quality of healthcare delivery at lower cost, there is still some reluctance in HCPs to use or recommend their use for others (Al-Rawashdeh et al., 2022; Alkhaldi et al., 2023).

A systematic review of digital problem based learning (DPBL) found that this approach was as effective as traditional problem-based learning (PBL) and more effective than traditional learning in improving knowledge (Tudor Car et al., 2019). DPBL may be more effective than traditional learning or traditional PBL in improving skills. Further studies should evaluate the use of digital technology for the delivery of other PBL components as well as PBL overall.

Giving clinicians a range of evaluated apps or an app appraisal tool to select from as well as offering training improved clinical confidence (Al-Lami et al., 2020; Byambasuren et al., 2020). Videos demonstrating the content of the apps were used mid-trial to showcase content, features and functionality.

Undergraduate level training can improve confidence and self-efficacy including developing the interpersonal skills needed to help patients use technology and how to download and interpret data (Rodder et al., 2018). However, there is a large gap between what is being taught and what is required in practice (Jimenez et al., 2020).

Training delivery

Kirkpatrick's four-level evaluation model for educational and training interventions has been used for a number of online learning approaches (Daniel et al., 2021; Muirhead et al., 2021):

- Kirkpatrick Level 1: Reaction or Satisfaction;
- Kirkpatrick Level 2a: Change in Attitudes;
- Kirkpatrick Level 2b: Change in Knowledge or Skills;
- Kirkpatrick Level 3: Change in Behavior;
- Kirkpatrick Level 4a: Change in Organizational Practice;
- Kirkpatrick Level 4b: Change in Clinical Outcomes.

Online learning

Daniel et al.'s (2021) recent review of online learning focused on medical education reported that the focus in the research so far tended to be on Levels 1 and 2 and that "Evaluations of both synchronous [everyone together] and asynchronous approaches [people have flexibility about when to access the learning] were mixed….Many learners agreed that the online formats were an acceptable means of acquiring theoretical or content knowledge, however, teaching procedural, lab-based or clinical skills were more challenging…Advantages to online learning cited included increased attendance, flexibility (access anytime, anywhere…and convenience/ability to work from home, less time spent travelling, self-pacing, time for reflection, multimedia learning and scalability. A few studies leveraged the disruptions imposed by the pandemic as an opportunity to break out from traditional boundaries. Regional, national and international collaborations emerged…allowing more educators to contribute and experts or those with different perspectives to be accessed, expanding local capacity to continue education during the crisis. Disadvantages of online learning cited included lack of social connections and interpersonal interactions with faculty and peers, passive participation, distractions of the home or online environment, communication challenges, 'Zoom fatigue'…and cyber threats…or information security issues. Discordance was seen across studies regarding learner engagement, participation and interactivity, with some studies describing 'more,' the 'same' or 'less' in the online environment." (p. 7-8)

Webinars

Gegenfurtner and Ebner (2019, p. 17) in their systematic review of the effectiveness of webinars found that "webinars and face-to-face classroom teaching are comparable in their effectiveness to promote student learning. This is good news for all teachers, trainers, and lecturers who wish to offer and implement digital modes of learning for their students because webinars offer higher levels of flexibility for the learners even if the achievement effects of webinars are small (positive, but trivial in size). This is because students can attend lectures at home or at their workplace without the temporal and monetary cost of traveling." There are complex issues involved and the recurring themes do continue to emphasize the importance of interactive (whether physically face-to-face or online), the application of

learning to participants' work; and the importance of follow-up support and evaluation of both staff and service user outcomes.

Interactive competency-based training

A competency-based provider training programme using interactive materials which allow learners to engage in the material was successful in training clinicians and significantly increased individual understanding, confidence and implementation. Having an onsite champion to offer support was also beneficial (Armstrong, 2019; Armstrong et al., 2018). One-to-one training has also been used successfully (Makhni et al., 2017).

Workshops

Other clinical areas have used workshops to educate dieticians to appraise the quality of the apps – working in small groups with other HCPs allowed for discussion and comparisons to be made and led to significant improvements in self-efficacy of mHealth apps (Chen & Allman-Farinelli, 2019). Chen et al. (2019) focused on supporting people to use the apps even in difficult/challenging situations.

Distance learning strategies

Healthcare provision in rural settings e.g. Australia have relied on technology for training staff and delivering care for many years and can provide a reference for exploring the effectiveness of online approaches (Bracq et al., 2019; Bradford et al., 2016). Considering the training needs of allied health professionals (AHPs) working in rural areas, Berndt et al. (2017) evaluated the effectiveness of distance learning strategies and included video and teleconferencing, web based platforms and virtual reality in their systematic review. Rural health settings face a broad range of challenges delivering care, often requiring a broad transdisciplinary skill base to meet the needs of a diverse group of clients, in an environment where resources can be scarce and support structures are limited. As demands for healthcare change, keeping up to date with technological advances is an important aspect of staff development and managing staff retention and satisfaction.

