Digital health: Monitoring the impact of the COVID-19 pandemic on care in Australian general practice

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The COVID-19 pandemic has severely impacted communities around the world, forcing health systems to make decisions about how to prioritise care, manage infection control, and maintain reserve capacity for future disease outbreaks (Reed, 2020). One health care consequence associated with the pandemic has been people's avoidance of contact with healthcare settings, whether out of fear of contracting COVID-19, as a means of reducing pressure on the healthcare system (Mareiniss, 2020), or because of the increased financial stress caused by the pandemic (Zhang, Liu, & Scott, 2020).

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The slump in general practice/primary care visits during heightened periods of the pandemic may have a detrimental and long-term impact on patient care and outcomes, especially if it affects diagnosis of new conditions, recommended disease and cancer screening programs, or ongoing monitoring of patients with chronic disease (Know Pathology, 2020). The pandemic has had a disproportionate impact on disadvantaged communities, catalysing the entrenchment of inequalities as a consequence of the economic measures used to contain the virus (Reed, 2020; Victoria State Government Health and Human Services, 2020). Internationally, there is also a major focus on the long-term clinical sequelae of COVID-19 and the challenges they represent to the future health of communities (Rajan et al., 2021).

The COVID-19 pandemic has led to a dramatic rise in the use of digital health innovations in many parts of the world. In some cases, these innovations (e.g., telehealth) have overcome legal and organisational barriers and have been shown to facilitate safe and rapid responses to the impact of the pandemic (Fernandez-Luque et al., 2021). Access to large data sources has in turn contributed to the promotion and utilisation of evidence-based information to plan, implement and monitor collaborative stakeholder responses to the pandemic (Scott et al., 2017; Georgiou et al., 2018). As highlighted by D'Anza and Pronovost (2021), digital health may not be a new method of medicine, but its value lies in the way it can enhance the delivery of health care.

This chapter outlines key components of a digital health project (COVID-19 – Utilising Near Real-Time Electronic General Practice Data to Establish Effective Care and Best-Practice Policy), which is funded by the Australia Digital Health Cooperative Research Centre (DHCRC). The project aims to: a) build a near real-time COVID-19 geospatial reporting framework; b) generate timely and critical evidence about the impact of COVID-19; c) create a predictive geospatial analytics dashboard for timely, evidence-based decision-making; and d) establish an evidence-based suite of general practice outcome measures required to monitor the quality and effectiveness of care related to incidence and prevalence, recovery, and mortality (Diagnostic Informatics and Australian Institute of Health Innovation, 2021). This contribution will outline three case studies (telehealth, pathology testing, and residential aged care [long-term care] facilities) that are featured as part of the project's General Practice COVID-19 Snapshot series of investigations of the impact of COVID-19 (Hardie, Sezgin, Dai et al., 2020; Hardie, Sezgin, Dai et al., 2021; Dai, Franco, Datta et al., 2021; Imai, Hardie, Franco et al., 2021). Each of the case studies highlights how electronic general practice data were used to identify key developments in the Australian general practice response, and contribute to efforts to plan and undertake quality improvement actions. The case studies highlight areas where digital health can help to enhance the delivery of health care during the COVID-19 pandemic (D'Anza & Pronovost, 2021), through enabling: i) direct care delivery (e.g., telehealth); ii) digital access (e.g., patient communication modalities); and iii) digital monitoring (e.g., quality improvement and measurement of key performance indicators).

Background

General practice services play an important ongoing role in Australia's response to COVID-19, not least because they are often the place of initial health system contact for most Australians (Kidd, 2020). General practice activity is also key to identifying and monitoring the health of communities, providing an early warning system of the spread of the pandemic and targeting areas where health care may be avoided or delayed, leading to the possibility of missed diagnoses, medications, and treatment, which may have serious future consequences for patients and the healthcare system. Australian Primary Health Networks (PHNs) are independent primary health organisations that have a role in commissioning health services in their respective regions (Australian Government Department of Health, 2020a). They work closely with general practitioners (GPs) to integrate health services at the local level.

