

An investigation into the digitalisation of New Zealand general practice services during COVID-19

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ABSTRACT

AIM: This study investigates the digital transition initiated by the onset of the COVID-19 pandemic and the factors that enabled the digitalisation of general practices (GPs) in New Zealand.

METHOD: Using a multiple case study design, we conducted 86 in-depth interviews with staff from 16 GP centres in New Zealand.

RESULTS: The critical enablers of digital transition in response to the pandemic were support from the community, agility and adaptability of GP medical centres and the ability to pragmatically create external operational processes to ensure business continuity and to meet patient expectations. Major barriers to digitalisation at the early stage of the COVID-19 pandemic (28 February to 30 August 2020) included lack of organisational leadership, financial support availability, systems management collaboration, and patient and staff knowledge and preferences. Digitalisation was characterised by the GP centre's ability to provide telehealth services using existing systems and technology, embracing e-prescription, e-referrals, e-lab and video-only consults.

CONCLUSION: The decision to adopt digitalisation had a significant impact on GP centres, disrupting the norm but also allowing continued access to health services to patients who were the most vulnerable during the pandemic. The pandemic forced GP medical centres to change to digitalisation and led to significant changes in GP medical centres' business models. However, it remains to be seen how the rapid change effected at this time correlates with patient satisfaction and how the digitalisation capabilities that have been built impact on future primary care services. This study suggests that changes brought about by COVID-19 may pave the way to an expansion of GP telehealth services, which has the potential to permanently change the primary care landscape.

In February and March 2020, most of the general practice (GP) centres across New Zealand started the year with business as usual. Few anticipated the extent of disruption and the pace of change that the unfolding COVID-19 (SARS-CoV-2) global pandemic would impose upon all primary healthcare providers' services, particularly GP medical centres. The first COVID-19 case was reported in New Zealand on 28 February 2020.¹ On Saturday 21 March 2020, in response to the COVID-19 pandemic in New Zealand and restrictions announced by the New Zealand Government, the Royal New Zealand College of General Practitioners (RNZCGP) requested all GP medical centres in the country immediately adopt virtual triage for all patient contacts and aim to provide 70% of consultations by virtual means, commencing Monday 23 March 2020.¹⁻²

In New Zealand, technology-integrated learning has been embedded in medicine and allied health programs for some time.¹⁻⁵ Information Communication Technology (ICT) specialists in healthcare have been actively involved in the development of digital solutions and process

reform.⁶⁻¹⁰ However, primary care, particularly GP services, had never been delivered over 70% remotely in New Zealand.² Subsequently, GP medical providers had to reorganise their medical centres within 48 hours to accommodate 1½ meter social distancing requirements and to enforce separation between everyday patients and potential COVID-19 patients. Among other measures, most practices had to remove chairs from waiting rooms, put up plexiglass screens at the reception, wear personal protective equipment (PPE) and follow physical distancing rules set by the Ministry of Health (MoH).¹¹⁻¹³

GP medical centres drew on the experience and expertise of their business managers and staff and acted quickly to source equipment, manage logistics and provide in-time assistance to support their centre's continued operations. There was a need to actively repurpose and redeploy resources, upskill staff digital competencies and develop new processes and systems to transition traditionally face-to-face consults to remote or online health service support/telehealth.¹⁴

Telehealth or telecare is defined by Sikka et al.

(2019) as *“the use of telecommunication technologies to communicate and facilitate health-related services between two remote parties and typically used in health care between provider and patient or between two healthcare providers.”*¹⁵

Even though most of primary care adopted digital technology and increased telehealth as a temporary measure, it became evident that GP medical centre digitalisation in the use of telehealth may become permanent.^{16–17} By the end of March 2020, the extent of COVID-19 disruption was demonstrated via the restrictions on face-to-face doctor appointments and significant lockdown restrictions, resulting in reductions in GP face-to-face visits and significant financial loss to medical centres in New Zealand.¹⁸

