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Title page

At the Edge of Chaos: Changing routines in Australian General Practices in response to COVID-19

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Abstract

Objectives: The rapid onset and progressive course of the COVID-19 pandemic challenged primary care practices to generate rapid solutions to unique circumstances; creating a natural experiment of effectiveness, resilience, financial stability and governance across primary care models. We aimed to characterize how primary care practices in Melbourne Australia modified clinical and organizational routines in response to the COVID-19 pandemic in 2020-21 and identify factors that influenced these changes.

Design: Prospective qualitative case study design using a theory-informed participatory approach, conducted between April 2020 and February 2021. Participant general practitioner (GP) investigators designed the study and were involved in recruitment, development of structured practice summaries and data analysis.

Setting: The case sites were six Melbourne primary care practices of varying size and organizational models.

Participants: Potential participants were approached by GP investigators. Social scientists interviewed practice health care workers on three occasions. Practice members provided feedback on presentations of preliminary findings.

Results: We conducted 58 interviews with 26 practice health care workers including practice owners, practice managers, GPs, receptionists, and nurses; and six interviews with GP Investigators. Data saturation was achieved at the level of each practice and across the sample. The pandemic generated changes to triage, clinical care, infection control and organizational routines, particularly around telehealth. While collaboration and trust increased within several practices, others fragmented, leaving staff isolated and demoralized. Financial and organizational stability, collaborative problem solving, creative leadership, and communication (internally and within the broader healthcare sector) were major influences on practices' ability to negotiate the pandemic.

Conclusions: This study demonstrates the complex influences on primary care practices, and reinforces the strengths of clinician participation in research design, conduct and analysis. Two implications are: telehealth, triage and infection management innovations are likely to continue; the existing payments system provides inadequate support to primary care in a global pandemic.

Strengths and limitations of this study

► Our prospective case study design provided a detailed understanding of the evolution of clinical and organisational routines within Australian general practices of varying models through the first year of the COVID-19 pandemic.

► Our use of GPs as participant investigators overcame the challenges of recruiting and collecting data from practices at a time when external researchers were unable to enter practices due to public health restrictions.

► The credibility of our findings are increased by the multi-method data collection strategy (providing a detailed, intensive exploration of individuals and organisations in context) and our presentation of emergent findings to practice teams.

► Practices were all from Melbourne, the region in Australia that experienced both the highest COVID case numbers and most prolonged and extensive lockdowns during 2020.

► Different practice routines may have emerged in other contexts, such as rural practices and those with no association with a University Department of General Practice.

Abbreviations

AOD	Alcohol and other drug
CALD	Culturally and linguistically diverse
CDM	Chronic disease management
CHC	Community Health Centre
FTE	Full Time Equivalent
GP	General Practitioner
CDM	Chronic disease management
MBS	Medical Benefits Schedule
N	Nurse
PPE	Personal Protective Equipment
PM	Practice manager
PO	Practice owner
R	Reception staff
SES	Socio-economic status

INTRODUCTION

The COVID-19 pandemic has challenged healthcare systems[1] and generated major changes in the delivery of primary care.[2] While Australia was spared high COVID-19 mortality during 2020,[3] two-thirds of 2020 COVID cases and nearly 90% of deaths were in the Melbourne metropolitan region (population 5.1 million), following a four-month outbreak. In response, between July and October 2020, the Victorian state government imposed one of the world's most stringent lockdowns.[4]

Both federal and state governments in Australia stressed the importance of primary care to the overall pandemic response. Australian primary care is largely delivered through a network of small, owner-operated general practices. Ten percent of practices are owned by large corporate entities,[5] and most states have a small number of comprehensive primary health care organizations, similar to Community Health Centers (CHCs) in other nations.[6] Under Australia's federal government single-payer insurance scheme, the Medical Benefits Schedule (MBS), general practitioners (GPs) are paid a standard amount for each consultation, and can either accept that payment ("bulk-bill"), or charge an additional "co-payment" to the patient.

While complex systems such as primary care are generally robust, [7] situations of instability can generate an 'edge of chaos' state between *"equilibrium and complete disorder where systems have the potential to be most adaptive and creative",*[8] but where *"systems that do not successfully change can become extinct".*[9] The early phase of the pandemic generated such a scenario within Australian general practice.

There is limited research on the experiences of primary care practices providing care within the systemic strains caused by the pandemic. We asked: a) what changes to clinical and organizational routines were made during the first year of the pandemic; and b) what contextual, organizational and individual factors facilitated these changes?

METHODS

Design: We used a participatory prospective qualitative case study[10] design, within which GP participant investigators shaped the project, and contributed to data collection and analysis.[11] Our methodology (including data collection tools) has been detailed elsewhere.[12]

Setting and participants: The study was set in six general practices of varying size and organizational model in metropolitan Melbourne. Practices were locations where GP investigators based their clinical work. Investigators comprised four clinician educators (JN, KA, SH and TSS), two clinician researchers (GR and ES) and two social science research fellows (JA and RL) with PhDs and experience in qualitative research. Each investigator was affiliated with a University Department of General Practice. WM and BC acted as external advisors. The GP investigators gained written informed consent from each participant. Data were collected between April 2020 and February 2021.

Data collection The GP investigators used structured diaries to record their experiences. They completed a practice description tool;[13, 14] and collated and photographed practice documents, signage and layout. RL and JA conducted semi-structured, in-depth, audio recorded telephone or videoconference interviews (30-60 minutes) with clinicians and administrative staff from each practice at three time points (see Figure 1). Each GP investigator was interviewed once in early 2021. Interviews focused upon participants' individual experiences, perceived practice responses, and beliefs about factors influencing practice performance. Practice staff were invited to attend live video presentations by investigators of emerging findings at mid and end of project. Responses were collected and informed analysis.

Data management: All digital data was stored on a secure server only accessible by JA, RL and project manager SC. Interviews were professionally transcribed and all identifying information removed. Interview transcripts and observational data (diaries, practice documents and field notes) were coded by JA and RL using NVivo [12.15] Our iterative coding template was based on emerging data themes and concepts from Miller, et al's Relationship Centred Model of Primary Care Practice Development.[16]

Data analysis: Data analysis used a constant comparative approach[17] informed by prior approaches to investigation of primary care practice routines.[14, 18] JA and RL undertook data analysis, which was refined at regular meetings with GR and JN, and at a data retreat[19] with all investigators.

The use of matrices facilitated cross case comparisons.[20] An initial matrix organized summarized data under thematic codes (rows) versus practices (columns). Subsequently, further summarized matrices were used to generate narratives, which described the key elements of changes in each practice. Reporting followed Standards for Reporting Qualitative Research.[21]

Public and patient involvement statement: Given limitations imposed by the pandemic on interaction with members of the community, this research was carried out without patient involvement

RESULTS

We recruited six of seven practices approached. One practice was part of a federal and state funded Community Health Centre, another was part of a large corporate network and the remainder were general practices of varying size, organizational structure, billing practices and patient characteristics. (See Table 1). All were organizationally and financially stable prior to the pandemic. We conducted 58 interviews with 26 practice staff including practice owners (PO), practice managers (PM), GPs, reception staff (R), and nurses (N) and six interviews with GP Investigators. Data

saturation was achieved at the level of each practice and across the sample. The CHC-based investigator left the practice in August 2020. Subsequently, another GP working at the practice provided liaison, but did not collect data.

PRACTICE PSEUDONYM	TYPE OF PRACTICE	LOCATION	BILLING SYSTEM[1]	PRACTICE POPULATION	GPS	NURSES	ALLIED HEALTH DISCIPLINES
CHC	Community Health Centre	Inner city suburbs	Bulk billing	Lower SES[2], CALD[3], refugees, AOD[4]	6 FTE[5]	5	Numerous health and social care disciplines
SE1	Private General Practice	South-eastern suburbs	Blended	High SES, children and elderly	3.5 FTE	2	Dentist
E	Private General Practice	Eastern suburbs	Blended	High SES, very few CALD	4-5 FTE	1 FTE (3 in total)	Diabetes educator
CBD	Private General Practice	Central business district	Blended	Higher SES, Tourists, Multi-lingual GPs	3.5 FTE	1 FTE (2 in total)	Clinical psychology
SE2	Private General Practice within large corporate	South-eastern suburbs	Bulk billing	Mid to low SES, broad patient mix	14 FTE	3.5FTE	Physiotherapy, dietetics
W	General Practice and Health Hub	Western suburbs	Blended	Low SES, gentrifying	15+ GPs	3.5 FTE	Numerous co-located disciplines including psychology, dietetics, physiotherapy, podiatry.

Table 1. Participating practices

1 Bulk billing is where clinicians accept the Medicare benefit as full payment for the service. A blended system is where clinicians bulk bill some patients and require a co-payment from others.
2 SES: socio-economic status.
3 CALD: culturally and linguistically diverse patients.
4 AOD: alcohol and other drug patients
5 FTE: Full time equivalent

Clinical and organizational routines evolved with the stages of the pandemic, patient demand and changes to MBS telehealth payments. Pre-pandemic plans required for practice accreditation prior to 2020 had minimal influence, and practices struggled with conflicting advice from government and professional organizations at times. Stability of the practice core, functional leadership, organizational model and communication were major influences on the ability of practices to modify routines to complex and unpredictable challenges. We begin by describing the evolution of the pandemic within the practices, followed by an interpretation of the drivers of routine change.