All of the interventions included in the review were considered resource intensive and would require investment to establish and replicate. Technology based delivery compared to face to face models reported similar levels of (positive) satisfaction and learning outcomes were as successful. Only three studies reported on practice change following the educational intervention but these were based on self-report and not standardised scales. None of the studies examined the relationship between continuing professional development and workforce retention. Interaction with instructors could avoid participants feeling isolated as rural workers as well as facilitating engagement with other participants in other rural areas and was the most enjoyable type of delivery.

Factors that influence success and sustainability (Bradford et al., 2016):

- Vision – establishing a clear, realistic goal for the purpose of the service
- Ownership – with both clinicians and management 'on board'

- Adaptability – the service will need to be adaptable to the needs of patients, clinicians and services and likely go through several iterations to establish suitability of the model
- Economics – transparent costs/time required that compare the clinical benefits to face-to-face services
- Efficiency
- Equipment – processes must be in place to support technical requirements

Video consulting

A study which pre-dated the pandemic, highlighted the positive potential for the use of technology to support the application of learning and the further development of skills. Baker et al. (2017) explored the effectiveness of video informed reflective practice in the context of the implementation of Active Support. They reported that "Training consisted of a 1-day workshop, and follow-up coaching. Momentary time sampling was used to measure engagement levels and staff assistance. A new observational tool was piloted to code the presence of positive and negative interactions between staff and the people with intellectual disabilities. Results showed that service user engagement levels and staff assistance increased significantly following the training. There was also a significant increase in positive interactions and a significant decrease in negative interactions between staff and service users." (p. 180)

There remains a lack of evidence to support the spread and scaling up of video consulting (James et al., 2021).

Video conferencing

Video conferencing was by far the most popular format for delivery for rural AHPs, having been established for longer and was also found to be the most cost effective. Video conference participants felt fatigued after a full-day session, reporting sore eyes from the screen time. Technical problems were frustrating and required learners to be patient. Most of the included studies described the technology behind their design, but few detailed the content of the educational programme under review. An observation from one study suggested that education that requires a change in beliefs and values (e.g. cultural sensitivity) may be more effective face-to-face to allow for in-depth discussion. The authors conclude that distance learning is well established and will produce good knowledge whatever way it is delivered, this may be in part, individuals' commitment to learn either way.

Virtual & augmented reality

The Digital Health Education Collaboration's systematic review and meta-analysis of virtual reality (VR) for health professions education included 31 studies (*N* = 2,407) (Kyaw et al., 2019). The certainty of evidence was low to moderate because of the risk of bias and/or inconsistency in the reporting. Meta-analysis of 8 studies found that VR slightly improved

post-intervention knowledge compared with traditional learning ([SMD]=0.44; 95% CI 0.18-0.69; I2=49%; 603 participants; moderate certainty evidence) or other types of digital education (e.g. online or offline (SMD=0.43; 95% CI 0.07-0.79; I2=78%; 608 participants [8 studies]; low certainty evidence). Another meta-analysis of 4 studies found that VR improved health professionals' cognitive skills compared with traditional learning (SMD=1.12; 95% CI 0.81-1.43; I2=0%; 235 participants; large effect size; moderate certainty evidence). Other forms of digital education favoured the VR group in two studies (SMD=0.5; 95% CI 0.32-0.69; I2=0%; 467 participants; moderate effect size; low certainty evidence) however, findings for attitudes and satisfaction were mixed and inconclusive. None of the studies reported any patient-related outcomes, behaviour change, as well as unintended or adverse effects of VR. The authors recommend that future research should evaluate the effectiveness of immersive and interactive forms of VR and evaluate other outcomes such as attitude, satisfaction, cost-effectiveness, and clinical practice or behaviour change.

Bracq et al. (2019) conducted a systematic review of virtual reality simulation for nontechnical HCP training and reported that screen-based VR simulators or virtual worlds are the most frequently used. Skills training focused on teamwork, communication, and situation awareness and while most studies have evaluated the acceptability and ease of use, few have measured the effects of VR simulation on nontechnical skills development. A scoping review assessing the effects of VR in medical education included 28 studies concluded that VR was safe, engaging and of benefit to participants (Dhar et al., 2023). Although there was wide variation in content, devices, and evaluation methods, the overall view was positive but further collaboration between healthcare and the VR industry to help realise its potential as an education tool.

VR has also been used effectively to promote workforce wellbeing. In a systematic review of VR and immersive technologies conducted by Riches and colleagues (Riches et al., 2023), VR relaxation was considered helpful in workplaces, but like much of the digital health research, better research is required.

VR also has the potential to transform assessment, understanding and treatment of mental health problems however greater efforts should be made to incorporate the views of service users in the design (Freeman et al., 2017).

Using VR and augmented reality has the potential to help health professionals and trainees to gain an understanding of behaviours and psychological responses associated with dementia within a safe environment (Jones et al., 2021).