In general, the core operation of GP medical centres appeared to continue. At the beginning of the pandemic, most GP medical centres waited on direction from the MoH and their primary health organisations (PHOs). PHO leaders were carefully monitoring the situation, including the need to transition to telemedicine and remote healthcare support services for patients.^{12,19–21} Following its guidance to transition to remote consults via telemedicine, the RNZCGP acted quickly and decisively to enable rapid GP services transformation by announcing a broad reduction to the regulatory burden for GP medical centres managing COVID-19 pandemic challenges.¹² This deregulation provided PHOs and GP medical centres with approval to effect changes to the modes of delivery of health services, as well as to provide remote medicine services to patients during the lockdown. The RNZCGP caveat, however, was that GP medical centres using telehealth and telemedicine must maintain quality standards as face-to-face consults.²¹

The RNZCGP-guided deregulation resulted in high satisfaction with telehealth in GP medical centres during the lockdown.¹² In 2020, approximately 4.7 million of the 5 million population of New Zealand was enrolled with a primary care organisation.²² The conversion to teleconsult (telephone consult) and video consult was critical to GP medical centres as they continued as the first point of contact in most situations for most people seeking medical care.¹⁸ There were significant obstacles to digitalisation. The initial stage of transition to telehealth can be particularly challenging to GP medical centres in rural areas with limited hardware technology and numerous enrolled patients with limited access to a network

connection. It is worth considering that there are also lower-income patients with no access to smartphones or other devices to facilitate telehealth access in all environments, from urban to rural.¹⁹ New Zealand studies suggested that transition into telehealth was gradual for many practices.²¹ Adopting multiple methods of GP service provision such as teleconsult, video consult, in-person (face-to-face), text or email allowed GP medical centres to meet the patient healthcare service demands.²⁰ Telehealth became the most practical option for GP medical centres during the lockdown, which caused significant changes to their internal and external processes and practices.²³ It was proposed that a digitalised health service response to COVID-19 could result in some patients being placed at increased risk of a missed or incorrect diagnosis due to the limitations of telehealth. However, there is evidence that some services suffer no deterioration from being delivered remotely; for instance, anticoagulation services delivered solely by teleconsult or video consult have been shown to create no statistically significant difference in the risk of extreme supra-therapeutic INR, major bleeding, minor bleeding or thromboembolic events.²⁴ However, in November, Wilson et al. (2021) proposed that the threat of COVID-19 infection, combined with patient and health system factors (including telehealth adaptation), were elements that contributed to delayed patient care in the early pandemic period and may have caused harm.²⁰ More research is required in this area.

While teleconsult and video consults can have great potential for patients seeking access to GP services as well as specialist services in rural and urban areas,²⁵ there is a need to work hard to safely connect patients to primary care services within the digital realm and in the absence of face-to-face, in-person interaction.¹⁸

This study does not focus on the limitations of telehealth or its safety but centres on the enablers and barriers to the forced digitalisation process as experienced by GP medical centres in New Zealand during the early stages of the COVID-19 pandemic, which enabled it. This study also examines the shared experiences of GP staff during this process and extracts lessons that could be employed in future pandemic scenarios. This aspect is of relevance as there is evidence that in post-COVID pandemic conditions GP practices are already starting to retreat from elements of digitalisation, creating the risk that lessons learnt may well be lost.

Method

The purpose of this research was to investigate digitalisation in GP medical services during a pandemic in order to understand and add new knowledge to both academic and practitioner understanding of digitalisation by capturing some of the adoption processes used during the time of COVID-19. The study adopted a qualitative approach with an embedded multiple-case study design and a phenomenological approach as an initial point. The case study research involved the examination of the COVID-enabled digitalisation phenomenon in GP medical centres.

A mix of GP medical centres were selected based on their performance in maintaining levels of patient service during the COVID-19 pandemic and maintenance of revenue stream. A total of 16 GP medical centres participated in the study. They were selected via purposeful sampling combined with a snowballing method to identify suitable cases. The practices included in the study were then selected based on geographical location, size, the number of employees and years the practices had spent operating in their specific locations. The intention of the selection process was to identify best practice from medical centres covering diverse demographic, socio-economic and geographic areas.

The majority of the practices selected during this study were the lead COVID-19 test centres during the first New Zealand lockdown.

Each GP practice was treated as an individual case. The selected GP medical centres encompassed urban, rural and suburban practices from different decile areas of New Zealand.