Early chaos (February 2020 - April 2020)

Practices began to be aware of the pandemic's implications in February 2020:

> *We expected to be overwhelmed with very sick people and we were basing that on what was happening in other countries… we had plans for home palliation, staggered staff shifts in case one shift was infected and the Health Department ordered everyone on that shift to disappear, so week on, week off. (CHC GP2)*

The subsequent weeks were chaotic, as workplaces changed overnight:

> *For two weeks at the very beginning, like early-mid March, it was absolute chaos. Just in terms of the volume of patients that were calling non-stop. Mostly phone calls, and mostly people really desperately wanting testing…. At first it was like very overwhelming, but then it became a new norm to just, "This is the new thing. Do it. Adapt, adapt, adapt." (CBD R)*

Many staff became increasingly frustrated by shortages of Personal Protective Equipment (PPE) and changing advice from government and professional bodies. They were concerned for their safety and that of their families and about the potential impact of rapid community transmission. The MBS broadened eligibility for telehealth consultations

(previously limited to rural and remote areas), allowing some older GPs and other vulnerable staff to work from home, which increased the complexity of receptionists' work.

Emerging stability (May 2020 - June 2020)

With cases falling, Victoria's community lockdown was lifted in late May. After the early disruption, the impact was less than feared:

> *The initial tension, anxiety, shock where people saw the horrendous news items from overseas: you could sense that in the doctors here, and the staff. … so initially there was a run for shelter.. … People feel as if things are well controlled and reasonably calm at the moment in terms of illness. (SE2 GP)*

All practices had incorporated fundamental changes to their work routines (see Table 2):

i) K*eeping staff and patients safe.* Once problems sourcing PPE were partially resolved, practices began to prioritise creation of a COVID-19 safe workplace. Clinicians began wearing scrubs, room ventilation and cleaning was improved and physical barriers and isolation areas were introduced. These came with major changes in screening, triage and booking routines. Online appointment booking was paused – reception staff screened all patients for COVID-19 infection risk by telephone, while informing them about requirements relating to safety, telehealth and billing. These infection control approaches varied between practices.

ii) Re-aligned clinical work. Telehealth had major impacts on clinical care delivery. Telephone, rather than video, consultations predominated due to GP preferences and some patient technological constraints. There was significant concern about patient unwillingness to attend in person, and GPs often viewed telehealth as inadequate for delivering quality care, especially for systematic chronic disease management (CDM).

iii) Practice management. To limit virus transmission risk, practice staff began communicating differently with each other. (See Table 3) Face to face meetings ceased, replaced by emails, and in some practices, smart phone apps and virtual meetings. Formal practice meetings were mostly held infrequently. Practice owners in the small private practices made decisions to change routines, often unilaterally. GPs became increasingly concerned about losing income due to reduced patient demand and an initial government mandate to bulk bill all telehealth consultations.

WORKFLOW ROUTINE	DEFINITION	DESCRIPTION OF CHANGES
1 KEEPING STAFF AND PATIENTS SAFE	Procedures to reduce infectious disease transmission	Increased PPE use; enhanced cleaning practices by external cleaners and practice staff. Patient waiting routines e.g. changed waiting room layout; wait in their car/outside until appointment times. Booking processes: All practices paused patient ability to make appointments online. Receptionists began to check respiratory symptoms and travel/contact history during patient booking for appointments by telephone and on arrival. Staff-to staff contact reduced greatly: such as closed lunch rooms, lunch to be eaten in rooms and in some practices the wearing of surgical scrubs. *(Impacts on routine 3)*
2 RE-ALIGNED CLINICAL WORK		
2.1 TELEHEALTH	Procedures for conducting consultations via phone or video, rather than face to face.	All practices began using telehealth for many consultations – enabled by changed MBS funding for telehealth (previously limited to rural and remote areas). All practices remained open for face to face consultations (usually with almost all GPs on site). Most GPs provided telehealth from the practice, but some worked from home when isolating or unwell or if they had personal risk factors such as advanced age or chronic disease: • Difficulties due to lack of required technology at home;

		providing access to patient data base, printing, faxing and billing. • At CHC all but two GPs worked from home; management provided home technology. GPs overwhelmingly used phone rather than video: • Reluctance to use video due to difficulties with logistics, practices' technology, and perceived ability for patients and/or GP to access and use technology. Receptionists needed to be aware of significantly modified billing schedule.
2.2 CASE MANAGEMENT CHRONIC ILLNESS/ CARE CONTINUITY	Procedures for management of patients' ongoing health conditions	All practices initially paused: Chronic Disease Management recalls; cervical cancer screening; 45-49 and 75+ year old health checks: • Major concerns about missed diagnosis with telehealth and patient reluctance to attend GP and/or hospital. Different approaches and timing for resuming chronic disease management follow ups – often financially driven in view of falling practice income: • Primarily conducted via phone or video with the assistance of the practice nurse.
3) PRACTICE MANAGEMENT	Procedures for coordination between practice staff	Staff meetings: Pre-existing large variation between practices in frequency and attendance: Shift to online meetings: excludes some, but includes others. Some practices increased meetings, others decreased them. Major loss in collegiality: Infection control obstructs social interaction and makes it more difficult to gain second opinions from practice colleagues. Especially where many staff work from home (as in the CHC) Online forums, meetings, phone calls assist, but exclude non-GPs in some practices.

Table 2. Workflow routines

Practice	Meeting routines				Communication Tools
	Pre COVID	**Early Chaos**	**Emerging Stability**	**2nd Wave**	
CHC	Monthly / as required- all staff	Twice weekly	Weekly Zoom (open to all staff, most attend, even on days off for some). Increased attendance from pre-pandemic.	As previous	Set up WhatsApp group at start of COVID-19 (for general staff communication)
SE1	GPs every 2 to 3 months, decided by owner.	Weekly Zoom from May 2020. Generated by employed doctor advocacy.	Weekly Zoom – only GPs.	As previous	WhatsApp group for GPs at start of COVID-19
E	Every 1 or 2 months	Fortnightly by zoom; Nurses and receptionists not usually included	No change	At peak of 2nd Wave, no meetings; leadership making all decisions.	Most communication by email
CBD	Monthly	Weekly, sometimes only GPs, sometimes Nurses. Also smaller informal meetings amongst GPs every morning	Nurses stopped attending	As previous	WhatsApp group prior to COVID-19 but used more often during pandemic. WeChat group added.
SE2	No all-staff meetings - off site managers only, no GP meetings, reception and nursing team have separate meetings	1 GP meeting in March 2020, clinical investigator stepped up to clinical director, started regular meetings of PM, head nurse and medical director	No change	No change	Medical director set up WhatsApp group for GPs in July to communicate changes to protocols, share thoughts, information - informal, not seen as good replacement for meetings

W	Partners meet 1-2 times a month, GPs monthly lunch meeting, AGM	All staff weekly or fortnightly	No practice wide meetings since late March 2020	As previous	Couple of WhatsApp groups, delegated nurse and doctor inactive during COVID-19

Table 3. Practice meetings and communication.

Negotiating a second wave (July 2020 – October 2020)

In early July, rapidly increasing cases led to a strict four-month metropolitan Melbourne lockdown.[22] Despite case numbers reaching 700 per day, many participants across the practices felt their earlier changes had prepared them for the challenge. Clinicians became increasingly concerned about missed diagnoses and late presentations:

> *[A patient has] really deteriorated in the last six weeks. … I've had several telephone calls to persuade him to go into hospital, and eventually he did yesterday. I got him to agree to some blood tests… his liver has packed up. And he's jaundiced and I don't know if he will survive, but at least he's gone in. And if he hadn't have gone in, I would have said, "Oh no, what do I do now?" … He would have died at home. (CHC GP1)*

Patients embraced telehealth, causing dilemmas for clinicians in maintaining quality care as a 'balance' between bringing patients to a potentially infectious location and dealing with the uncertainties of remote clinical care:

> *We've put all sort of strict guidelines around what we think's suitable for telehealth and what's not. So, things like say mental health plans, basic administrative things like repeat scripts…referrals to other specialists... do that over the phone. But as soon as they start saying, "I've got abdominal pain," or,*

> *"I've got this thing on my arm, I'm not sure what it is," they've got to come in and have an appointment. (SE1 PO)*

Three practices began managing COVID-19 testing clinics:

> *… we took over screening [from the Department of Health, because] They were taking up to two weeks to get a positive result to a patient. … that was a significant increase in workload…. I pretty much worked seven days a week. I think for three months I didn't have a day off, there were just lots of results coming through, notifications. The time taken to notify one positive result, to notify the Department of Health, could take one staff member two to three hours …. (CHC GP2)*

As the lockdown continued, financial pressures increased. New staff vacancies were unfilled, and some staff and clinicians were asked to take annual leave or reduce working hours. The privately owned practices sought to diversify income; training nurses in remote CDM, systematically calling patients for recall (most practices); or providing COVID-19 testing for asymptomatic travellers (CBD). The corporate's regional management modified CDM 'targets' to increase income. As cases rose, the CHC assumed responsibility for managing the pandemic response at nearby public housing towers, which required significant staffing resources and eventually attracted additional state government funding.

