Leveraging new opportunities to advance integrated care using digital health

The interest in digital health in the context of integrated care has been growing substantially over the last five years as evidenced through increased publication numbers and citations, international conference activities and events, as well as the increasing number of solutions developed and implemented. This interest accelerated when digital health became essential to how health systems responded to the COVID-19 crisis (Webster, 2020; Ferguson et al., 2021; Bhatia et al., 2021; Pérez Sust et al., 2020). Notably (but not necessarily related to the acceleration of digital health use) integrated care was also viewed as a key solution to address diverse needs of populations through the pandemic (Lindner et al., 2020). As countries worldwide continue to recover from the pandemic while building more sustainable and resilient health systems, there remains an opportunity to capitalize on both these trends to help advance the transformation toward digitally-enabled integrated health and social care systems.

Digital health enabling integrated care has been previously defined as “the use of digital health technologies to enable and support the functional activities and processes, as well as normative values and culture put in place to achieve the aims of an integrated model of care” (Steele Gray, 2021), which should result in better health outcomes and patients’ experience at lower cost. This definition points to how technology can play multiple roles in supporting integrated care, supporting the activities and processes of care delivery, as well as the values, norms and ideals that underpin these models (Steele Gray et al., 2021). In the long run, digitally-enabled integrated care should be equitably beneficial for all members of the society, by building tools through a framework of diversity, inclusion and responsible innovation.

While there has been a significant increase in the number of articles that address digital health and integrated care, there is wide variation in how these two concepts are understood and approached (Piera-Jiménez et al., 2020). This special issue presents a collection of papers from Australia, Canada, Finland, Norway, Spain and international teams, which cover a range of therapeutic areas on organizational and system level issues while offering an in-depth exploration of each topic. Papers in this issue span three crucial areas: (1) the design and development of technologies and models of care; (2) the implementation opportunities and challenges; and (3) the evaluation of the impact of digitally-enabled models. Each of these areas is critically important when considering how technology can help accelerate wider health system transformation efforts toward more integrated health and social care delivery.

How development, implementation and evaluation of digital health is advancing integrated care

Design and development of digital health solutions and ecosystems

The first three papers of this special issue offer approaches and practical examples of development and design of technologies which can enable integrated care. Lillrank and colleagues apply service engineering and design science approaches to establish principles for a technological ecosystem to underpin integrated care. The proposed framework, being...
applied in Finland, acts as a set of standards to format data to allow it to move from one place to another (known as the “middle layer” in interoperable systems) bringing together different data elements to support a Virtual Care Operator model – an “information-focused approach to integration, coordination and continuity of care.”

The two other development focused papers in this special issue offer different approaches to putting a vision like the one proposed by Lillrank et al. into practice. Turk et al. apply human-centered design and design thinking approaches to engage in an iterative co-creation process to identify user needs, be they patients, health professionals and other stakeholders, and create prototypes to guide technology development. Using tools such as personas and user journeys (which the authors call “shared objects”), this paper demonstrates how to meaningfully engage with users to establish a development vision in which technology supports the view that “integrated health requires getting closer to the people at the center of care delivery.”

Villa Garcia and colleagues similarly apply user-centered design thinking to develop an integrated care plan for patients with complex care needs living at home. The iterative approach described in this paper is similar to that used by Turk et al., but takes a step further in the development process to include lab-based and field testing of their solution. In doing so, Villa Garcia et al. uncover important challenges in the design and development space, in particular around aligning user-centered design methods with agile technology development approaches. This tension has been noted in the literature, with useful advancements around how we can bring together research and user-centered design methods (Wilson et al., 2018).

Implementing digital health solutions in integrated care
As implementation is among one of the greatest challenges in getting digital health into routine practice (Buis, 2019), having five papers on the topic in this special issue is both fitting and instructive to help systems move forward. Both the paper by Pant et al. and by RossiMori et al. provides frameworks to help address implementation barriers. While the former outlines some of the pressing challenges around interoperability, specifically focusing on technical and information security related barriers, the latter provides a toolkit that can help overcome those challenges, by focusing on “integrated care needs” that are being addressed through technological solutions. Both these papers provide us with strategies and practical tools to enable service transformation across different settings.

After technology adoption, the next step is to consider how technologies will mature and upscale within models of care. Ling-Sinn and colleagues present a useful maturity model framework for integrated virtual care, developed in partnership with patients, families, providers and other system stakeholders. Domains in this model focus on technology, team organization, program support, integration of information systems, performance and quality, with maturity assessed on how well the model is enabling integration of service delivery around coordination of activities and other key issues like equity. This maturity model builds on the framework presented by RossiMori et al., helping to think through where Service Components may fit within a larger technology ecosystem.