The analysis generated themes from the interview data. The multiple case studies did not require control of the behavioural event/elements and focussed specifically on the COVID-19 pandemic. Primary data were collected through interviews with doctors, nurses and the GP centre's management and support staff teams.

The New Zealand MoH report into COVID-induced disruption to hospital and GP activity was used as secondary data to triangulate the findings from primary data by comparing overall hospital and GP activities data from March to June 2020 with the same months in 2018 and 2019.¹⁸

The individual interviewees within each case were selected based on their experience and involvement in the centre's COVID-19 pandemic-driven digitalisation process.

The analysis was performed using a combination of qualitative analysis software (N-Vivo)

and visual and hand-coding. The transcripts from interviews were reviewed and coded. All comments that mentioned digitalisation adoption processes were highlighted and collected on a summary sheet. The summary sheets from each participating practice were then compared to the aggregated data, and comparisons and contrasts were drawn from the process.

Ethical approval

This study was approved by the University of Canterbury Human Ethics Review Board and Research Ethics Committee. The reference number for ethics approval is #09032021.

Results

This study took place from February to April 2021. However, the interview questions were focussed on the first six months of the COVID-19 outbreak in New Zealand (February to August 2020). During the initial pandemic period, all 16 GP medical centres in the study confirmed converting to telehealth within 48 hours of the lockdown announcement. All 86 research participants acknowledged the significant work required by staff to implement digitalisation within a very limited time frame and gave credit to the ubiquitous messaging that the health and wellbeing of patients were of primary importance in the process. Telehealth was utilised to triage patients, provide GP consult services and mitigate the loss of revenue. Each interviewed staff member's reflection tended to identify temporary solutions using existing practice systems and hardware being utilised initially, as well as personal smartphones.

The practice managers moved to incorporate temporary solutions but also planned for future telehealth sustainability during the pandemic amid an anticipated need for a balanced health-care service approach. Patient and staff adaptability and support were discussed in nearly all interviews. Some staff found the experience of accelerated change into the digitalisation of general practice very exciting and fruitful, while others found the experience daunting and highly unsettling. In general, there were shared concerns about the radical change in practice operation, especially combined with the extraordinary workloads the COVID-19 pandemic-fuelled digitalisation transition required. Notably, nearly all 16 GP medical centres already had digitalisation systems identified in their strategic

plan for the next two to three years (2020–2023). COVID-19 led to instantaneous implementation. The systems that facilitated fast transition to digitalisation were electronic-prescription, electronic-referrals, electronic-lab and patient administration systems (e.g., MedTech/Indici).

Table 1 shows the digital systems used in telehealth to support GP medical centres during the early stages of the COVID-19 pandemic.

The interviews were undertaken during 2021 when lockdowns were still common, and COVID-19 vaccines were not yet available; most of the participants reported that GP services were likely to change permanently given the scale of change during the pandemic, with some concerned that this change would call into question the traditional face-to-face approach to practice. Senior GPs were more likely to comment on concerns that physical distancing and digital change had been implemented at the expense of quality of care, and as a rapid response to an unprecedented situation. Furthermore, this group was concerned that the speed of the digitalisation transition allowed little time for reflection and evidence-based refinement. However, it is notable that despite these concerns, none of the GP medical centres reported incorrect diagnoses, late diagnoses or missed diagnoses resulting from patients using telehealth services. Most GPs reported being more cautious during telehealth consults and advised patients to come in for a face-to-face consult if it was felt further examination was needed.

Table 2 and Table 3 show enablers and barriers to the digitalisation of general practice in the initial six months of the COVID-19 pandemic.

Discussion

Enablers to digitalisation

The last pandemic of the same scale as COVID-19 was the Spanish influenza in 1918, in the pre-digital age. Adapting health infrastructure and administrations to a pandemic via digital means was a new experience in New Zealand and globally.

A dynamic balance between the identified enablers and barriers to digitalisation of New Zealand GP services during COVID-19 determined the rate of digitalisation in this environment.