Widespread digitisation and use of digital health technologies by Australian GPs has encouraged interest in the use of electronic health record (EHR) data as a rich information source for identifying variations in general practice activities. The value of electronic data lies in its longitudinal nature (allowing comparisons over time), its comprehensiveness (large sample sizes and a variety of data encompassing multiple aspects of the care process), and its depth (demographic and geographic) (Sezgin et al., 2018; Imai et al., 2020). While gathering electronic data from primary care is increasing worldwide, its secondary use for epidemiological research and health policymaking is still relatively new, and therefore limited (Gentil et al., 2017). In Australia, the use of diagnostic services data (pathology laboratory and medical imaging) to examine patient outcomes in general practice has been an overlooked area of research. This is at least partly due to the difficulty of accessing high-quality datasets, the siloed nature of general practice data (often only available in individual practices), and the lack of standardisation between clinical software used by practices, resulting in difficulties when combining datasets for research purposes (Australian Institute of Health and Welfare [AIHW], 2018).

Methodology

The project is a collaboration between Macquarie University, Outcome Health, Gippsland, Eastern Melbourne, South Eastern Melbourne PHNs and the Royal College of Pathologists of Australasia Quality Assurance Programs. Outcome Health is a non-profit organisation that collaborates with six PHNs across Australia to collect de-identified patient data from general practices. Outcome Health, as a data custodian, uses its Population Level Analysis & Reporting (POLAR) Data Space to provide a secure and comprehensive digital health platform that offers pooled and standardised data from consenting general practices across the above-mentioned PHNs.

The project involves a series of observational studies utilising near real-time electronic general practice data to promote effective care and best-practice policy. The studies are centred on 450 general practices within three Victorian PHNs: Gippsland PHN, Eastern Melbourne PHN and South Eastern Melbourne PHN. These PHNs cover metropolitan and rural regions across a combined area totalling 48,903 km,

delivering health care to 3,132,382 Australians (Hardie, Sezgin, Imai et al. 2020). The data are supplemented by the inclusion of 350 general practices across two PHNs in New South Wales (NSW): the Central and Eastern Sydney PHN and South Western Sydney PHN. The Central and Eastern Sydney PHN encompasses a population of 1,637,740 people, while South Western Sydney PHN delivers care to 966,450 people living in the region.

Data examination and analysis was performed using Stata/MP 16 (StataCorp, 2020), the R v4. 0.2 (R Core Team) (The R Foundation, 2020), and SAS 9.4 statistical software (SAS Institute). Statistical methods included descriptive and inferential statistics depending on the components of the project. Outcome Health has received ethical approval from the Royal Australian College of General Practitioners National Research and Evaluation Ethics Committee (NREEC) 17-008 Population Level Analysis and Reporting (POLAR) general practice data warehouse. The Macquarie University Human Research Ethics Committee (HREC) Medical Sciences Committee has granted approval to the project (Reference No. 5202067517176).

CASE STUDY 1: THE USE OF TELEHEALTH (TELEPHONE AND VIDEO) SERVICES DURING THE COVID-19 PANDEMIC

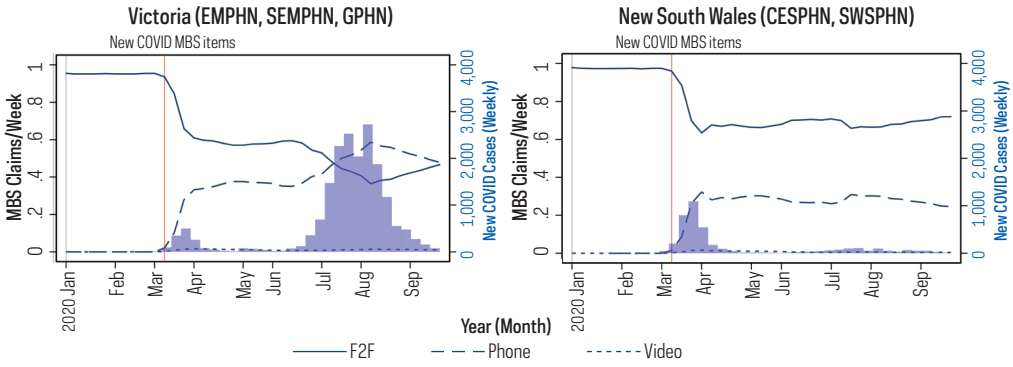
The Australian health system is underpinned by a government-funded universal healthcare scheme (Medicare) that provides free subsidised healthcare services to the entire population. The Medicare Benefits Scheme (MBS) is a schedule of fees for medical services within the Medicare scheme. It lists a range of professional services, including consultations, procedural/therapeutic services, and diagnostic services, and allocates a unique item number to each service, along with a description of the service.