A view on how wider implementation of digital health can support system transformation is offered in the viewpoint paper presented by the Expert Group for Integrated Care and Digital Health (EGIDE), authored by Genovese and colleagues. Focusing on how integrated care addresses chronic disease management as a starting point, this viewpoint provides guidance on how digital solutions can be used as a foundation for system transformation. To help jurisdictions realize this vision, six principles are presented to help guide efforts, including attention to digital health education. Zhao et al.’s paper in this special issue offers a deep dive into the education component, suggesting a novel approach that applies an “adaptive expertise” method in which learning supports development of “both procedural knowledge (knowing what to do) alongside conceptual understanding (know why you’re
Evaluating impact of digitally-enabled integrated care

Four papers in this issue provide case reports and empirical studies of evaluations that assess the impact of digitally-enabled integrated models of care. First, White et al. offer a qualitative assessment of patient experiences of receiving virtual care in Australia during the COVID-19 pandemic. This paper illustrates patients’ varied experiences with virtual care, but ultimately found that for virtual care to be of use it needed to support strong collaborative relationships between patients and providers; identified as a key factor in models of integrated care delivery.

Aird and colleagues present an implementation focused evaluation, using a multi-method approach to explore the roles and use of a new system of information exchange between one hospital and one long-term care home in Canada. This interoperability project emphasizes how information exchange can support patient transitions from hospital to home, while also uncovering challenges with “piecemeal” integration efforts like these, as the existing workflows of clinicians often span multiple organizations.

Stamenova et al. evaluate a virtual visit program put in place to provide access to care during the COVID-19 pandemic using a convergent mixed-methods design which draws on usage data, surveys and interviews with patients and provider users of virtual care systems across different units within a hospital. This evaluation includes similar implementation variables as those included in the previous paper, while also capturing use and experience data. The authors find similar tensions to those reported by Aird and colleagues when working with new technologies particularly around the value proposition of the new model of care. Both papers are Canadian examples where these types of technologies are relatively new, demonstrating that there remain many procedural challenges around technology infrastructure, workflow alignment (or realignment) and the perceived value of a new care model.

In contrast, the final paper in this special issue comes from an environment more advanced in their use of digital technologies to enable integrated care. Vela et al. reports an evaluation of a new technology enabled model of post-stroke care in Catalonia, Spain which has had a strong digital infrastructure in place for decades. This paper illustrates what digitally-enabled integrated care models can look like when you can leverage existing interoperability capabilities, allowing for a robust evaluation that can uncover system level challenges, such as, in this example, the challenge of access to timely home care (domiciliary) services. Together these four evaluations walk us through what it means to evaluate digitally-enabled integrated care across earlier and more mature models and how our methods, questions and analysis can adapt to these different contexts.

Integrating the movement of people, processes and information

Beyond theoretical and empirical examples, this collection suggests different ways of thinking about and approaching the notion of “integration.” Looking across these articles, we find this is ultimately a story about movement; the movement of people as they transition between services, the movement of processes as we shift and transform activities, teams, organizations and workflows and the movement of data and information to enable communication, coordination and continuity. How we design the paths forward, implement strategies to help navigate those paths, and evaluate where we got to are informed by many variables at micro, meso and macro levels in these articles; perhaps unsurprising given
integrated care requires transformation across these areas (Valentijn et al., 2013). This multi-level representation aligns with a socio-technical systems view of technology which, like the papers in this issue, suggest that for us to develop and implement technologies successfully we need to attend to multiple factors such as: Hardware and software, clinical content, the human–computer interface, people, workflow, internal organizational features, external rules and regulations (Sittig and Singh, 2010).

Perhaps most encouraging about the group of papers in this Special Issue is how patients, families and communities are often driving the design, implementation and evaluation of digitally-enabled integrated care; particularly in the formative development of these systems and frameworks. Many of the papers here present examples of systems at a formative stage of adoption, with notable exceptions of countries with more mature systems such as Spain (as in the paper Vela et al.), or the Netherlands, Germany and the United Kingdom as found in a recent review (Baltaxe et al., 2019). There is an opportunity for different jurisdictions to learn from each-others transformation journey, so that past successes can be built upon and challenges avoided. Opportunities are also created through bottom-up movements presented in these papers, where innovations stemming from health care organizations, universities and industry can help drive the change process that should be scaled and spread widely. What we see in these papers provides an important foundation for the design, implementation and evaluation of digitally-enabled integrated care that can continue to be studied and advanced to help support health and social care integration efforts.

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