Enablers were perceived differently depending on the size of GP centres. The availability of existing technology and devices within the GP medical centres was found to be the primary enabler for provision of telehealth services and establishing digital solutions in a short time. Often, digital-

ised options had been available using pre-existing IT but not utilised as there had been limited perceived “market demand”; during COVID-19, GP surgeries activated this latent IT functionality. During interviews, 88% of participants confirmed that they used existing systems and hardware to support patients and provide GP services.

Training and staffing levels had a large impact on this enabler. In larger GP centres, digital solutions tended to be adopted more rapidly, mainly due to there being more fully trained personnel available to implement change than in the small- and mid-size GP medical centres.

Research conducted during the same time in eight European countries confirmed a similar primary enabler for fast digitalisation of primary care during the initial phases of the COVID-19 pandemic.²⁶ In the U.K., a telemedicine programme was created “overnight”, which allowed the primary care provider to reduce the number of face-to-face consults via pre-screening and prioritisation.²⁷ The second enabler identified was the integrability—the ease of use of the current technology to facilitate digitalisation, combined with cost effectiveness and secure communication. It was vital that sufficient communication capabilities were available at a low operational cost to establish secure communication structures on both a short- and long-term basis. Key factors included remote-access availability, access to the patient information management system and transmission of prescriptions to pharmacies.

The third enabler consisted of forced Information Communication Technology (ICT) adaptation caused by COVID-induced business disruption and social and physical distancing restrictions—COVID-19 acted as an accelerator of change, as change was essential to facilitate the continuation of the business. The COVID-19 crisis forced GP medical centres to adapt rapidly to new realities, enabling new ways to work with patients and colleagues remotely. In doing so, GP medical centres arguably demonstrated substantial improvements in creating patient-centric systems as patients were presented with a range of interaction mechanisms and increased flexibility in healthcare access.

The combination of these three enablers and the adoption of telehealth combined with selective face-to-face consultations in a hybrid model allowed risk mitigation by clinicians and allowed practice teams to feel confident in their clinical and administrative decision making. The results highlighted the need to continue to engage with

Table 1: Digital resources supporting GP medical centre telehealth services during the COVID-19 pandemic.

GP medical centres	Full transition to new digital solutions	Updated PMS	Electronic referrals	Electronic prescription	Electronic lab	Video consult	Doctor info	Manage my health
GPMC1	Yes	✓	✓	✓	✓	✓	✓	✓
GPMC2	Yes	✓	✓	✓	✓	✓	✓	✓
GPMC3	No		✓	✓	✓		✓	
GPMC4	Yes	✓	✓	✓	✓			
GPMC5	Yes		✓	✓	✓	✓	✓	✓
GPMC6	No		✓	✓	✓			
GPMC7	Yes		✓	✓	✓		✓	✓
GPMC8	Yes		✓	✓	✓		✓	
GPMC9	Yes	✓	✓	✓	✓		✓	✓
GPMC10	Yes	✓	✓	✓	✓		✓	✓
GPMC11	No		✓	✓	✓		✓	
GPMC12	Yes	✓	✓	✓	✓	✓	✓	✓
GPMC13	Yes	✓	✓	✓	✓	✓		✓
GPMC14	Yes	✓	✓	✓	✓	✓	✓	✓
GPMC15	Yes	✓	✓	✓	✓	✓	✓	✓
GPMC16	Yes		✓	✓	✓		✓	
TELHNZ	No		N/A	N/A	N/A		✓	

Table 2: Enablers of GP medical centre digitalisation during the COVID-19 pandemic (n=86).

Purpose	Themes	Sub-themes	Number of participants who identified the sub-themes	Total number of references to the sub-themes within the interviews	Percentages and rank in each theme
Enablers of GP medical centre digitalisation during the COVID-19 pandemic	Existing information communication technology	Telehealth capability with existing hardware and systems	76	187	88%
		Accessibility, integration and ease of use	73	191	84%
		Forced ICT transition	71	175	82%
		Willingness to adopt and retain new technology	57	96	66%
	Organisational agility and adaptability	Well-designed digitalised innovative systems	51	88	59%
		Reduction in workload due to adoption of technology	45	77	52%
		Incorporation of digital administration processes	59	106	68%
		Work flexibility, time efficiency and remote work	58	101	67%
		Understanding of local needs and priority setting	55	103	63%
		Good communication and support for the community	41	70	47%
		Gain of income and revenue from new services and subsidies	40	81	46%
		In-house knowledge, fast appropriate training and adaptability	38	52	44%

Table 2 (continued): Enablers of GP medical centre digitalisation during the COVID-19 pandemic (n=86).