Multiuser virtual worlds (MUVWs) for collaborative learning is increasingly popular for training HCPs across a range of clinical contexts, influenced by the success of the team-based simulation for developing collaborative practice (Liaw et al., 2018). Policy drivers have contributed to instigating change, with the aim of improving emergency planning and preparedness for disasters. Liaw et al.'s (2018) review primarily included undergraduate

students, mostly on nursing, medical or pharmacy pathways. Only five of the 18 included studies involved two or more professions learning together in a MUVW. Team training in acute care settings and communication training were the most common areas of learning as well as focusing on developing critical thinking tools based on patient case studies or research studies. Three included studies focused on developing professional values when working with marginalised and vulnerable groups. Most of the virtual worlds were hospital or classroom settings. Only half of the studies used theoretical learning approaches and most used simulation scenarios to practice skills. Outcome measures included changes in perceptions and attitudes and knowledge and skills. The evidence would suggest that MUVWs are acceptable however more research is required to evaluate their effectiveness.

Massive open online learning

Massive open online courses are free web-based distance learning programmes designed for large-scale participation and geographically dispersed students. In a scoping review, Longhini and Rossettini (2021) mapped the main characteristics of massive open online courses and aimed to establish how effective they are in promoting continuous education. Historically, this approach has been adopted by universities and health settings in the USA and deliver a range of different teaching methods and content, with a multidisciplinary target audience including HCPs. Based on their findings, the authors conclude that some public health issues may benefit from this method. However decision-makers should consider effectiveness evidence when selecting programmes.

Telesupervision

Telesupervision (clinical supervision using communication technology) has been evaluated as a feasible and acceptable form of supervision if set up well. Factors that influenced quality and effectiveness of telesupervision included (Martin et al., 2018):

- Supervisee characteristics – having clinical practice experience, have an insight into their own learning and supervision needs, and choose to have distance supervision.
- Supervisor characteristics – experience of isolated rural practice was beneficial and having a site co-ordinator or identified facilitator for the videoconference session (e.g. sending an agenda, and facilitating discussions).
- Supervision characteristics – structured sessions, minutes/agenda and discussion topics agreed prior to sessions, booking a room and testing the technology beforehand.
- Supervisory relationship – immediacy and continuity of supervisor availability.
- Communication strategies – using a more formal, slower speaking style, longer blocks of dialogue and taking notes to avoid interruptions and being disciplined, taking turns to speak was recommended and effective use of silence. It will likely take time to develop these skills and for users to feel confident in using them.
- Prior face to face contact – easier to establish a relationship if a face-to-face one is already in place.

- Environmental factors – quiet space, access to a phone and computer, rooms where distractions were minimal. Poor soundproofing could affect people's perceptions of privacy.
- Technological considerations – background noise, audio lag, auditory distractions and using old equipment were all barriers. Keeping firewalls and software up to date and training people to use the equipment confidently.
- Benefits and pitfalls – power imbalances, tendency to keep emotional issues to face-to-face sessions and increased costs setting up the technology in the first place.

Clinical decision-making support tools

The implementation of the CommonGround shared decision-making intervention involving peer workers and a computerised decision support process was evaluated in 4 community mental health settings (Bonfils et al., 2018). The evaluation established that most clients did not use the intervention consistently, with technological difficulties adding to the staff burden, difficulties with the design of the system that did not match the service structure, low investment in staff and high staff turnover were also associated with problems with the implementation.

Gillam (Gillam et al., 2022) identified similar complexities in developing eHealth care for people living with dementia in long term care, demonstrating the difficulties designing systems that work for service users, families and clinical teams but recommend that collaboration needs to continue to improve to maximise uptake and integration.

Technology-enabled dementia education

Technology-enabled dementia education (TEDE) can provide learning opportunities for HCPs by increasing training opportunities in a range of practice contexts and can be delivered via e-learning, online learning and blended approaches (Muirhead et al., 2021). The delivery setting is important and must consider staff time, internet access and digital competence; up-take and completion rates but relying on individuals to make time to schedule their own learning may lead to poorer outcomes (Surr & Gates, 2017). Interactive web-based resources and active learning approaches are considered to be more effective than passive approaches such as watching an online video lecture. Combinations of individual study online or face-to-face discussion were preferred in e-learning programmes with online discussions considered particularly beneficial; however resources are intensive to deliver high quality training including the time demands for learners and facilitators and the need for specialist technical support (Surr et al., 2017). Scerbe et al. (Scerbe et al., 2019) reviewed teaching and learning digital tools used for TEDE including videos, audio-narration, graphics and interactive content and while it was demonstrated that they were acceptable and effective in improving the outcomes measured, methodological problems make it difficult to attribute improvements to the interventions.

Key features for TEDE include (Surr et al., 2017):

- Active participation including collaboration and problem solving
- Interactivity between groups of learners and experience facilitators
- Meet the individual needs of learners offering collaboration, peer and facilitator support and group reflective activities

It is unclear whether TEDE is more cost-effective than traditional approaches and further research is required to establish how effective it is in improving dementia care (Muirhead et al., 2021, 2022).