During the onset of the COVID-19 pandemic, Australian general practices were severely affected by an initial drop in face-to-face (F2F) visits (Australian Government Services Australia, 2021). Between March 13 and 30, 2020, the Australian Government Department of Health progressively released a list of temporary MBS Telehealth Services item numbers (Australian Government Department of Health, 2020b) to cover general practice payments for out-of-hospital patients, with the aim of covering this gap in F2F visits and reducing the risk of community transmission of COVID-19. This case study presents data on the uptake of telehealth services compared to F2F visits, including video and phone consultations, before and after the introduction of the new MBS Telehealth Services item numbers, including differences in uptake based on demographic factors, including age, sex, socioeconomic status (SES) (Australian Bureau of Statistics, 2016), and region.

After the introduction of new MBS item numbers for video and telephone consultations, a decline in F2F consultations and an increase in video and telephone consultations occurred. These changes occurred on a larger scale across Victorian PHNs than those in NSW (Figure 1). In Victoria, median phone consults per week rose to 95,357 during the pandemic, and video consults saw an increase to 2,540 during the same period in 2020. By contrast, in NSW, median telephone consultations per week rose to 42,850 in 2020, and median video consultations increased to 805 in the same period.

FIGURE 1

PROPORTION OF WEEKLY TOTAL MBS CLAIMED ITEMS FOR THE PRIMARY HEALTH NETWORKS IN EACH STATE (2020)



NOTE: VICTORIA = EASTERN MELBOURNE PHN (EMPHN), SOUTH EASTERN MELBOURNE PHN (SEMPHN) AND GIPPSLAND PHN (GPHN); NSW = CENTRAL AND EASTERN SYDNEY PHN (CESPHN) AND SOUTH WESTERN SYDNEY PHN (SWSPHN). NEW COVID-19 CASES ARE INDICATED BY PURPLE BARS (RIGHT Y-AXIS) (HARDIE, SEZGIN, IMAI ET AL.,2020). REPRINTED WITH PERMISSION OF THE DIAGNOSTIC INFORMATICS RESEARCH TEAM, AUSTRALIAN INSTITUTE OF HEALTH INNOVATION (AIHI), MACQUARIE UNIVERSITY.

The shift from F2F visits to telehealth, including both video and phone consultations, after the implementation of the temporary MBS item numbers, suggests that telehealth consultations can fill the gap left by the decrease in F2F visits.

CASE STUDY 2: MONITORING THE IMPACT OF THE COVID-19 PANDEMIC ON PATHOLOGY TESTING

The results of an Australian survey found that during the period from June 1 to 6, 2020, 14% of respondents chose not to see a health professional when they needed to (Zhang et al., 2020). While these findings may represent the initial effect of COVID-19 restrictions on general practice, there is increasing concern about the long-term impacts of the pandemic on non-COVID care, including screening, diagnosis, and management of chronic health conditions (Pearce et al., 2020). An important component of diagnosis and ongoing management of disease is pathology testing.