Purpose	Themes	Sub-themes	Number of participants who identified the sub-themes	Total number of references to the sub-themes within the interviews	Percentages and rank in each theme
Enablers of GP medical centre digitalisation during the COVID-19 pandemic (continued)	Internal and external processes and practices	Risk awareness and risk averseness	63	99	73%
		Changed operational processes, guidelines for collaboration	59	105	68%
		Health organisation support (PHOs, MoH, IT providers)	58	118	67%
		Open to telehealth or face-to-face consults	54	92	62%
		Introduction of a new legal framework for telehealth & telemedicine	41	56	47%
	Patient expectations and market demand	Patient-centric systems and operational processes	58	111	67%
		Expectations towards managing a pandemic amongst the public	50	87	58%
		Readiness to respond to pandemic-induced demand	49	85	56%
		Patient attitudes and preferences towards telemedicine	46	78	53%
		Patient demand for and interest in telehealth	42	61	48%
		Utilisation of existing good practices examples from other countries and successful pilot schemes	36	69	42%

Table 3: Barriers to GP medical centre digitalisation during the COVID-19 pandemic (n=86).

Purpose	Themes	Sub-themes	Number of participants who identified the sub-themes	Total number of references to the sub-themes within the interviews	Percentages and rank in each theme
Barriers to GP medical centre digitalisation during the COVID-19 pandemic	Organisational leadership and financial barriers	Loss of time, revenue and resources	62	127	72%
		Disruption of existing practices, routines, and culture	44	90	51%
		Inadequate/incorrect/conflicting/failed communication	42	78	49%
		Cost of equipment, system membership and remote work	30	39	35%
	Role of management and collaboration barriers	Lack of digital administration processes and resources	52	91	61%
		Lack of readiness to respond to a pandemic	40	61	46%
		Privacy, confidentiality, and security-related concerns	25	33	29%
		Outdated legal framework and requirements from MoH	24	34	28%
	Systems and technology barriers	Lack of ideal design, systems connectivity, compatibility and ease of use	57	125	66%
		Doubts regarding ability to provide services or adequate data quality	31	57	36%
		Old, out-of-date patient management systems unable to accommodate telehealth requirements	49	97	57%
		Poor quality devices and equipment, phone and internet services	24	34	45%

Table 3 (continued): Barriers to GP medical centre digitalisation during the COVID-19 pandemic (n=86).

Purpose	Themes	Sub-themes	Number of participants who identified the sub-themes	Total number of references to the sub-themes within the interviews	Percentages and rank in each theme
Barriers to GP medical centre digitalisation during the COVID-19 pandemic (continued)	User knowledge and preference barriers	Lack of knowledge, awareness and interest	63	156	73%
		Preference for face-to-face patient interactions over telehealth	55	114	64%
		Perceived risk caused by lack of physical contact with patients and perceived low utility of telehealth systems	52	98	60%
		Preference for social interaction over digital interaction	52	93	60%
		Preference for doctor-centric systems, not patient-centric	39	59	45%

patients face-to-face if unsure about a diagnosis during the course of a teleconsult or video consult. GPs created their own assessment requirements and parameters and applied them to each patient regarding their suitability for telemedicine consults. This assessment took into account the necessary degree of confidentiality and the amount of needed face-to-face interaction for each patient, as well as the patient's capacity to use communication technology. The three enablers identified were dependent on a fourth, overarching enabler; new legal and regulatory guidelines from the MoH alongside new funding for telehealth that gave a framework and model for business sustainability. Legal guidelines allowed the use of available systems, such as electronic-prescription, electronic-lab, electronic-referrals, teleconsults and video consults. However, initially, this enabler created substantial tension as the full details were being adapted in real-time to a dynamic pandemic environment, leaving practices uncertain regarding their medico-legal standing. In one example, the MoH changed the legal requirements of having doctors physically sign each prescription. This then allowed for e-scripts and greater facilitation of remote consultation. However, this created a medico-legal issue that the MoH then had to address, as GPs increasingly consulted and prescribed remotely but could not examine the patient remotely, leading to a hypothetical increase in the risk of clinical error.