Barriers to online learning

O'Doherty et al. (2018) considered online learning in medical education and reported that time constraints, poor technical skills, inadequate infrastructure, negative attitudes and an absence of institutional strategies and support were all barriers. Recommended solutions to improve engagement included improving educator/facilitator skills, providing incentives and time rewards to develop and improve delivery of online content and promote institutional approaches to garner support and engagement.

Supporting service users

Berry, Bucci and Lobban (2017) explored staff views of the internet/mobile phones to support service users with severe mental health problems. Staff had conflicting views about the pros and cons of web-based resources and digital health interventions designed to manage wellbeing. While they were considered to be helpful, there was also some concern it could increase the digital divide and the understanding that digital health should be used to enhance face-to-face support and not replace it. The findings suggest that staff need clear guidance and training to identify reliable and secure settings and how to manage professional boundaries online. The authors recommend that management should promote digital interventions as a way to improve care and choice rather than a cost-cutting exercise.

Maintaining compassionate care in a digital world

Training and coaching using digital technology to increase compassion has been used to experience simulated symptoms of schizophrenia, psychosis and dementia. Mindfulness training has been used to promote wellbeing, mood tracking and help improve responses to suffering and improve care. In their review of compassionate mental health care, Kemp et al. (2020) categorised digital interventions that were classified as 'compassion-oriented technologies' and included shared gaming time between professionals and patients to promote bonding, mental health apps and patient portals.

Detractions from compassion care include the effect of patients' nonresponse to email/instant messaging and clinical experiences that could not be replicated online (Kemp et al., 2020).

Technology for self-care

Davis (2020) considered technology based tools that could improve clinician access to mental health treatments, remove stigma and reduce burnout. While there were no digital tools specifically designed for HCPs, the author suggested that many already available target populations facing similar issues and can be an effective approach to improve work-life balance, target compassion fatigue and help address the physical impact of burnout.

In a similar review, Lopes et al. (2022) examined interactive approaches for relieving work-related stress associated with mental health including computer monitoring systems that can detect emotion-sensing and analyse physiological data within the workplace. Stress-mitigating interventions included VR-based using head-mounted displays to help foster calming states (Thoondee & Oikonomou, 2017) although VR may not be the best option in business environments as the evidence suggests that there is little difference in the effectiveness of immersive and non-immersive stress-reducing techniques.

The Headspace mindfulness meditation app has been reviewed in a number of different studies and significant improvements in daily positive affect and global wellbeing have been reported in workers which include a reduction in occupational stress (Bostock et al., 2019).

Desktop applications that provide stress mitigating interventions and advice were delivered in research by Sano et al. (Sano et al., 2015, 2017) such as prompting workers to take a short walk with a colleague or improve their posture. In over 50% of prompts, the timing was considered inopportune and further investigation involved establishing optimal timing to deliver these micro-interventions. Their findings showed that interventions suggested in the early morning or afternoon before becoming immersed in work tasks were favoured. Somatic interventions were the most effective, and social somatic interventions (e.g., walking with someone) were more effective in reducing stress. The least preferred intervention type was positive psychology (e.g., making someone else feel better).

Phillips, Gordeev and Schreyögg (2019) included 50 studies (and 34 in a meta-analysis) in their review of the effectiveness of occupational e-mental health interventions and reported moderate treatment effects on stress, insomnia, and burnout, and small effect sizes for depression, anxiety, wellbeing and mindfulness. They conclude that there is evidence for significant improvements in health. However further research is required to establish what factors lead to change.

Implementation

Inter-professional education

In an attempt to improve education in the assessment and care of adults at risk of suicide, nurses in a Canadian study demonstrated improvements in suicide awareness, confidence and knowledge as part of education and electronic suicide risk training.

Management and resources

While digital technology may improve individual people's lives, there is limited information available on the impact from a management perspective and IT is the main driver of change rather than organisational strategy (Angerer et al., 2022). People-focused disciplines including human resources, governance/ethics and organisational behaviour have been under-represented in their design and development and as Henriette et al. describe, "digital transformation is more than just a technological shift". More research is required to understand how technology and management can collaborate with the development and implementation of technology to help meet the strategic and operational elements of healthcare management and organisational design (Angerer et al., 2022). Brommeyer et al. (2023) undertook a scoping review of the literature to examine competencies required for health service managers leading the implementation of informatics and digital technology in health settings and the factors that contribute to building management workforce capacity to enable it. They identified the need for information and data management to be part of the core competencies needed for health service managers in addition to four key skills and experience:

1. Leadership
2. Operational and resource management
3. Personal, interpersonal and professional qualities
4. Understanding the industry and environment

In a review of the implementation of web-based therapies in mental health services, many of the same themes were identified and professional concerns about delivery but acknowledged that many people will not access web-based support without the support of educated, well-trained and supported professionals that can incorporate online therapies in their practice (Davies et al., 2020). Supporting HCPs to do this should be promoted to design systems to encourage this way of working and allay any concerns they have.

