Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Digital health for patients with chronic pain during the COVID-19 pandemic

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Coronavirus disease 2019 (COVID-19) has rapidly infected more than 10 million individuals and caused more than 500 000 deaths in the first half of 2020. It has resulted in front-loaded healthcare systems and extensive disruptions to daily life in efforts to 'flatten the curve'. The impact on health systems has been amplified by fear-mongering and misinformation.[1] The WHO has dubbed this an 'infodemic' in a recent situation report, calling for urgent solutions to amplify official guidance.[1] Rosenbaum[2] has highlighted additional concerning consequences for care of non-COVID-19 ailments, compounding the effects of extended lockdowns and the infodemic. The marked declines in presentations of acute coronary and cerebrovascular syndromes are contributed to by impaired healthcare accessibility from over-stretched emergency services and fear of exposure to COVID-19 at medical facilities.[2] These trends similarly impact patients with chronic diseases, threatening to impair long-term control, and perpetuate late detection of complications or deterioration in clinical condition.

The impact of COVID-19 on chronic pain patients

Chronic pain is an increasingly prevalent medical problem affecting more than a third of some populations.[3] It is the leading cause of disability globally, increases economic vulnerability, has a detrimental impact on quality of life, and is commonly associated with both anxiety and mood disorders.[4,5] Chronic pain has many established risk factors including advanced age, multiple co-morbid conditions, smoking, and obesity,[4] which overlap with factors associated with increased severity of COVID-19 infection.[6]

Furthermore, public health responses involving social distancing have led to widespread isolation and loneliness, with detrimental effects on mental function.[6] This will likely lead to a surge in mental health disorders such as anxiety and depression that are commonly associated with chronic pain.[7] Collectively, these factors make chronic pain patients particularly vulnerable in the context of the COVID-19 pandemic.

They create a necessity to minimise exposure and the time spent for physical encounters in healthcare facilities. At the same time, chronic pain patients require avenues to maintain control of their condition and stay engaged. Moreover, patients with COVID-19 are also at increased risk of developing chronic pain, particularly those admitted to the ICU.[8] Therefore, there is an urgent need to deploy solutions to address misinformation, provide chronic pain patients access to continued care, and expand the capacity of existing healthcare services to address the growing needs of chronic pain patients.

Digital telehealth platforms

Telehealth is a form of digital health that promises to provide the much-needed supporting infrastructure for care continuity in the context of the pandemic. Traditional non-digital telehealth mediated by interventions such as nurse-led telephone calls have been described with encouraging results such as in the SCOPE trial.[9] New national policy shifts are now enabling rapid adoption of digital telehealth to provide more scalable responses to the pandemic,[10] with recent reviews of potential applications and clinical practice recommendations for teleconsultation in chronic pain patients.[11,12] However, these linear platforms have a long history of failed experiments, largely as a result of underestimated resource and manpower capacity required for successful deployment of telehealth services.[13] Therein lies the importance of considering the form of service delivery in detail in addition to the forms of technology.

The most suitable form of service delivery may vary for each practice based on numerous considerations such as manpower availability, infrastructure, and existing workflows in the intended clinical setting. The form of telehealth delivery also needs to be considered, whether asynchronous with 'store-and-forward' mechanisms, synchronous with real-time scheduled or 'on-demand' consultations, or both.[14] These considerations can be incorporated together in a well-planned study using approaches such as design thinking,[15] as illustrated in the SAVED trial of hybrid synchronous-asynchronous digital telereview of patients with acute undifferentiated abdominal pain.[16] The SAVED trial demonstrated effective operationalisation of a digital telehealth intervention along with potential manpower and time savings that are much needed to expand service capacity in the context of the ongoing pandemic.