The Accident Claims Corporation (ACC) and Work and Income NZ (WINZ) also had to adjust to the new environment at the beginning of the pandemic, and this took time to materialise. The impact of this adaptation time by the MoH, ACC and WINZ is illustrated by an interview at GP medical centre (case 16), which focussed on the requirement to see patients face to face; an interviewee stated:

"There were also the medico-legal ramifications if you haven't seen a patient if you haven't touched them, can you do as effective an assessment? ACC (Accident Claims Corporation) and Work and Income require in-person assessments; you've got to sign that you have seen and touched this patient today. So even where it was just an extension of something that potentially could have been signed off without an examination, there was that requirement. So, I think that the system kind of reinforced that

expectation that you were seeing people in person rather than virtually."

The resolution of inconsistencies in the medico-legal and regulatory environment was crucial to the success of New Zealand GP digitalisation.

Barriers to digitalisation

The first barrier identified was staff familiarity with and training in digital solutions. In the majority of the 16 GP medical centres, employees were hesitant in adopting the digital solutions that were available prior to the COVID-19 pandemic. However, it was clear from some interviews that lack of knowledge and awareness of digital technology played a significant role in creating a barrier to adoption. 73% of the research participants mentioned they were not motivated to adopt digitalisation innovations in practice as they were unaware of what was available or did not know enough about existing technology capabilities to readily adopt it in daily operations. Additionally, there were barriers caused by managers' difficulties in setting up employees for remote work and remote working practices, which would allow for GPs, nurses and admin staff to collaborate in a flexible, digitalised environment.

Specific categories of staff were impacted more than others by this barrier. General practitioners were the most impacted group, followed by the administrative staff. The administrative staff were responsible for moving manual and paper-based processes into the digital space. As a result, there was a drastic change in the type of work these teams were expected to perform. Nursing staff were the least impacted, as many reported that they were still focused on triaging over the phone, making wellness calls, updating files and seeing patients face-to-face to provide wound care services or vaccination.

Lack of knowledge of and prior training in Information Technology (IT) systems for effective telehealth delivery among GPs and administrative staff was one significant aspect of this barrier. Training and setting up patients to use video consults was the second significant aspect and the most tedious and time-consuming part of the transition into digitalisation as reported by GPs. A large proportion of patients were elderly with little to no knowledge of how to utilise video consults or the supporting technology. Therefore, the majority of GPs choose to use teleconsult instead of video. A secondary reason for this choice, especially in remote and rural clinics, was a perceived

unreliability of the internet infrastructure and its ability to sustain reliable video consults.

Administrative staff had the most prominent role in supporting the transition to digitalisation. Some of the administrative staff transitioned from advising and supporting patients face-to-face to processing online billings, uploading pictures to patient files, supporting e-prescriptions if there were any issues with the pharmacist and educating and training patients on digitalised consults.

The perceived inadequacy of existing ICT systems was identified by numerous participants. The perceived inadequacy was caused by technical difficulties setting up e-prescriptions, e-lab, Doxy-Me (video consult capability) and remote desktops. The second barrier encompasses the transition of manual and paper-based administrative processes outside of what existing systems and software could provide for remote working staff. Poor internet connections, outdated Patient Management Systems (PMS, mostly MedTech32) and old hardware devices also generated the perception that digitalisation may not be able to adapt quickly enough to involve admin processes and allow ongoing support by practice managers in difficult situations. The second barrier to the digitalisation of GP services was partially dependent on the first and consisted of the perception of risk and the potential impact/utility of health interventions delivered via digital vs face-to-face means among primary care teams and patients.

GPs commented on the risk associated with telehealth services due to lack of physical touch.

"It would be okay for some things, but [to] get them [the patient] to touch their own tummy and tell me if it hurts doesn't help an awful lot because you want to know if they've [got] rebound [tenderness] or rigidity or all these other sorts of things that a person themselves can't tell you."