Kho, Gillespie and Martin-Khan (Kho et al., 2020) reflect the debate about lack of attention to change management in telemedicine implementation in their systematic scoping review of practice. Their research concurs with Brommeyer et al. (2023), critical of the piecemeal approach and a lack of planning, managing and reinforcing change in telemedicine.

Policy

Although training has been criticised at undergraduate and institutional levels, wider support for digitisation is needed and this includes policy directives that encourage the reporting of

outcome data that monitors care, improves the interface to enable clinical care and IT systems that can support implementation (Jimenez et al., 2020).

Coproduction

The development of mHealth interventions had been slow to incorporate the views and experience of service users but this is beginning to change. One of the main criticisms in digital development is the lack of guidelines and this can lead to deficits in the products, not least in the utility of the interface and outputs from a service user perspective (Eyles et al., 2016).

Kleiven et al. (2020) used qualitative interviews with 26 home care health professionals in Norway to explore the implementation of a digital medication dispensing system. 'Technology scripts' are developed by those who design the interventions and are often based on how they anticipate they will be used but these often represent stereotypes (Östlund et al., 2015) and may not reflect real-life practice. Safety of medication use was a considerable concern for professionals and concern that a 'warm' handover task (dispensing the medication face to face) would be replaced by a 'cold' one (digitised dispensing). Involving HCPs in the process of negotiating and developing the dispensing system and how the 'technology script' was detailed was helpful, "I wasn't happy about it at first. I thought that they were removing the warm hands and replacing it for a cold thing instead. If you see what I mean? That we were being replaced. But I have realized that it is beneficial, my views have changed. It was unfamiliar, a strange object. My impression is that many of us thought like I did." (Auxiliary nurse) (Kleiven et al., 2020, p. 5). A process of developing trust is described but also accepting that not everyone will want to use the dispenser and decisions to implement it were based on the needs/competencies of the user, not the technology. This study highlights the importance of coproducing technological solutions during the implementation phase.

4 Conclusions

Health care professionals need more support to evaluate and appraise the range of technology available to them. Consideration of the co-development of an approved list of tools could be developed and updated regularly to offer evidence-based advice in a rapidly developing sector.

Technology offers a range of cost effective support but professionals need reassurance to understand that technology is not a cheaper alternative but can be used to enhance quality care. Of not least importance is the role that technology can provide to gather data collection and improve treatment outcomes and, in turn, increase patient satisfaction, reduce episodes of hospitalization and offer accessible expert care. Interventions should be cognisant of literacy and communication issues, as well as the affordability and accessibility of technology to reduce inequalities.

Concerns about safety and privacy need to be adequately addressed.

Adequate training and ongoing support requires investment to offer tailored training at an appropriate level to instil confidence and develop the right skills to deliver safe care. This will require commitment and investment at an organizational level, led by multidisciplinary management that hold the human resource knowledge, governance and policy intelligence as well as the technical requirements to implement organizational change. Coproduction again must feature to improve design, delivery and outcomes. The champion model could be a way to support implementation in services.

The options for training delivery are many and varied and there should be suitable approaches for everyone, but matching training delivery to specific needs should be considered when designing training for staff.

Supporting service users remains the central objective to implementing technology and any concerns about reducing staff compassion and understanding using digital care should be allayed. Promoting self-care and workforce wellbeing can be well supported digitally.

The role that inter-professional education can provide to promote and improve collaboration using technology is promising but without visionary leadership and the appropriate skills and knowledge to lead change, barriers will remain.

Table 1. Summary of evidence

e-Mental Health Interventions		
Study ID	**Potential benefits**	**Issues to consider**
Bernard 2022	Occupational e-Mental health interventions Implementation of technology.	Urgent research required to inform implementation strategies & engage decision-makers
Odendaal 2020	mHealth initiatives Effectiveness & utility.	Useful in providing care & collaborative working but infrastructure limitations can impede use.
Internet of Things (IoT)		
Study ID	**Potential benefits**	**Issues to consider**
Al-Rawashdeh 2022; Alkhaldi 2023; Christie 2019	• Cost savings • More reliable outcome measurement • Improved disease & medication management • Error reduction • Increased patient satisfaction • Improved knowledge, confidence & self-efficacy	Despite utility, uptake and adoption rates of technology are low. Current systems lack potential for integration. HCPs need support to understand utility of technology, including ease of use. Concerns about privacy, cost, safety are barriers. Data protection is an added concern, particularly if devices are stolen. HCPs could benefit from a list of approved/recommended apps designed for specific needs. Investment in training is essential.
Patient portals		
Study ID	**Potential benefits**	**Issues to consider**
Laukka 2020; Voruganti 2017	• Greater understanding of the patient experience • Reduction in hospital visits • Increased trust and confidence in care provider	Patient portals are designed to offer patients secure access to information and enable reciprocal communication between HCPs and service users and improve patient self-management. Can lead to increased workload for HCPs by creating additional steps in care process. Concerns about safety and confidentiality should be addressed to reduce fear about adoption. Technical training and support is required and care taken to ensure interactions do not lack empathy or sensitivity or fail to respond to patient distress. Not everyone will have the confidence and skills to use the platform and tailored support and training may be beneficial.
Task sharing		
Study ID	**Potential benefits**	**Issues to consider**
Hoeft 2018; Kroenke 2017; Leung 2022; Naslund 2019	• Integrating non-clinicians in guided digital interventions can improve outcomes • They may also enhance adherence	Further research is required to demonstrate the cost effectiveness of these approaches and determine the scalability and sustained delivery within resource-stretched settings.