Entering a new normal (November 2020 – February 2021)

Strict lockdown ended in late October 2020 and heralded an uneasy optimism. With new routines embedded, staff reflected on the consequences of the strain of the experience:

> *We're all pretty exhausted. And I've noticed - especially the past couple of months, I personally have been very, very short with patients. … I don't indulge anyone at all anymore. I just say straight up this is how we work, you could*

come, you could not come. That's it. I'm not going to spend 10 minutes on the phone with you convincing you because I have so much work to do. (CBD R)

Understanding the change

Our data showed that the characteristics of and variations between the practices in the organization and delivery of clinical care were driven by the health policy environment, local ecology and each practice's core and adaptive reserve.[10]

Health Policy Environment

While the Australian federal government provided no specific financial support to general practices during the pandemic, the impact was ameliorated by its 'JobKeeper' wage subsidy[23] and the introduction of MBS payments for telehealth. JobKeeper was only accessed by staff from one practice (CBD), but all made extensive use of telehealth. The federal government's Primary Health Networks[24] distributed some PPE as the months passed, although practices continued to need to source these privately. While practices were aware of, and often attentive to, a steady stream of government, Primary Health Networks and professional organization advice, shifting guidance with inadequate notice made it difficult to forge a consistent path.

Local Ecology

The pandemic's impact varied across metropolitan Melbourne – neighbourhoods surrounding practices W and CHC had four times as many COVID-19 infections compared to the other practices.[25] Practice W's (federally funded) on-site COVID-19 testing clinic was established prior to the first local infection, and was viewed as critical in keeping the general practice environment 'safe'. The rising incidence of COVID-19 in public housing towers close to the CHC led to extensive outreach services. The extensive changes adopted by the other practices were unrelated to local infection rates, although the CBD practice created a COVID-19 testing clinic to meet the needs of its overseas worker clientele who were required to obtain COVID-19 tests prior to returning home.

Practice core

The lack of formal external support or meaningful pandemic planning left the private practices internally focussed and needing to generate their own solutions to the pandemic challenges. The solutions and their uptake reflected the practices' organizational models and their leaders' internal models.

For example, the structure within SE2's corporate model (where early decision making was made by off-site regional managers) compounded local leaders' frustration and made it difficult for the practice to address the demands of the pandemic.

For all practices the introduction of MBS telehealth payments eased financial pressures that emerged with patients' increasing reluctance to seek face to face care. This required new routines to manage acute illness, plan prevention, and monitor CDM. Nevertheless, as the pandemic continued, financial pressures continued, with most practices reporting a 25-60% fall in income and adjustments to staffing to offset losses.

Government financial regulations generated some perverse incentives. During early pandemic phases, government funded telehealth consultations could not attract co-payments. As a result, several of the private practices began to encourage patients to attend the practice for face-to-face consultations, which still attracted private co-payments.

Adaptive reserve

Internal motivations were similar between practices. The early preoccupation was with a safe workplace focussed on structural changes, modifications to patient flow and an ongoing need for triage. As time passed, work was driven by desires to maintain both financial viability and quality clinical care. Most practice staff were increasingly concerned about their patient cohort's welfare, especially those with mental health conditions or complex chronic disease.

Leaders were key to adaptive reserve in the four privately owned practices and were critical to the maintenance of services in the CHC and the corporate practice. Within the CHC's complex external governance structure, management resources were rapidly redirected to the general practice, with decision making mostly devolved to managers and staff members close to the general practice level.

By contrast, at the four private practices, practice owners made most of the decisions, often with minimal consultation with nurses, receptionists and contractor doctors:

> *The practice principals have been taking a lot of unilateral decisions recently and there has not been a doctors' meeting for quite some time now. They even sent out an email asking for all the discussion to cease as they would be making the decisions from now on. I'm a bit worried it got everyone offside. (de-identified)*

Professional roles remained isolated and few leaders sought information from outside their own professional group. Pre-pandemic hierarchies between the owners and clinical and administrative staff were maintained and sometimes reinforced. Despite needing to "*take on the lion's share of the infection control and cleaning and [having] very high risk interactions*" (*de-identified*), nurses were rarely included in decision making.

The data suggested occasional evolution of leadership approaches. The corporate practice (SE2) began with key decisions being made by the practice's regional management team. Practitioners and staff feelings of disempowerment improved when a local leadership team was formed comprising the practice manager, a senior nurse and a medical lead. However, several changes to routines (such as temperature testing all patients) were later overturned by regional leaders on cost grounds.

In the early months of the pandemic, contractor GPs in one practice felt the practice leadership was not "*taking it seriously enough*" *(de-identified N)*. Following a formal presentation of the non-owner GPs' concerns to management, the practice transformed to become more collaborative, with weekly meetings and extensive use of social media for communication. However, nurses and administrative staff remained isolated from decision making:

A: No, the weekly meetings are not everyone. They're just the GPs. They do a Zoom meeting now.

Q: But not with you?

A: No, not with us. So that's what I'm saying, we just get things told to us in the corridor. (de-identified participant N)

DISCUSSION

Despite Melbourne's pandemic experience being the worst in Australia in 2020, practices were spared the staff deaths or multiple practice closures experienced overseas. The study practices mirrored international transformations of clinical, organizational and infection control routines. As elsewhere, PPE was difficult to access,[26] practice income fell[27] and practitioners worried about reduced face-to-face consultations[28] and the potential impact on patients with chronic health conditions.[29]

Unanticipated crises, like a pandemic, can uncover the strengths, flexibility and fragility of organizations and the systems in which they are embedded.[7] The pandemic acted as a natural experiment of the effectiveness of models of care predominant in Australian general practice. We believe our data emphasises the fragility of the organizational models, financial security and support underpinning Australian primary care.

Models of care

Our study data highlighted the potential of the CHC model to bridge the gap between primary care and public health.[30] Victoria's CHCs incorporate a focus on prevention, health equity and the social determinants of health.[31] The combination of the CHC's community focus and secure state funding helped it meet its mandate of addressing the evolving needs of local communities. By contrast, most of the private practices lacked the structural or organizational ability to go much beyond maintaining basic practice functions. They were isolated, internally preoccupied and, while provided with

extensive information, generally left to negotiate the challenges of the pandemic alone. SE2's remote governance and lack of internal management compounded workforce fragmentation and demoralisation, and made it difficult for the practice to align with evolving demands. Practice W was a partial exception, as its size, active leadership and community connection was reflected in the decision to host a federally funded COVID-19 testing facility.

The relative financial security of the CHC funding model and the explicit links with state health services highlighted the potential of the CHC to address local needs of vulnerable communities. Models similar to CHCs are widespread in North America and have been important in delivering quality care to underserved populations.[32] Given the disproportionate impact of the pandemic on vulnerable communities, and the importance of primary care to population health, future health planning should explore the potential for either expanding the coverage of the CHC model or exploring ways to incentivise the incorporation of CHC-like functions into private primary care delivery.

Financial security

As elsewhere,[33-35] all our participating practices were financially challenged by the pandemic. A recent survey found that 65% of Australian GPs, particularly in urban and more affluent areas, experienced reduced income in the early months of the pandemic.[36] Similar early financial impacts were reported in many other nations,[37 38 39] with losses per FTE physician in the USA estimated as over $65,000 in 2020. Waitzberg observed that dramatically decreased income from patient visits combined with minimal direct governmental control "reverses the conventional financial positions of payers and providers and acts as a further hurdle to prioritizing public health".[37]

Given the fee for service payment model for GPs in private businesses and the CHC, our participants unsurprisingly had a preoccupation with financial security and modifying routines to maintain income and avoid practice closures. This challenge could have been addressed by directed government financial support.

Some degree of practice-directed financial support could be considered in future pandemics. Even relatively small capitated payments from payers (i.e. the federal government in Australia) could be used to mitigate losses and keep practices open.[40]

Leading change at the practice level

It has been suggested that COVID-19 highlights the weak points in systems, but also provides an opportunity for transformation.[41] While practices in this study were all able to realign their organizational and clinical routines, transformation was constrained by hierarchical leadership structures, rigid financial models and pervasive professional boundaries.

As others have found, our data identified isolated examples of increased collaboration,[42] and, at times (especially within the CHC) evidence of visionary, operational, and distributed leadership.[43] However, overall our data supported Gerada's contention that practices can both "crave" for authoritative leaders at times of distress, but also find such approaches to be disempowering.[44] Practice models and financing provided minimal incentives for leaders to be attentive to the local environment,[16] or open to creating links between organizations.[45]

Limitations

While data was collected from a range of organizational models, these were within a single Australian metropolitan area in the first year of a moderate COVID-19 pandemic. It is feasible that different routines would have emerged in practices in a different health policy or local environment context, such as rural practices, those not faced by a metropolitan area lockdown, and with no association with a University Department of General Practice. While it was possible that key routines were not revealed, our external investigators, iterative approach and inclusion of international experts decreased this possibility.

Conclusion

Our study represented a natural experiment of the resilience, financial stability and governance within models of primary care in Australia. We found a fragile primary care sector that struggled to be fit for purpose in dealing with a pandemic. Practice isolation and financial strain were early and pervasive challenges to practice security. Leadership was critical, but many routine changes followed both financial and clinical priorities. Nevertheless, innovations in telehealth, triage and infection management are likely to be long lasting.

The Australian federal government's 10-year vision for improving primary care[46] highlights the importance of leadership at all levels and reconsideration of federal and state responsibilities in supporting general practices. Our findings point to the potential value of models such as the CHC for organizing and delivering care to highly vulnerable populations, and to the key role of practice leaders. The significant financial burdens experienced by several practices raises concerns as to the abilities of a purely fee for service system to both innovate and manage the critical primary care challenges of a global pandemic.