GPs also commented on how patients value the social interaction inherent in a face-to-face consult.

"As soon as we went into Levels 1,2,3 and up, people call in and say, 'can I have a face-to-face?' although we always say to them, these are always options, you can either do a phone consult, Zoom consult, or face-to-face, the majority preferred face-to-face."

The third major barrier identified was individual resistance to change among medical teams

and patients; resistance to change was largely determined by personality traits and beliefs among medical centre staff and patients that GP medical centres and practice managers could not directly overcome, especially in a short time. Resistance was particularly strong among GPs due to the fear of the unknown and the required learning effort involved in changing from face-to-face to teleconsult or video consults.

Conclusion

This study identified three main enablers and three main barriers to the digitalisation of GP medical services in New Zealand.

Enablers:

1. The availability of existing technology and devices within the GP medical centres.
2. The ease of use of the current technology to facilitate digitalisation combined with cost effectiveness and secure communication.
3. Forced Information Communication Technology (ICT) adoption caused by COVID-induced business disruption, and social and physical distancing restrictions (a necessity-based enabler).

Barriers:

1. The perception of risk and potential impact/utility of health interventions delivered via digital vs face-to-face means among primary care teams and patients.
2. Individual resistance to change amongst medical teams and patients.
3. Lack of knowledge and prior training in Information Technology (IT) systems for effective telehealth delivery amongst GPs and administrative staff.

As the COVID-19 pandemic evolves into an endemic in New Zealand, there is no doubt that GP medical centres leaders and GPs especially deserve recognition for their management and support to the communities they serve. As in most Westernised healthcare systems, New Zealand GPs provide an overwhelming majority of the medical care in New Zealand for a very small fraction of the New Zealand healthcare budget. Their focussed efforts in the face of a global pandemic caused by a disease with no known vaccine or cure (in early 2020), disruption, uncertainty and substantial business volatility ensured the

continuation of effective and safe healthcare services for patients. For GP medical centres, the decision to adopt digitalisation had a deep impact, disrupting the norm but also allowing continued access to health services to patients who were the most vulnerable during the pandemic.²⁷⁻²⁹

The pandemic forced the change to digitalisation and led to “*more change in 48 hours to GP business models than there had been in the preceding ten years.*” Several challenges were recognised by GPs, practice managers and their teams during the early pandemic: education of staff and patients, knowledge of technology, time management, resources and system technical capabilities. Accurate triaging of potential COVID-19 cases via telehealth was also a significant challenge as the diagnostic criteria kept evolving. Management and administration staff demonstrated role adaptability and assisted GP colleagues in meeting healthcare service demand and their obligations in providing healthcare advice.^{3,30-31} For patients, the flexibility and adaptability of the GP medical centre enabled continuity of care that was effective and fit for purpose in the COVID-19 pandemic. Interestingly, in-person interactions between patient and GP, which is uniquely highlighted as an integral part of health service requirements by the MoH, was demonstrated to be less crucial than anticipated to continuity of care. Of note, and in a time of crisis and uncertainty, the GP medical centre

management teams acted and thought like leaders—often in the face of conflicting advice from regional- and national-level bodies that was constantly evolving. Health and safety were prioritised, followed by healthcare service standards and the development of flexible solutions for business continuity. Despite the barriers identified in this study, the participants acknowledged and commented on the remarkable mobilisation, commitment, speed of change and agility of their GP medical centres and of their patients.

There has been a change in GP medical service provision in New Zealand since the start of the COVID-19 pandemic. It remains to be seen how the rapid change effected during this period correlates with patient satisfaction and how the digitalisation capabilities that have been built impact on future primary care services.³²⁻³⁴ This study suggests that changes brought about by COVID-19 may pave the way to an expansion of GP telehealth services, which would permanently change the primary care landscape. The research in this study also provides some insight into the controllable enablers and barriers that could be utilised to instigate and maintain digitalisation processes.

Whether the benefits of digitalisation overcome the desire for human touch and face-to-face contact among GPs and their patients as the pandemic recedes as a threat is a subject worthy of future study.

COMPETING INTEREST

Nil.

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