	• Helps develop knowledge, skills and competencies • Facilitates supervision and staff retention • Improved connections and support to patients • Improved data collection and care co-ordination • Improved insight into the patient experience and cultural sensitivity	
Attitudes to technology		
Study ID	**Potential benefits**	**Issues to consider**
Basholli 2018; Bucci 2019; Christensen 2020; Gagnon 2016; Hickes 2022; Hung 2021	• Technology must be easy to use, considered useful to be adopted • With comprehensive training and ongoing support, implementation will be easier • Benefits of collecting robust data that can improve decision-making and ultimately improve care and quality of life • Easy accessibility for those who can afford it • Empowering for service users who don't have to always rely on staff member availability • Promotes choice and a sense of ownership • Can offer homework/reinforcement activities as an adjunct therapy	There remain barriers and concerns about implementation and negative impact on service users. It must not be considered a cheaper alternative to good quality care. Professionals need reassurance that the technology can be trusted and the training to develop confidence to deliver. Staff expectations of technology are low, they can be considered a burden to staff in light of current staffing pressures and workload demands. Concerns about the patient experience remain, especially consideration of the cost of smart phones, poor literacy and communication skills and exacerbation of symptoms.
Training needs		
Study ID	**Potential benefits**	**Issues to consider**
Jimenez 2020; Rodder 2018; Wong 2021	• Opportunities for interdisciplinary learning • Adopting technology during undergraduate level training may aid implementation	Capacity building required within educational settings including providing students with meaningful opportunities to engage in decision-making processes through practical experience. Further consideration of ethical issues required. Undergraduate training can improve confidence and self-efficacy although there remains a gap between education and what is required in practice.
Jimenez 2020; Konttila 2019; Kuek 2020; Longhini 2022;	• Opportunities to meet the needs of a diverse and changing workforce and improve care outcomes	Evidence base of knowledge gaps is dated, especially in digital health which is a fast-changing environment. Training in ethical decision making is required. While the large proportion of staff will feel confident about using new technology, there will be a significant number who could benefit from targeted education and training, identifying those with lower

Nicoll 2018; Virtanen 2021	• Although digital skills are important, social and communication skills are still pivotal • Interventions that promote motivation to use and apply professional skills development will improve implementation	levels of digital literacy may be important. The most effective means of training staff should be evidence-based.
Training delivery		
Study ID	**Potential benefits**	**Findings**
Daniel 2021; Muirhead 2021	*Online learning* • Online learning is an acceptable way of acquiring theoretical or content knowledge • Online also facilitates increased attendance, is more flexible and allows for self-paced and reflective learning • Online education offers opportunities to engage a greater variety of professionals and expertise	Teaching procedural, lab or clinical based skills are better face to face. Online learning can limit social connections and interpersonal reactions with teachers and students. Zoom fatigue is a risk, as is disruptions associated with working from home.
Gegenfurtner 2019	• Webinars can be as effective as face-to-face learning	Follow-up support and evaluation of staff and service user outcomes is important to understand training effectiveness.
Armstrong 2018, 2019; Makhni 2017	• Interactive competency-based training using interactive materials can be an effective approach to training clinicians and improve individual understanding, confidence and implementation • Can also be delivered 1-1	Onsite champions to offer support are beneficial.
Bracq 2019; Berndt 2018; Bradford 2016	• Distance learning has been applied successfully for many decades in Australia and there is a large number of source materials and research evaluating this approach • This is an appropriate way to train multidisciplinary teams especially those located in rural settings • Technological training to address new developments can help retain staff and improve wellbeing	Good delivery relies on a clear, realistic goals for the purpose of the service, ownership from both clinicians and management and an adaptable service that meets the needs of patients, clinicians and services. Training will likely go through several iterations to establish suitability of the model. Transparent costs/time are required that compare the clinical benefits to face-to-face services. Equipment must be in place to support technical requirements