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Contributors GR led the project. GR, ES, JN, KA, TS-S and SH acted as participant investigators. BFC and WLM provided expert advice. JA and RL conducted and coded interviews and led data analysis. This paper was written by GR, JA, and RL with contributions from TS-S, JN, SH, BFC, WLM and KA. All authors contributed to study design and approved the final manuscript.

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References

1. Hick JL, Biddinger PD. Novel Coronavirus and Old Lessons — Preparing the Health System for the Pandemic. *New England Journal of Medicine*. 2020/05/14 2020;382(20):e55. doi:10.1056/NEJMp2005118

2. Huston P, Campbell J, Russell G, et al. COVID-19 and primary care in six countries. *BJGP Open*. Sep 8 2020;doi:10.3399/bjgpopen20X101128

3. Braithwaite J, Tran Y, Ellis LA, Westbrook J. The 40 health systems, COVID-19 (40HS, C-19) study. *Int J Qual Health Care*. Feb 20 2021;33(1)doi:10.1093/intqhc/mzaa113

4. Boroujeni M, Saberian M, Li J. Environmental impacts of COVID-19 on Victoria, Australia, witnessed two waves of Coronavirus. *Environ Sci Pollut Res Int*. Mar 2021;28(11):14182-14191. doi:10.1007/s11356-021-12556-y

5. Erny-Albrecht K, Bywood P. *Corporatisation of general practice – impact and implications.* 2016:1-53. *PHCRIS Policy Issue Review*.

6. McDonald J, Ward B, Lane R, et al. How are co-located primary health care centres integrating care for people with chronic conditions? *International Journal of Integrated Care*. 2017;17(3)doi:10.5334/ijic.3163

7. Carmeli A, Schaubroeck J.Crisis-Preparedness: The Importance of Learning from Failures. *Long Range Planning*. 2008/04/01/ 2008;41(2):177-196. doi:https://doi.org/10.1016/j.lrp.2008.01.001

8. Plsek PE, Greenhalgh T. Complexity science: The challenge of complexity in health care. *BMJ*. 2001;323(7313):625-8.

9. Miller WL, Crabtree BF, McDaniel R, Stange KC. Understanding change in primary care practice using complexity theory. *J Fam Pract*. May 1998;46(5):369-76.

10. Yin R. *Case study research: Design and methods (3rd ed.).* Sage; 2003.

11. van Buul LW, Sikkens JJ, van Agtmael MA, Kramer MHH, van der Steen JT, Hertogh CMPM. Participatory action research in antimicrobial stewardship: a novel approach to improving antimicrobial prescribing in hospitals and long-term care facilities. *Journal of Antimicrobial Chemotherapy*. 2014;69(7):1734-1741. doi:10.1093/jac/dku068

12. Russell G, Advocat J, Lane R, et al. How do general practices respond to a pandemic? Protocol for a prospective qualitative study of six Australian practices. *BMJ Open*. 01-Sep-2021 2021;11(9):e046086. doi:10.1136/bmjopen-2020-046086

13. Balasubramanian BA, Chase SM, Nutting PA, et al. Using Learning Teams for Reflective Adaptation (ULTRA): Insights From a Team-Based Change Management Strategy in Primary Care. *Ann Fam Med*. September 1, 2010 2010;8(5):425-432. doi:10.1370/afm.1159

14. Lane R, Russell G, Bardoel EA, et al. When colocation is not enough: a case study of General Practitioner Super Clinics in Australia. *Aust J Prim Health*. Aug 17 2016;doi:10.1071/PY16039

15. *NVivo qualitative data analysis software. Version 12.* 2018.

16. Miller WL, Crabtree BF, Nutting PA, Stange KC, Ja√©n CR. Primary Care Practice Development: A Relationship-Centered Approach. *The Annals of Family Medicine*. May 1, 2010 2010;8(Suppl 1):S68-S79. doi:10.1370/afm.1089

17. Glaser BG. The Constant Comparative Method of Qualitative Analysis. *Social Problems*. 1965;12(4):436-445. doi:10.2307/798843

18. Russell G, Advocat J, Geneau R, et al. Examining organizational change in primary care practices: experiences from using ethnographic methods. *Fam Pract*. Dec 1 2011;doi:cmr117 [pii] 10.1093/fampra/cmr117

19. Strauss AL. *Basics of qualitative research : techniques and procedures for developing grounded theory*. 2nd ed. ed. Thousand Oaks : Sage Publications; 1998.

20. Miles MB, Huberman AM, Saldana J. *Qualitative data analysis : a methods sourcebook*. Third edition. ed. Thousand Oaks, Californinia : SAGE Publications, Inc.; 2014.

21. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. Dec 2007;19(6):349-57. doi:10.1093/intqhc/mzm042

22. Australian Broadcasting Commission. Melbourne placed under stage 4 coronavirus lockdown, stage 3 for rest of Victoria as state of disaster declared. ABC. Accessed 13/02/2022, Melbourne placed under stage 4 coronavirus lockdown, stage 3 for rest of Victoria as state of disaster declared

23. Australian Government: Treasury. JobKeeper Payment. Commonwealth of Australia. Accessed 13/02/2022, https://treasury.gov.au/coronavirus/jobkeeper

24. Australian Government: Department of Health. Primary Health Networks. Commonwealth of Australia. Accessed 12/02/2022, https://www.health.gov.au/initiatives-and-programs/phn

25. Australian Broadcasting Commission. Postcode data on coronavirus cases reveals Victoria's COVID-19 hotspots. 12/02/2022, Postcode data on coronavirus cases reveals Victoria's COVID-19 hotspots

26. Alsnes IV, Munkvik M, Flanders WD, Oyane N. How well did Norwegian general practice prepare to address the COVID-19 pandemic? *Fam Med Community Health*. Dec 2020;8(4)doi:10.1136/fmch-2020-000512

27. Roehr B. Covid-19 is threatening the survival of US primary care. *BMJ*. Jun 22 2020;369:m2333. doi:10.1136/bmj.m2333

28. Xu Z, Fan J, Ding J, et al. The Impact of COVID-19 on Primary Care General Practice Consultations in a Teaching Hospital in Shanghai, China. *Front Med (Lausanne)*. 2021;8:642496. doi:10.3389/fmed.2021.642496

29. Rawaf S, Allen LN, Stigler FL, et al. Lessons on the COVID-19 pandemic, for and by primary care professionals worldwide. *Eur J Gen Pract*. Dec 2020;26(1):129-133. doi:10.1080/13814788.2020.1820479

30. Russell GM. Is prevention unbalancing general practice? *Med J Aust*. Jul 18 2005;183(2):104-5.

31. Powell Davies G, McDonald J, Jeon Y, Krastev Y, Christl B, Faruqi N. *A narrative synthesis of models of integrated primary care centres/polyclinics*. 2009.

32. Nagel DA, Keeping-Burke L, Pyrke RJL, et al. Frameworks for evaluation of community health centers' services and outcomes: a scoping review protocol. *JBI Database System Rev Implement Rep*. Apr 2019;17(4):451-460. doi:10.11124/JBISRIR-2017-003843

33. Wilson G, Currie O, Bidwell S, et al. Empty waiting rooms: the New Zealand general practice experience with telehealth during the COVID-19 pandemic. *N Z Med J*. Jul 9 2021;134(1538):89-101.

34. Filippi MK, Callen E, Wade A, et al. COVID-19's Financial Impact on Primary Care Clinicians and Practices. *J Am Board Fam Med*. May-Jun 2021;34(3):489-497. doi:10.3122/jabfm.2021.03.200502

35. Krist AH, DeVoe JE, Cheng A, Ehrlich T, Jones SM. Redesigning Primary Care to Address the COVID-19 Pandemic in the Midst of the Pandemic. *Ann Fam Med*. Jul 2020;18(4):349-354. doi:10.1370/afm.2557

36. Scott A. The impact of COVID-19 on GPs and non-GP specialists in private practice. Melbourne Institute of Applied Economic and Social Research; 2020. p. 1-20.

37. Waitzberg R, Quentin W, Webb E, Glied S. The Structure and Financing of Health Care Systems Affected How Providers Coped With COVID-19. *The Milbank quarterly*. 2021;99(2):542-564. doi:10.1111/1468-0009.12530

38. Kippen R, O'Sullivan B, Hickson H, Leach M, Wallace G. A national survey of COVID-19 challenges, responses and effects in Australian general practice. *Aust J Gen Pract*. Nov 2020;49(11):745-751. doi:10.31128/ajgp-06-20-5465

39. Roth C, Breckner A, Moellinger S, et al. Beliefs and practices among primary care physicians during the first wave of the COVID-19 pandemic in Baden-Wuerttemberg (Germany): an observational study. *BMC Fam Pract*. May 6 2021;22(1):86. doi:10.1186/s12875-021-01433-9

40. Basu S, Phillips RS, Phillips R, Peterson LE, Landon BE. Primary Care Practice Finances In The United States Amid The COVID-19 Pandemic. *Health Aff (Millwood)*. Sep 2020;39(9):1605-1614. doi:10.1377/hlthaff.2020.00794

41. Friedman TL. We Need Great Leadership Now, and Here's What It Looks Like. *New York Times*. April 21, 2020. https://www.nytimes.com/2020/04/21/opinion/covid-dov-seidman.html?referringSource=articleShare

42. Renaa T, Brekke M. Restructuring in a GP practice during the COVID-19 pandemic - a focus-group study. *Tidsskr Nor Laegeforen*. Feb 2 2021;141(2)Driftsomlegging ved et fastlegekontor under covid-19-pandemien - en fokusgruppestudie. doi:10.4045/tidsskr.20.0713