Online health communities

Unlike telehealth solutions, which provide closed communication between providers and patients, other providers that are visible only to participants, or both, online health communities provide more scalable avenues for open communication that are visible to any that enter a website or application.[17] These have been applied for various conditions and indications, including patient peer-to-peer support, to share coping strategies and health advice related to their condition. Studies of patients with chronic diseases such as psoriasis have also reported improved quality of life from peer social support derived from patient interactions in online health communities such as the Psoriasis Google Groups and the National Psoriasis Foundation forum.[18]

However, regulatory oversight and quality of the digital solutions on the market are highly variable, and caution should be exercised.[11] This creates a largely unmet need for open, managed solutions that empower verified providers as moderators of content and usage of these applications.[19] In Singapore, volunteer providers and developers from AskDr responded to calls from the WHO for solutions to address the infodemic.[20] They developed a managed platform that leverages network effects of social media with gamified moderation by registered professionals (Fig. 1). Providers may find managed solutions such as these useful to scale up psychosocial support for chronic pain patients, and to highlight warning symptoms and indications for their patients to seek in-person care during this crisis.

Conversational artificial intelligence

Another category of potentially relevant digital health solutions for chronic pain patients in the context of COVID-19 is Artificial Intelligence (AI)-based conversational applications. These 'chat bots' have been applied for patient counselling/support, collection of patient-reported symptoms/questionnaires, and triage through symptom checkers. Several pilot studies have indicated the potential value of these automated chat bots to enhance care and scale up psychological support for patients with mental health disorders or even well participants.[21,22] Numerous symptom checkers have also emerged to help triage patients in the ongoing crisis, such as Babylon.[23] Results from a pilot trial of an AI-chat bot to promote self-management of chronic pain (SELMA) were recently published with encouraging results.[24]

Many of these chat bots function as promising forms of asynchronous telehealth for advice to out of hospital patients. This helps to filter patients that primarily require reassurance or advice, from those who may need further synchronous video consultations or in-person review. This 'sorting conveyor' model is beneficial to leverage digital solutions to address the needs of patients and reduce unnecessary healthcare presentations, thereby helping to reduce risks of healthcare associated transmission of COVID-19.[16] That said, a recent review reported that most healthcare applications of chat bots lack sufficient validation of clinical outcomes.[25] This is a crucial step that is needed for these solutions to be safely deployed.[26] Therefore, while these solutions may be useful to scale up patient support for mental health and self-management, any deployed solutions should be closely monitored for performance.

Applying digital health for the care of chronic pain patients in COVID-19

The management of chronic pain is a multidisciplinary process requiring close co-ordination and high engagement between chronic pain patients and pain physicians. Allied healthcare professionals such as psychologists and therapists also play a crucial role through interventions such as cognitive behavioural therapy that can be delivered remotely with sustained and cost-effective improvement in chronic pain.[27] Earlier studies of non-digital interventions using phone calls in the SCOPE study and MUSICIAN trial have laid the groundwork for the development of scalable digital solutions to enhance the capacity of existing services and provide chronic pain patients the support they require during this pandemic.

The COVID-19 pandemic has created an urgent clinical need and patient preference for digital services, whereby