	• Interaction with instructors could avoid participants feeling isolated and facilitate engagement with other participants in other rural areas	
Baker 2017; James 2021	• Video-informed reflective practice training can improve service user engagement and reduce negative interactions with staff • Video conferencing has the largest evidence base having been established for much longer and research suggests it is cost effective	Further work is required to scale up this technology to support wider implementation. Length of video conference delivery requires consideration – long full-day sessions can be tiring, with too much screen time. Technical problems need to be resolved quickly.
Bracq 2019; Dhar 2023; Freeman 2017; Jones 2021; Kyaw 2019; Riches 2023	• VR and augmented reality has been developed effectively for health professionals training and can improve cognitive skills more than traditional learning approaches • Non-technical training delivered via VR simulation are becoming more frequently used and have been demonstrated as acceptable, engaging and easy to use • VR has been successfully used to promote workforce wellbeing • VR training can improve understanding of HCPs behavioural and psychological responses in service users e.g. dementia patients	Incorporating the views of service users could help improve the design of VR training.
Liaw 2018	• Multiuser virtual worlds for collaborative learning is increasing in popularity for HCPs across a range of clinical contexts and allows for a range of professions to learn together	More evidence is required to establish the effectiveness of this approach.
Longhini 2021, 2022	• Massive online learning courses adopted by universities and some healthcare settings can deliver multidisciplinary learning using different teaching methods and content	This approach does not work for topics/audiences and an evidence-based approach should inform type of delivery.
Martin 2018	• Telesupervision has been evaluated as a feasible and acceptable form of supervision if set up well	Supervisee and supervisor characteristics influence effectiveness and will depend on level of experience, insight into personal needs and choice in the type of delivery. Supervision should be well structured, with a clear agenda and a dedicated online meeting space, with reliable technology and without interruptions. Establishing an online relationship should begin with

		face to face interactions. Be aware that some issues may not be discussed in online spaces, particularly if they are emotive. Appropriate investment in technology is required from the outset.
Organisational support		
Study ID	**Potential benefits**	**Issues to consider**
Virtanen 2021		Creating a supportive team environment to promote participation is important.
Appraisal skills		
Study ID	**Potential benefits**	**Issues to consider**
Al-Lami 2020; Al-Rawashdeh 2022; Alkhaldi 2023; Byambasuren 2020; Tudor Car 2019	• Potential to improve quality of healthcare delivery at lower cost • Digital platforms may be more effective learning approaches than traditional ones • Offering clinicians a selection of evaluated apps or an app appraisal tool may improve confidence	There remains a reluctance for some HCPs to use or recommend their use to others. Videos demonstrating the content of the apps can be used to showcase content, features and functionality.
Clinical decision-making support tools		
Study ID	**Potential benefits**	**Issues to consider**
Bonfils 2018; Gillam 2022	• Computerised decision-making tools are designed to support clinicians and peer support workers	The current evidence suggests that compliance is inconsistent and technological difficulties can add to staff burden. Further work is required to synergise the technology with current service structures. High staff turnover also limits implementation and adherence. Greater collaboration between service users and HCPs is required to design systems that work for everyone.
Technology-enabled dementia education (TEDE)		
Study ID	**Potential benefits**	**Issues to consider**
Muirhead 2021, 2022; Scerbe 2019; Surr 2017	• TEDE can increase training opportunities in a range of practice contexts and can be delivered via e-learning, online learning and blended approaches • Combination and interactive approaches can be beneficial	The delivery setting is important and must consider staff time, internet access and digital competence; up-take and completion rates but relying on individuals to make time to schedule their own learning may lead to poorer outcomes. Resources to deliver high quality training are intensive and appropriate investment must be made. More research is required to establish how cost effective this approach is.
Barriers to digital learning		
Study ID	**Potential benefits**	**Issues to consider**

O'Doherty 2018	• Time constraints • Poor technical skills • Inadequate infrastructure • Negative attitudes • Lack of institutional strategies and support	Improving educator/facilitator skills, providing incentives and time rewards to develop and improve delivery of online content and promote institutional approaches to garner support and engagement.
Supporting service users		
Study ID	**Potential benefits**	**Issues to consider**
Berry 2017; Kemp 2020	• Digital health can be used to enhance face-to-face support and not replace it • Digital methods have been used to increase compassion by simulating symptoms of dementia, psychosis and schizophrenia • Mindfulness training has also been used successfully to promote wellbeing, track moods and help improve responses to care needs	Staff had conflicting views about the pros and cons of digital health interventions and resources and were cautious of deepening the digital divide. Staff need clear guidance and training to identify what works to improve and enhance care. Some evidence for compassion-oriented technologies designed to improve care.
Supporting staff and self-care		
Study ID	**Potential benefits**	**Issues to consider**
Bostock 2019; Davis 2020; Lopes 2022; Philips 2019; Sano 2015, 2017; Thoondee 2017	• Access to self-care technology providing mental health treatments can help reduce stigma and tackle burnout and reduce stress e.g. Headspace mindfulness meditation app • Computer monitoring/desktop systems can detect work-related stress and provide mitigating interventions/advice • VR-based interventions that can help foster calming states • Occupational e-mental health interventions can be helpful	VR may not be the best option in business environments as the evidence suggests that there is little difference in the effectiveness of immersive and non-immersive stress-reducing techniques. More high quality research evidence is required for self-care digital approaches.
Considerations for implementation		
Angerer 2022; Brommeyer 2023; Davies 2020; Eyles	• Inter-professional education • Developments have largely been IT-led, people-focused disciplines should be better represented in design and development including HR, governance/ethics and organisational behaviour	