43. Donahue KE, Halladay JR, Wise A, et al. Facilitators of transforming primary care: a look under the hood at practice leadership. *Ann Fam Med*. May-Jun 2013;11 Suppl 1:S27-33. doi:10.1370/afm.1492

44. Gerada C. Reflections on leadership during the Covid pandemic. *Postgrad Med*. Sep 2021;133(7):717-720. doi:10.1080/00325481.2021.1903218

45. Westfall JM, Liaw W, Griswold K, et al. Uniting Public Health and Primary Care for Healthy Communities in the COVID-19 Era and Beyond. x. *J Am Board Fam Med*. 2021;34(Supplement):S203. doi:10.3122/jabfm.2021.S1.200458

46. Commonwealth of Australia (Department of Health). Consultation Draft - Future focused primary health care: Australia's Primary Health Care 10 Year Plan 2022-2032. Commonwealth of Australia. Accessed 12/02/2022,

Figure legend Figure 1 COVID-19 in Victoria during 2020. Data Collection Timeline

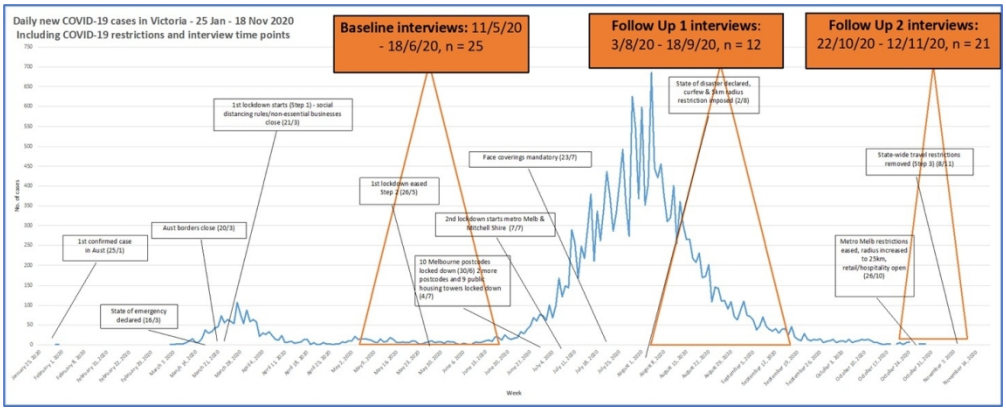

Figure 1 COVID-19 in Victoria during 2020. Data Collection Timeline

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A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
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Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

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At the Edge of Chaos: A prospective multiple case study in Australian General Practices adapting to COVID-19

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Title page

At the Edge of Chaos: A prospective multiple case study in Australian General Practices adapting to COVID-19

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Abstract

Objectives: The rapid onset and progressive course of the COVID-19 pandemic challenged primary care practices to generate rapid solutions to unique circumstances; creating a natural experiment of effectiveness, resilience, financial stability and governance across primary care models. We aimed to characterize how practices in Melbourne Australia modified clinical and organizational routines in response to the pandemic in 2020-21 and identify factors that influenced these changes.

Design*:* Prospective, qualitative, participatory, case study design using constant comparative data analysis, conducted between April 2020 and February 2021. Participant general practitioner (GP) investigators were involved in study design, recruitment of other participants, data collection and analysis. Data analysis included investigator diaries, structured practice observation, documents and interviews.

Setting: The cases were six Melbourne practices of varying size and organizational model.

Participants: GP investigators approached potential participants. Practice healthcare workers were interviewed by social scientists on three occasions, and provided feedback on presentations of preliminary findings.

Results: We conducted 58 interviews with 26 practice healthcare workers including practice owners, practice managers, GPs, receptionists and nurses; and six interviews with GP Investigators. Data saturation was achieved within each practice and across the sample. The pandemic generated changes to triage, clinical care, infection control and organizational routines, particularly around telehealth. While collaboration and trust increased within several practices, others fragmented, leaving staff isolated and demoralized. Financial and organizational stability, collaborative problem solving, creative leadership, and communication (internally and within the broader healthcare sector) were major influences on practices' ability to negotiate the pandemic.

Conclusions: This study demonstrates the complex influences on primary care practices, and reinforces the strengths of clinician participation in research design, conduct and analysis. Two implications are: telehealth, triage and infection management innovations are likely to continue; the existing payments system provides inadequate support to primary care in a global pandemic.

Strengths and limitations of this study

► Our prospective case study design provided a detailed understanding of the evolution of clinical and organisational routines within Australian general practices of varying models through the first year of the COVID-19 pandemic.

► Our use of GPs as participant investigators overcame the challenges of recruiting and collecting data from practices at a time when external researchers were unable to enter practices due to public health restrictions.

► The credibility of our findings are increased by the multi-method data collection strategy (providing a detailed, intensive exploration of individuals and organisations in context) and our presentation of emergent findings to practice teams.

► Practices were all from Melbourne, the region in Australia that experienced both the highest COVID case numbers and most prolonged and extensive lockdowns during 2020.

► Different practice routines may have emerged in other contexts, such as rural practices and those with no association with a University Department of General Practice.

Table 1: Abbreviations

AOD	Alcohol and other drug
CALD	Culturally and linguistically diverse
CDM	Chronic disease management
CHC	Community Health Centre
FTE	Full Time Equivalent
GP	General Practitioner
CDM	Chronic disease management
MBS	Medical Benefits Schedule
N	Nurse
PPE	Personal Protective Equipment
PM	Practice manager
PO	Practice owner
R	Reception staff
SES	Socio-economic status

INTRODUCTION

The COVID-19 pandemic has challenged healthcare systems[1] and generated major changes in the delivery of primary care.[2] While Australia was spared high COVID-19 mortality during 2020,[3] two-thirds of 2020 COVID cases and nearly 90% of deaths were in the Melbourne metropolitan region (population 5.1 million), following a four-month outbreak. In response, between July and October 2020, the Victorian state government imposed one of the world's most stringent lockdowns.[4]

Both federal and state governments in Australia stressed the importance of primary care to the overall pandemic response. Australian primary care is largely delivered through a network of small, owner-operated general practices. Ten percent of practices are owned by large corporate entities,[5] and most states have a small number of comprehensive primary health care organizations, similar to Community Health Centres (CHCs) in other nations (see Table 1 for a list of all abbreviations).[6] Under Australia's federal government single-payer insurance scheme, the Medical Benefits Schedule (MBS), general practitioners (GPs) are paid a standard amount for each consultation, and can either accept that payment ("bulk-bill"), or charge an additional "co-payment" to the patient.

While complex systems such as primary care are generally robust, [7] situations of instability can generate an 'edge of chaos' state between *"equilibrium and complete disorder where systems have the potential to be most adaptive and creative",*[8] but where *"systems that do not successfully change can become extinct".*[9] The early phase of the pandemic generated such a scenario within Australian general practice.

There is limited research on the experiences of primary care practices providing care within the systemic strains caused by the pandemic. We asked: a) what changes to clinical and organizational routines were made during the first year of the pandemic; and b) what contextual, organizational and individual factors facilitated these changes? We anticipated

that addressing these questions would provide insights into the adaptivity and robustness of the primary care system within Australia.

METHODS

Design: We used a participatory, prospective qualitative case study[10] design, within which GP participant investigators shaped the project, and contributed to data collection and analysis.[11] Design was informed by principles of participatory action research in which processes of planning, action and reflection are conducted in close collaboration with stakeholders and participants (here referring to both GP investigators and practice owners and other staff). [12] Our methodology (including data collection tools, and approach to analysis) has been detailed elsewhere, [12] and data collection is summarised below.

GP investigators comprised four clinician educators (JN, KA, SH and TSS) and two clinician researchers (GR and ES), alongside two social science research fellows (JA and RL) with PhDs and experience in qualitative research. Each investigator was affiliated with a single University Department of General Practice. WM and BC acted as external advisors.

The practices constituted the cases being compared; they were the unit of analysis. Investigators were clinicians at these practices, and social scientists. Data sources were GP investigator observations, practice documents, interviews with practice clinicians and staff, responses to a presentation of interim findings to practices, and reflective interviews with GP investigators.

Setting and participants: The study was set in six general practices of varying size and organizational model in metropolitan Melbourne. Aligned with the participatory approach, practices were chosen from locations where GP investigators based their clinical work. GR and EAS contacted

potential participant investigators from GPs who were either current academic staff or recent PhD graduates of the Department of General Practice, prioritising those working within practices of varying size and organisational model.[12] Practice interview participants included GPs, nurses, practice managers and administrative staff. The GP investigators gained written informed consent from practice participants; the social scientists gained written consent from GP investigators for their reflective interviews. Data were collected between April 2020 and February 2021.

Data collection: The GP investigators used structured diaries to record their experiences. They completed a practice description tool;[13, 14] collated and photographed practice documents, signage and layout, and provided continuing input to data collection. RL and JA conducted semi-structured, in-depth, audio recorded telephone or videoconference interviews (30-60 minutes) with clinicians and administrative staff from each practice at three time points (see Figure 1). Subsequently, each GP investigator was interviewed once in early 2021, to reflect on data collected and their experiences. Interviews focused upon participants' individual experiences, perceived practice responses, and beliefs about factors influencing practice performance. Practice staff were invited to attend live video presentations by investigators of emerging findings at mid and end of project. Responses were collected and informed analysis.