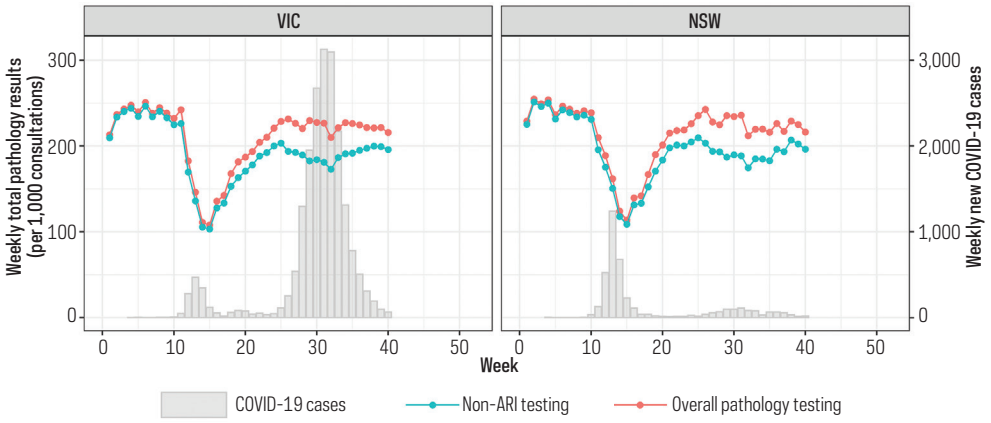
Figure 2 shows the weekly number of pathology tests conducted in 2020. The overall volume of pathology testing and non-ARI testing (excluding that for acute respiratory illnesses [ARI] such as respiratory viral pathogen polymerase chain reaction [PCR] for influenza and COVID-19) were similar before COVID-19 cases emerged around the 10th week in 2020. After the first wave of COVID-19, a distinct gap between the overall and non-ARI testing volumes was observed, which suggests an increasing proportion of ARI testing within the overall pathology testing volume. Figure 2 also illustrates that, although the overall volume of pathology testing appeared to recover after a sharp decline during the first wave, the volume of non-ARI testing remained relatively lower than before COVID-19.

Important patterns in the relationship between patient sociodemographic characteristics and non-ARI testing volumes during both waves of the pandemic

also emerged from the analyses. First, the difference in testing volumes between 2020 and past years was larger as patient age increased. The testing volume in 2020 was 12.8% less than previous years for patients 0 to 14 years old in Victoria, whereas patients 25 to 44 years old, and 65 years old or older, had declines of 23.7% and 28.6%, respectively. Females also had a larger decline of non-ARI testing in 2020 compared to males (-26.0% in females vs. -18.0% in males in Victoria; -15.7% in females vs. -10.4% males in NSW). Patients of higher SES had a larger decrease in non-ARI testing than those of middle to lower SES in both states.

FIGURE 2

WEEKLY NUMBER OF ALL TYPES OF PATHOLOGY TESTS AND NON-ARI TESTS (2020)



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Understanding the impact of the pandemic and its associated restrictions on requests for laboratory tests in general practice has the potential to guide GPs in identifying areas in need of action, for example, the need for potentially important or critical tests to be undertaken.

CASE STUDY 3: THE IMPACT OF THE COVID-19 PANDEMIC ON GENERAL PRACTICE CONSULTATIONS IN RESIDENTIAL AGED CARE (LONG-TERM CARE) FACILITIES