2016; Kho 2020; Kleiven 2020	• Greater understanding is needed of how technology and management can collaborate to meet the strategic and operational elements of healthcare delivery • Consideration needs to be given to the skills and competencies required to implement informatics and digital technology in health settings • Workforce planning is required to deliver implementation and include the competencies and skills identified • Information and data management should form a core requirement of health service managers alongside leadership, operational and resource management, personal, interpersonal and professional qualities and an understanding of the industry and environment • Policy must direct and lead in the importance of using data to monitor care and drive change • Digital technology has been slow to embrace coproduction approaches, the development of clear guidelines to provide a framework for involvement is key • Developments have been product led rather than designed to meet the needs and wishes of service users and staff • Warm introductions and handovers to implement technology are an effective way of engaging people and encourage adoption by building trust

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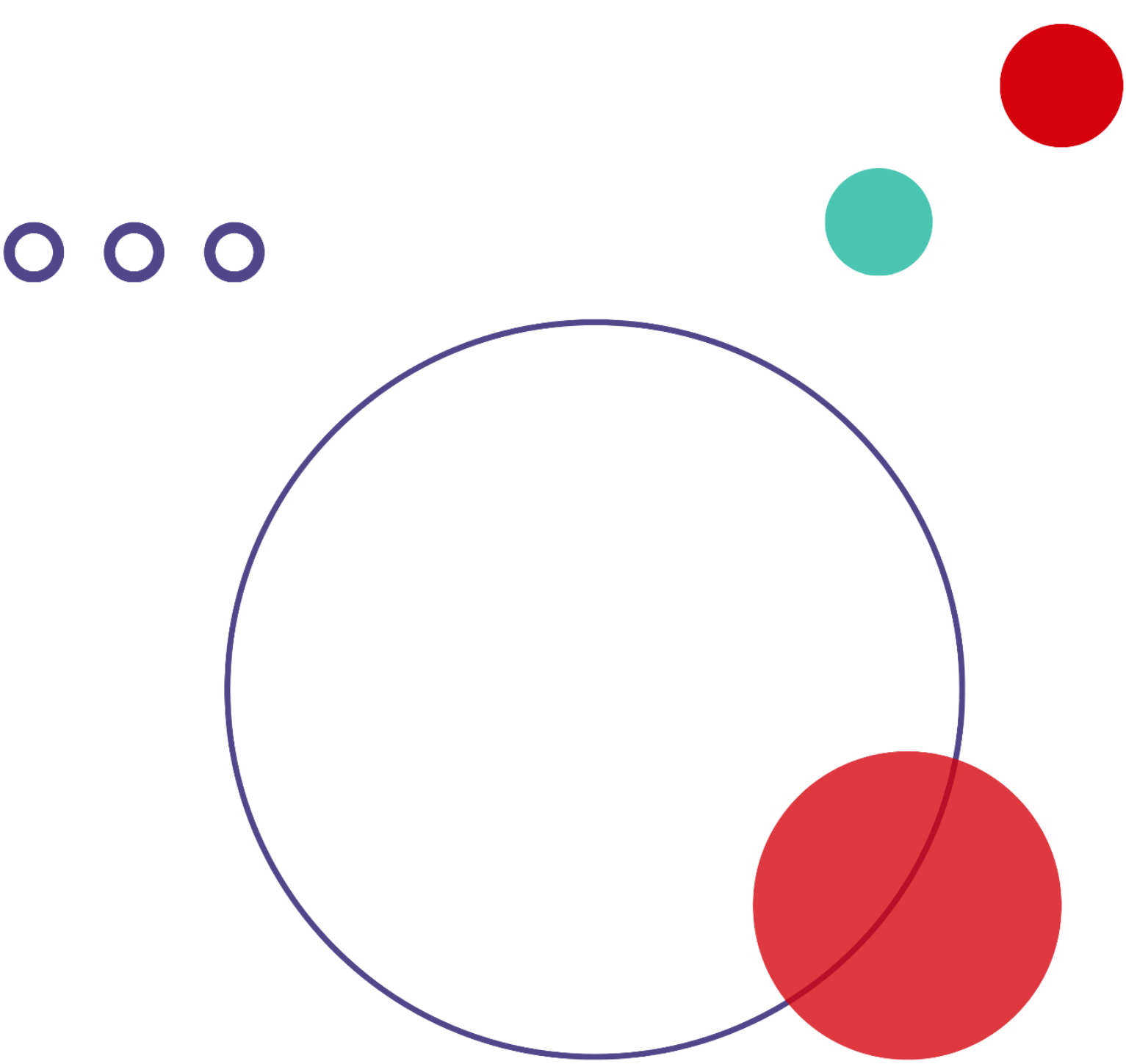

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