Data management: All digital data was stored on a secure server only accessible by JA, RL and project manager SC. Interviews were professionally transcribed and all identifying information removed. Interview transcripts and observational data (diaries, practice documents and field notes) were coded by JA and RL using NVivo [12, 15] Our iterative coding template was based on concepts from Miller, et al's Relationship Centred Model of Primary Care Practice Development,[16] themes derived from initial reading and familiarisation with the raw data, and further emerging data themes.

Data analysis: Data analysis used a constant comparative approach[17] informed by prior approaches to investigation of primary care practice routines.[14, 18] JA and RL undertook data analysis, which was refined at regular meetings with GR and JN, and at a data retreat[19] with all investigators.

The use of matrices facilitated cross case comparisons.[20] An initial matrix organized summarized data under thematic codes (rows) versus practices (columns). Subsequently, further summarized matrices were used to generate narratives, which described the key elements of changes in each practice. As outlined in the protocol paper, intervention narratives and the matrices were further analysed through cross-case analysis to develop hypotheses to explain the implementation, uptake and sustainability of routine changes that followed the commencement of the pandemic. [12] Secondary analysis on the themes of leadership and staff burden has informed subsequent journal article submissions. Reporting followed Tong et al's consolidated criteria for reporting qualitative research.[21]

Public and patient involvement statement: Given limitations imposed by the pandemic on interaction with members of the community, this research was carried out without patient involvement.

RESULTS

We recruited six of eight practices approached. One practice was part of a federal and state funded Community Health Centre, another was part of a large corporate network and the remainder were general practices of varying size, organizational structure, billing practices and patient characteristics. (See Table 2). All were organizationally and financially stable prior to the pandemic. We conducted 58 interviews with 26 practice staff including practice owners (PO), practice managers (PM), GPs, reception staff (R), and nurses (N) and six interviews with GP Investigators. Data saturation was achieved at the level of each practice and across the sample. The CHC-based

investigator left the practice in August 2020. Subsequently, another GP working at the practice provided liaison, but did not collect data.

Table 2. Participating practices

PRACTICE PSEUDONYM	TYPE OF PRACTICE	LOCATION	BILLING SYSTEM[1]	PRACTICE POPULATION	GPS FTE IN PRACTICE	NURSES FTE IN PRACTICE	ALLIED HEALTH DISCIPLINES
CHC	Community Health Centre	Inner city suburbs	Bulk billing	Lower SES[2], CALD[3], refugees, AOD[4]	6 FTE[5]	5	Numerous health and social care disciplines
SE1	Private General Practice	South-eastern suburbs	Blended	High SES, children and elderly	3.5 FTE	2	Dentist
E	Private General Practice	Eastern suburbs	Blended	High SES, very few CALD	4-5 FTE	1 FTE (3 in total)	Diabetes educator
CBD	Private General Practice	Central business district	Blended	Higher SES, Tourists, Multi-lingual GPs	3.5 FTE	1 FTE (2 in total)	Clinical psychology
SE2	Private General Practice within large corporate	South-eastern suburbs	Bulk billing	Mid to low SES, broad patient mix	14 FTE	3.5FTE	Physiotherapy, dietetics
W	General Practice and Health Hub	Western suburbs	Blended	Low SES, gentrifying	15+ GPs	3.5 FTE	Numerous co-located disciplines including psychology, dietetics, physiotherapy, podiatry.

1 Bulk billing is where clinicians accept the Medicare benefit as full payment for the service. A blended system is where clinicians bulk bill some patients and require a co-payment from others.
2 SES: socio-economic status.
3 CALD: culturally and linguistically diverse patients.
4 AOD: alcohol and other drug patients
5 FTE: Full time equivalent

Our team reflected on the time passage of the pandemic in its first year. We felt that the data would be easier to understand if it were contextualised by stages. The names were approved by consensus, and are intended to provide context through which to understand the broad study findings.

Clinical and organizational routines evolved with the stages of the pandemic, patient demand and changes to MBS telehealth payments. Pre-pandemic plans required for practice accreditation prior to 2020 had minimal influence, and practices struggled with conflicting advice from government and professional organizations at times. Stability of the practice core, functional leadership, organizational model and communication were major influences on the ability of practices to modify routines to complex and unpredictable challenges. We begin by describing the evolution of the pandemic within the practices, followed by an interpretation of the drivers of routine change seen through the lens of the relationship centred model.

Early chaos (February 2020 - April 2020)

Practices began to be aware of the pandemic's implications in February 2020:

> *We expected to be overwhelmed with very sick people and we were basing that on what was happening in other countries… we had plans for home palliation, staggered staff shifts in case one shift was infected and the Health Department ordered everyone on that shift to disappear, so week on, week off. (CHC GP2)*

The subsequent weeks were chaotic, as workplaces changed overnight:

> *For two weeks at the very beginning, like early-mid March, it was absolute chaos. Just in terms of the volume of patients that were calling non-stop. Mostly phone calls, and mostly people really desperately wanting testing…. At first it was like*

very overwhelming, but then it became a new norm to just, "This is the new thing. Do it. Adapt, adapt, adapt." (CBD R)

Many staff became increasingly frustrated by shortages of Personal Protective Equipment (PPE) and changing advice from government and professional bodies. They were concerned for their safety and that of their families and about the potential impact of rapid community transmission. The MBS broadened eligibility for telehealth consultations (previously limited to rural and remote areas), allowing some older GPs and other vulnerable staff to work from home, which increased the complexity of receptionists' work.

Emerging stability (May 2020 - June 2020)

With cases falling, Victoria's community lockdown was lifted in late May. After the early disruption, the impact was less than feared:

The initial tension, anxiety, shock where people saw the horrendous news items from overseas: you could sense that in the doctors here, and the staff. … so initially there was a run for shelter.. … People feel as if things are well controlled and reasonably calm at the moment in terms of illness. (SE2 GP)

All practices had incorporated fundamental changes to their work routines (see Table 3):

i) K*eeping staff and patients safe.* Once problems sourcing PPE were partially resolved, practices began to prioritise creation of a COVID-19 safe workplace. Clinicians began wearing scrubs, room ventilation and cleaning was improved and physical barriers and isolation areas were introduced. These came with major changes in screening, triage and booking routines. Online appointment booking was paused or amended at all practices – reception staff screened all patients for COVID-19 infection risk by telephone, while informing them about requirements relating to safety, telehealth and billing. These infection control approaches varied between practices.

ii) Re-aligned clinical work. Telehealth had major impacts on clinical care delivery. Telephone, rather than video, consultations predominated due to GP preferences and some patient technological constraints. There was significant concern about patient unwillingness to attend in person, and GPs often viewed telehealth as inadequate for delivering quality care, especially for systematic chronic disease management (CDM).

iii) Practice management. To limit virus transmission risk, practice staff began communicating differently with each other. (See Table 4) Face to face meetings ceased, replaced by emails, and in some practices, smart phone apps and virtual meetings. Formal practice meetings were mostly held infrequently. Practice owners in the small private practices made decisions to change routines, often unilaterally. GPs became increasingly concerned about losing income due to reduced patient demand and an initial government mandate to bulk bill all telehealth consultations.

Table 3. Modifications to workflow routines

WORKFLOW ROUTINE	DEFINITION	DESCRIPTION OF CHANGES
1 KEEPING STAFF AND PATIENTS SAFE	Procedures to reduce infectious disease transmission	Increased PPE use; enhanced cleaning practices by external cleaners and practice staff. Patient waiting routines e.g. changed waiting room layout; wait in their car/outside until appointment times. Booking processes: All practices paused patient ability to make appointments online. Receptionists began to check respiratory symptoms and travel/contact history during patient booking for appointments by telephone and on arrival. Staff-to staff contact reduced greatly: such as closed lunch rooms, lunch to be eaten in rooms and in some practices the wearing of surgical scrubs. *(Impacts on routine 3)*
2 RE-ALIGNED CLINICAL WORK		
2.1 TELEHEALTH	Procedures for conducting consultations via phone or video, rather than face to face.	All practices began using telehealth for many consultations – enabled by changed MBS funding for telehealth (previously limited to rural and remote areas). All practices remained open for face to face consultations (usually with almost all GPs on site). Most GPs provided telehealth from the practice, but some worked from home when isolating or unwell or if they had personal risk factors such as advanced age or chronic disease: • Difficulties due to lack of required technology at home; providing access to patient data base, printing, faxing and billing. • At CHC all but two GPs worked from home; management provided home technology. GPs overwhelmingly used phone rather than video: • Reluctance to use video due to difficulties with logistics, practices' technology, and perceived ability for patients and/or GP to access and use technology. Receptionists needed to be aware of significantly modified billing schedule.
2.2 CASE MANAGEMENT CHRONIC ILLNESS/ CARE CONTINUITY	Procedures for management of patients' ongoing health conditions	All practices initially paused: Chronic Disease Management recalls; cervical cancer screening; 45-49 and 75+ year old health checks: • Major concerns about missed diagnosis with telehealth and patient reluctance to attend GP and/or hospital. Different approaches and timing for resuming chronic disease management follow ups – often financially driven in view of falling practice income:

		• Primarily conducted via phone or video with the assistance of the practice nurse.
3) PRACTICE MANAGEMENT	Procedures for coordination between practice staff	Staff meetings: Pre-existing large variation between practices in frequency and attendance: Shift to online meetings: excludes some, but includes others. Some practices increased meetings, others decreased them. Major loss in collegiality: Infection control obstructs social interaction and makes it more difficult to gain second opinions from practice colleagues. Especially where many staff work from home (as in the CHC) Online forums, meetings, phone calls assist, but exclude non-GPs in some practices.