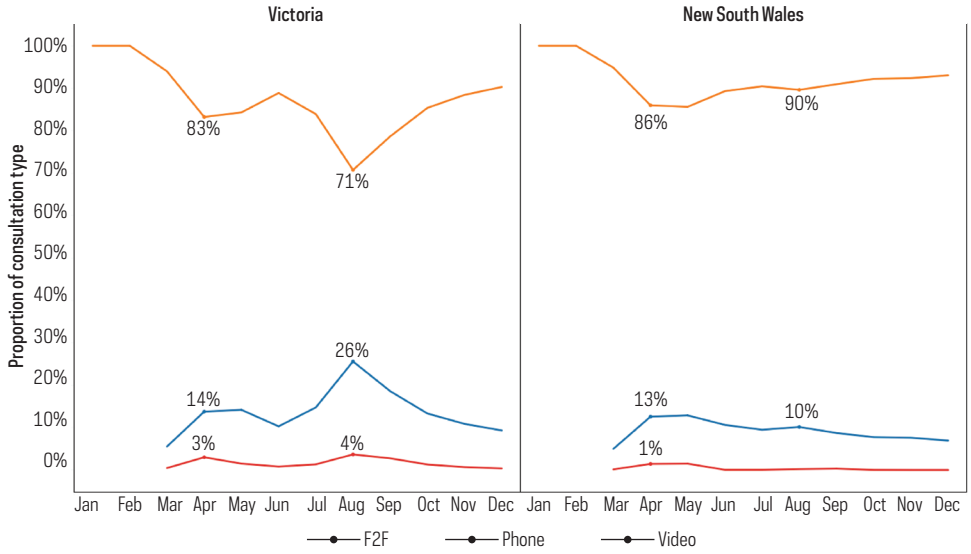
Due to older age (65 years old or older), comorbidities, pre-existing conditions, and frailty, residents in aged care facilities have represented one of the most vulnerable populations during the COVID-19 pandemic. With 44% of the residential aged care facilities (RACFs) across Australia reporting at least one case of COVID-19 (Australian Government Department of Health, 2021), many care facilities became hotspots for this viral infection. The severity of COVID-19 in RACFs, and multiple lockdowns and restrictions, have had an enormous impact on assisted living routines as well as access to health care and disease management in the RACF population (Gilbert, 2020). In this case study, we present the patterns of GP consultations in RACFs during the COVID-19 pandemic.

In Victorian PHNs, GP in-person visits to RACFs declined from March to December in 2020 when compared with the same period in 2019. A more apparent decline in this MBS item claim was seen in May (-27%), July (-20%), and August (-37%). In NSW PHNs, there was a slight increase in the number of claims for this item in 2020 when compared with 2019.

Across both states, the decline in F2F consultations began in April (Figure 3). The decrease was more apparent in Victoria. In response, the use of telephone consultations showed an overall upward trend in Victoria, with an increase of 14% in April and 26% in August. In NSW, telephone consultations were stable overall, with an increase of 13% in April and 10% in August. The months of April and August fell within the first and the second wave (Victoria only) of the COVID-19 outbreaks and lockdowns. However, the utilisation of video consultations was low overall in both states (<4%).

FIGURE 3

PROPORTION OF MODE OF GP STANDARD CONSULTATIONS (F2F, PHONE, VIDEO) IN VICTORIA AND NEW SOUTH WALES (2020)



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Lower utilisation of videoconferencing compared with telephone consultations deserves further investigation, because video consultations offer benefits when addressing conditions such as skin problems, musculoskeletal disorders, trauma, and surgical procedures that require timely care delivery (Jaklevic, 2020). Future investigations should look into barriers that contribute to the low use of videoconferencing in GP consultations. These barriers may include: i) technology issues (e.g., internet connection, availability and accessibility of digital devices/

applications, quality of sound and images, and additional resources and technical expertise required for video compared with telephone); ii) regulations related to data security and privacy; iii) RACF workflows and staffing issues; and iv) clinicians' work schedules and confidence surrounding the use of technology.

Discussion and conclusion

The case studies outlined above provide exemplar findings from the project "COVID-19 – utilising near real-time electronic general practice data to establish effective care and best-practice policy." Taken together, the case studies highlight areas where digital health has helped to inform and enhance the delivery of health care during the COVID-19 pandemic, while identifying areas for further exploration (D'Anza & Pronovost, 2021). One area of benefit is direct care delivery, where the rapid uptake of telehealth (telephone and video), can lead to timely interaction between patients and providers, with obvious benefits in situations facing pandemic restrictions and issues of accessibility (Hardie, Sezgin, Dai et al., 2020). A corollary to telehealth is the development of enhanced digital access (e.g., e-prescribing, messaging between patients and general practitioners, and patient portals), which can help to promote access to the healthcare system through scheduling and communication. The case studies also highlight the importance of using electronic health data to generate timely evidence about the impact of COVID-19 on patient care, which can help to inform timely decision-making and clinical practice.

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