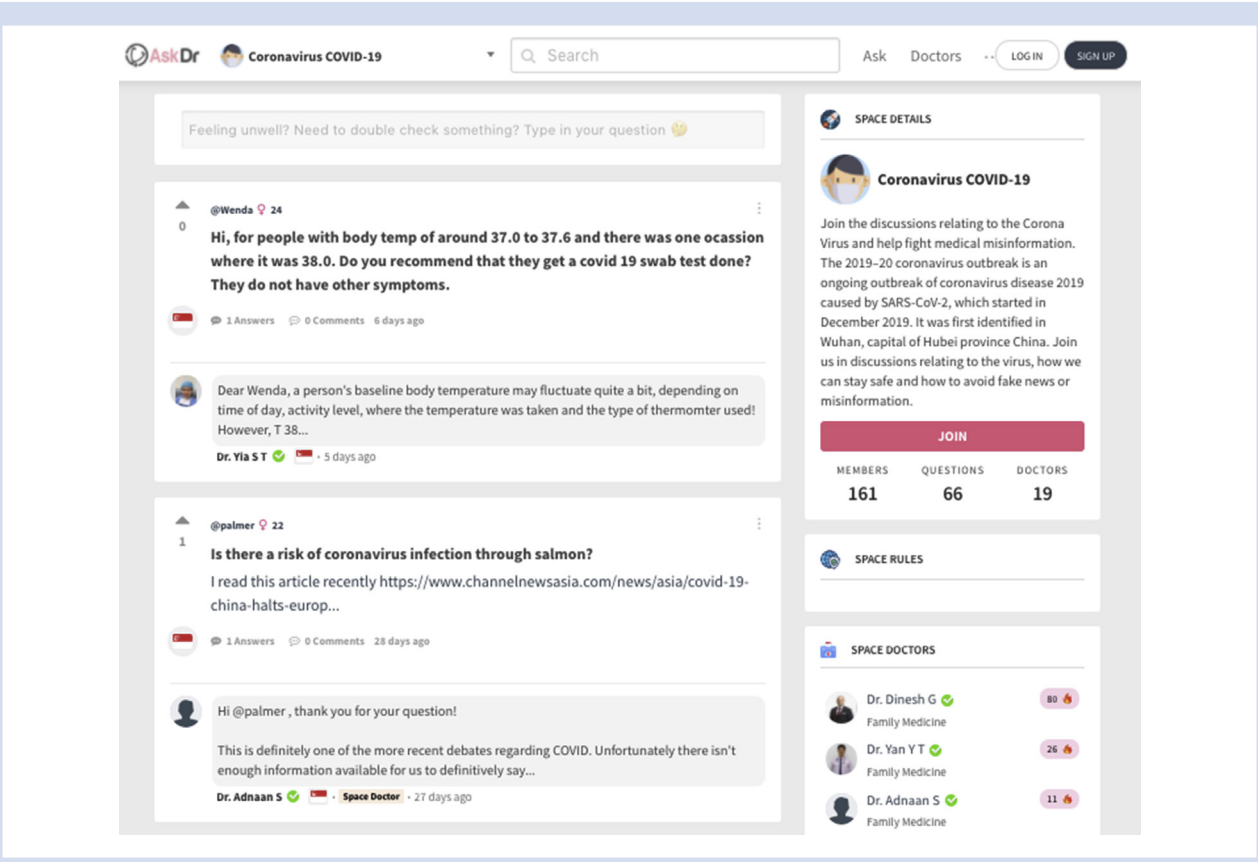

Fig 1. Singapore's digital solution AskDr to address the 'infodemic'. AskDr is a free digital tool for patient-led medical discussions with involvement of verified providers (from professional medical registers) as moderators for crowd-sourced, scalable, transparent, and data-driven public health promotion with gamification to encourage public and provider contributions.

numerous clinical specialities have responded with rapid deployment to reduce unnecessary physical encounters.[10] Potential applications of a broad spectrum of digital solutions for the management of chronic pain patients have been discussed, including digital telehealth platforms, online health communities, and AI-based conversational chat bots, along with lessons from latest descriptions such as SELMA.

Looking ahead

We have highlighted several options and opportunities to apply digital health for continued care of chronic pain patients. However, given the limitations highlighted, clinicians will need to evaluate whether suitable content and procedures for quality assurance are available for any given digital health application based on the intended clinical applications, including considerations for targeted messaging to engage patients and whether certain conditions instead require in-person assessment.[2] Patient privacy and confidentiality are important, particularly for applications of surveillance technology whereby patients do not 'opt in' for the service, such as big data monitoring or contact tracing systems. Given the urgency of the current pandemic situation, providers will likely find these digital health solutions useful to address misinformation, provide support, and maintain continuity of care for their patients. However, clinicians will also need to consider the forms of solutions and service delivery in order to ensure successful application of these digital tools.

Authors' contributions

Contributed to all phases of this editorial including conception and design, drafting the manuscript, revising it critically for important intellectual content, and final approval of the version to be submitted: all authors
Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: all authors

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Declarations of interest

DVG reports equity investment in AskDr, Doctorbell (acquired by MaNaDr, Mobile Health), VISRE, and Shyfts. He also reports serving as an advisor to university-affiliated technology

developers and start-up companies involved in the development of patient engagement systems in Southeast Asia. He declares receipt of travel funding from the Commonwealth Fellowship in Innovation award, Mobile Health Education grant, and National Youth Fund award, for clinical research training, and collaborations at Oxford University, Oxford, UK and Stanford University, Palo Alto, CA, USA. LLW and ACMK declare that they have no conflicts of interest.

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