Table 4. Practice meetings and communication.

Practice	Meeting routines				Communication Tools
	Pre COVID	**Early Chaos**	**Emerging Stability**	**2nd Wave**	
CHC	Monthly / as required- all staff	Twice weekly	Weekly Zoom (open to all staff, most attend, even on days off for some). Increased attendance from pre-pandemic.	As previous	Set up WhatsApp group at start of COVID-19 (for general staff communication)
SE1	GPs every 2 to 3 months, decided by owner.	Weekly Zoom from May 2020. Generated by employed doctor advocacy.	Weekly Zoom – only GPs.	As previous	WhatsApp group for GPs at start of COVID-19
E	Every 1 or 2 months	Fortnightly by zoom; Nurses and receptionists not usually included	No change	At peak of 2nd Wave, no meetings; leadership making all decisions.	Most communication by email
CBD	Monthly	Weekly, sometimes only GPs, sometimes Nurses. Also smaller informal meetings amongst GPs every morning	Nurses stopped attending	As previous	WhatsApp group prior to COVID-19 but used more often during pandemic. WeChat group added.
SE2	No all-staff meetings - off site managers only, no GP meetings, reception and nursing team have separate meetings	1 GP meeting in March 2020, clinical investigator stepped up to clinical director, started regular meetings of PM, head nurse and medical director	No change	No change	Medical director set up WhatsApp group for GPs in July to communicate changes to protocols, share thoughts, information - informal, not seen as good replacement for meetings
W	Partners meet 1-2 times a month, GPs monthly lunch meeting, AGM	All staff weekly or fortnightly	No practice wide meetings since late March 2020	As previous	Couple of WhatsApp groups, delegated nurse and doctor inactive during COVID-19

Negotiating a second wave (July 2020 – October 2020)

In early July, rapidly increasing cases led to a strict four-month metropolitan Melbourne lockdown.[22] Despite case numbers reaching 700 per day, many participants across the practices felt their earlier changes had prepared them for the challenge. Clinicians became increasingly concerned about missed diagnoses and late presentations:

> *[A patient has] really deteriorated in the last six weeks. … I've had several telephone calls to persuade him to go into hospital, and eventually he did yesterday. I got him to agree to some blood tests… his liver has packed up. And he's jaundiced and I don't know if he will survive, but at least he's gone in. And if he hadn't have gone in, I would have said, "Oh no, what do I do now?" … He would have died at home. (CHC GP1)*

Patients embraced telehealth, causing dilemmas for clinicians in maintaining quality care as a 'balance' between bringing patients to a potentially infectious location and dealing with the uncertainties of remote clinical care:

> *We've put all sort of strict guidelines around what we think's suitable for telehealth and what's not. So, things like say mental health plans, basic administrative things like repeat scripts…referrals to other specialists... do that over the phone. But as soon as they start saying, "I've got abdominal pain," or, "I've got this thing on my arm, I'm not sure what it is," they've got to come in and have an appointment. (SE1 PO)*

Three practices began managing COVID-19 testing clinics:

> *… we took over screening [from the Department of Health, because] They were taking up to two weeks to get a positive result to a patient. … that was a significant increase in workload…. I pretty much worked seven days a week. I*

think for three months I didn't have a day off, there were just lots of results coming through, notifications. The time taken to notify one positive result, to notify the Department of Health, could take one staff member two to three hours …. (CHC GP2)

As the lockdown continued, financial pressures from decreased practice income increased. New staff vacancies were unfilled, and staff and clinicians were asked to take annual leave or reduce working hours. The privately owned practices sought to diversify income; training nurses in remote CDM, systematically calling patients for recall (most practices); or providing COVID-19 testing for asymptomatic travellers (CBD). The corporate's regional management modified CDM 'targets' to increase income. As cases rose, the CHC assumed responsibility for managing the pandemic response at nearby public housing towers, which required significant staffing resources and eventually attracted additional state government funding.

Entering a new normal (November 2020 – February 2021)

Strict lockdown ended in late October 2020 and heralded an uneasy optimism. With new routines embedded, staff reflected on the consequences of the strain of the experience:

We're all pretty exhausted. And I've noticed - especially the past couple of months, I personally have been very, very short with patients. … I don't indulge anyone at all anymore. I just say straight up this is how we work, you could come, you could not come. That's it. I'm not going to spend 10 minutes on the phone with you convincing you because I have so much work to do. (CBD R)

Understanding the change

Our data showed that the characteristics of and variations between the practices in the organization and delivery of clinical care were driven by the health policy environment, local ecology and each practice's core and adaptive reserve.[10]

Health Policy Environment

While the Australian federal government provided no specific financial support to general practices during the pandemic, the impact was ameliorated by its 'JobKeeper' wage subsidy[23] and the introduction of MBS payments for telehealth. JobKeeper was only accessed by staff from one practice (CBD), but all made extensive use of telehealth. The federal government's Primary Health Networks[24] distributed some PPE as the months passed, although practices continued to need to source these privately. While practices were aware of, and often attentive to, a steady stream of government, Primary Health Networks and professional organization advice, shifting guidance with inadequate notice made it difficult to forge a consistent path.

Local Ecology

The pandemic's impact varied across metropolitan Melbourne – neighbourhoods surrounding practices W and CHC had four times as many COVID-19 infections compared to the other practices.[25] Practice W's (federally funded) on-site COVID-19 testing clinic was established prior to the first local infection, and was viewed as critical in keeping the general practice environment 'safe'. The rising incidence of COVID-19 in public housing towers close to the CHC led to extensive outreach services. The extensive changes adopted by the other practices were unrelated to local infection rates, although the CBD practice created a COVID-19 testing clinic to meet the needs of its overseas worker clientele who were required to obtain COVID-19 tests prior to returning home.

Practice core

The lack of formal external support or meaningful pandemic planning left the private practices internally focussed and needing to generate their own solutions to the pandemic challenges. The solutions and their uptake reflected the practices' organizational models and their leaders' internal models.

For example, the structure within SE2's corporate model (where early decision making was made by off-site regional managers) compounded local leaders' frustration and made it difficult for the practice to address the demands of the pandemic.

For all practices the introduction of MBS telehealth payments eased financial pressures that emerged with patients' increasing reluctance to seek face to face care. This required new routines to manage acute illness, plan prevention, and monitor CDM. Nevertheless, as the pandemic continued, financial pressures continued, with most practices reporting a 25-60% fall in income and adjustments to staffing to offset losses.

Government financial regulations generated some perverse incentives. During early pandemic phases, government funded telehealth consultations could not attract co-payments. As a result, several of the private practices began to encourage patients to attend the practice for face-to-face consultations, which still attracted private co-payments.

Adaptive reserve

Internal motivations were similar between practices. The early preoccupation was with a safe workplace focussed on structural changes, modifications to patient flow and an ongoing need for triage. As time passed, work was driven by desires to maintain both financial viability and quality clinical care. Most practice staff were increasingly concerned about their patient cohort's welfare, especially those with mental health conditions or complex chronic disease.

Leaders were key to adaptive reserve in the four privately owned practices and were critical to the maintenance of services in the CHC and the corporate practice. Within the CHC's complex external governance structure, management resources were rapidly redirected to the general practice, with decision making mostly devolved to managers and staff members close to the general practice level.

By contrast, at the four private practices, practice owners made most of the decisions, often with minimal consultation with nurses, receptionists and contractor doctors:

> *The practice principals have been taking a lot of unilateral decisions recently and there has not been a doctors' meeting for quite some time now. They even sent out an email asking for all the discussion to cease as they would be making the decisions from now on. I'm a bit worried it got everyone offside. (de-identified)*

Professional roles remained isolated and few leaders sought information from outside their own professional group. Pre-pandemic hierarchies between the owners and clinical and administrative staff were maintained and sometimes reinforced. Despite needing to "*take on the lion's share of the infection control and cleaning and [having] very high risk interactions*" (*de-identified*), nurses were rarely included in decision making.

The data suggested occasional evolution of leadership approaches. The corporate practice (SE2) began with key decisions being made by the practice's regional management team. Practitioners and staff feelings of disempowerment improved when a local leadership team was formed comprising the practice manager, a senior nurse and a medical lead. However, several changes to routines (such as temperature testing all patients) were later overturned by regional leaders on cost grounds.

In the early months of the pandemic, contractor GPs in one practice felt the practice leadership was not "*taking it seriously enough*" *(de-identified N)*. Following a formal presentation of the non-owner GPs' concerns to management, the practice transformed to become more collaborative, with weekly meetings and extensive use of social media for communication. However, nurses and administrative staff remained isolated from decision making:

A: No, the weekly meetings are not everyone. They're just the GPs. They do a Zoom meeting now.

Q: But not with you?

A: No, not with us. So that's what I'm saying, we just get things told to us in the corridor. (de-identified participant N)

DISCUSSION

Despite Melbourne's pandemic experience being the worst in Australia in 2020, practices were spared the staff deaths or multiple practice closures experienced overseas. The study practices mirrored international transformations of clinical, organizational and infection control routines. As elsewhere, PPE was difficult to access,[26] practice income fell[27] and practitioners worried about reduced face-to-face consultation[28] and the potential impact on patients with chronic health conditions.[29]

Unanticipated crises, like a pandemic, can uncover the strengths, flexibility and fragility of organizations and the systems in which they are embedded.[7] The pandemic acted as a natural experiment of the effectiveness of models of care predominant in Australian general practice. We believe our data emphasises the fragility of the organizational models, financial security and support underpinning Australian primary care.

Models of care

Our study data highlighted the potential of the CHC model to bridge the gap between primary care and public health.[30] Victoria's CHCs incorporate a focus on prevention, health equity and the social determinants of health.[31] The combination of the CHC's community focus and secure state funding helped it meet its mandate of addressing the evolving needs of local communities. By contrast, most of the private practices lacked the structural or organizational ability to go much beyond maintaining basic practice functions. They were isolated, internally preoccupied and, while provided with

extensive information, generally left to negotiate the challenges of the pandemic alone. SE2's remote governance and lack of internal management compounded workforce fragmentation and demoralisation, and made it difficult for the practice to align with evolving demands. Practice W was a partial exception, as its size, active leadership and community connection was reflected in the decision to host a federally funded COVID-19 testing facility.

The relative financial security of the CHC funding model and the explicit links with state health services highlighted the potential of the CHC to address local needs of vulnerable communities. Models similar to CHCs are widespread in North America and have been important in delivering quality care to underserved populations.[32] Given the disproportionate impact of the pandemic on vulnerable communities, and the importance of primary care to population health, future health planning should explore the potential for either expanding the coverage of the CHC model or exploring ways to incentivise the incorporation of CHC-like functions into private primary care delivery.

Financial security

As elsewhere,[33-35] all our participating practices were financially challenged by the pandemic. A recent survey found that 65% of Australian GPs, particularly in urban and more affluent areas, experienced reduced income in the early months of the pandemic.[36] Similar early financial impacts were reported in many other nations,[37 38 39] with losses per FTE physician in the USA estimated as over $65,000 in 2020. Waitzberg observed that dramatically decreased income from patient visits combined with minimal direct governmental control "reverses the conventional financial positions of payers and providers and acts as a further hurdle to prioritizing public health".[37]

Given the fee for service payment model for GPs in private businesses and the CHC, our participants unsurprisingly had a preoccupation with financial security and modifying routines to maintain income and avoid practice closures. This challenge could have been addressed by directed government financial support.

Some degree of practice-directed financial support could be considered in future pandemics. Even relatively small capitated payments from payers (i.e. the federal government in Australia) could be used to mitigate losses and keep practices open.[40]

Leading change at the practice level

It has been suggested that COVID-19 highlights the weak points in systems, but also provides an opportunity for transformation.[41] While practices in this study were all able to realign their organizational and clinical routines, transformation was constrained by hierarchical leadership structures, rigid financial models and pervasive professional boundaries.

As others have found, our data identified isolated examples of increased collaboration,[42] and, at times (especially within the CHC) evidence of visionary, operational, and distributed leadership.[43] However, overall our data supported Gerada's contention that practices can both "crave" for authoritative leaders at times of distress, but also find such approaches to be disempowering.[44] Practice models and financing provided minimal incentives for leaders to be attentive to the local environment,[16] or open to creating links between organizations.[45]

Limitations

While data was collected from a range of organizational models, these were within a single Australian metropolitan area in the first year of a moderate COVID-19 pandemic. It is feasible that different routines would have emerged in practices in a different health policy or local environment context, such as rural practices, those not faced by a metropolitan area lockdown, and with no association with a University Department of General Practice. While it was possible that key routines were not revealed, our external investigators, iterative approach and inclusion of international experts decreased this possibility.

The GP investigators were involved in recruitment and data collection in their practice, and were closely involved in data analysis. Their views are inevitably influenced by their personal experiences

of practice dynamics. This adds important insights into practice functioning, but also has the potential to override the views of other practice participants. This possibility is countervailed by two key factors. 1) The vast majority of data analysis, including all coding of data, was undertaken by the social scientists. 2) Feedback sessions by practice staff on interim data provided member-checking of data validity.

Conclusion

Our study represented a natural experiment of the resilience, financial stability and governance within models of primary care in Australia. We found a fragile primary care sector that struggled to be fit for purpose in dealing with a pandemic. Practice isolation and financial strain were early and pervasive challenges to practice security. Leadership was critical, but many routine changes followed both financial and clinical priorities. Nevertheless, innovations in telehealth, triage and infection management are likely to be long lasting.

The Australian federal government's 10-year vision for improving primary care[46] highlights the importance of leadership at all levels and reconsideration of federal and state responsibilities in supporting general practices. Our findings point to the potential value of models such as the CHC for organizing and delivering care to highly vulnerable populations, and to the key role of practice leaders. The significant financial burdens experienced by several practices raises concerns as to the abilities of a purely fee for service system to both innovate and manage the critical primary care challenges of a global pandemic.

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References

1. Hick JL, Biddinger PD. Novel Coronavirus and Old Lessons — Preparing the Health System for the Pandemic. *New England Journal of Medicine*. 2020/05/14 2020;382(20):e55. doi:10.1056/NEJMp2005118

2. Huston P, Campbell J, Russell G, et al. COVID-19 and primary care in six countries. *BJGP Open*. Sep 8 2020;doi:10.3399/bjgpopen20X101128

3. Braithwaite J, Tran Y, Ellis LA, Westbrook J. The 40 health systems, COVID-19 (40HS, C-19) study. *Int J Qual Health Care*. Feb 20 2021;33(1)doi:10.1093/intqhc/mzaa113

4. Boroujeni M, Saberian M, Li J. Environmental impacts of COVID-19 on Victoria, Australia, witnessed two waves of Coronavirus. *Environ Sci Pollut Res Int*. Mar 2021;28(11):14182-14191. doi:10.1007/s11356-021-12556-y

5. Erny-Albrecht K, Bywood P. *Corporatisation of general practice – impact and implications.* 2016:1-53. *PHCRIS Policy Issue Review*.

6. McDonald J, Ward B, Lane R, et al. How are co-located primary health care centres integrating care for people with chronic conditions? *International Journal of Integrated Care*. 2017;17(3)doi:10.5334/ijic.3163

7. Carmeli A, Schaubroeck J.Crisis-Preparedness: The Importance of Learning from Failures. *Long Range Planning*. 2008/04/01/ 2008;41(2):177-196. doi:https://doi.org/10.1016/j.lrp.2008.01.001

8. Plsek PE, Greenhalgh T. Complexity science: The challenge of complexity in health care. *BMJ*. 2001;323(7313):625-8.

9. Miller WL, Crabtree BF, McDaniel R, Stange KC. Understanding change in primary care practice using complexity theory. *J Fam Pract*. May 1998;46(5):369-76.

10. Yin R. *Case study research: Design and methods (3rd ed.).* Sage; 2003.

11. van Buul LW, Sikkens JJ, van Agtmael MA, Kramer MHH, van der Steen JT, Hertogh CMPM. Participatory action research in antimicrobial stewardship: a novel approach to improving antimicrobial prescribing in hospitals and long-term care facilities. *Journal of Antimicrobial Chemotherapy*. 2014;69(7):1734-1741. doi:10.1093/jac/dku068

12. Russell G, Advocat J, Lane R, et al. How do general practices respond to a pandemic? Protocol for a prospective qualitative study of six Australian practices. *BMJ Open*. 01-Sep-2021 2021;11(9):e046086. doi:10.1136/bmjopen-2020-046086

13. Balasubramanian BA, Chase SM, Nutting PA, et al. Using Learning Teams for Reflective Adaptation (ULTRA): Insights From a Team-Based Change Management Strategy in Primary Care. *Ann Fam Med*. September 1, 2010 2010;8(5):425-432. doi:10.1370/afm.1159

14. Lane R, Russell G, Bardoel EA, et al. When colocation is not enough: a case study of General Practitioner Super Clinics in Australia. *Aust J Prim Health*. Aug 17 2016;doi:10.1071/PY16039

15. *NVivo qualitative data analysis software. Version 12.* 2018.

16. Miller WL, Crabtree BF, Nutting PA, Stange KC, Ja√©n CR. Primary Care Practice Development: A Relationship-Centered Approach. *The Annals of Family Medicine*. May 1, 2010 2010;8(Suppl 1):S68-S79. doi:10.1370/afm.1089

17. Glaser BG. The Constant Comparative Method of Qualitative Analysis. *Social Problems*. 1965;12(4):436-445. doi:10.2307/798843

18. Russell G, Advocat J, Geneau R, et al. Examining organizational change in primary care practices: experiences from using ethnographic methods. *Fam Pract*. Dec 1 2011;doi:cmr117 [pii] 10.1093/fampra/cmr117

19. Strauss AL. *Basics of qualitative research : techniques and procedures for developing grounded theory*. 2nd ed. ed. Thousand Oaks : Sage Publications; 1998.

20. Miles MB, Huberman AM, Saldana J. *Qualitative data analysis : a methods sourcebook*. Third edition. ed. Thousand Oaks, Californinia : SAGE Publications, Inc.; 2014.

21. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. Dec 2007;19(6):349-57. doi:10.1093/intqhc/mzm042

22. Australian Broadcasting Commission. Melbourne placed under stage 4 coronavirus lockdown, stage 3 for rest of Victoria as state of disaster declared. ABC. Accessed 13/02/2022, Melbourne placed under stage 4 coronavirus lockdown, stage 3 for rest of Victoria as state of disaster declared

23. Australian Government: Treasury. JobKeeper Payment. Commonwealth of Australia. Accessed 13/02/2022, https://treasury.gov.au/coronavirus/jobkeeper

24. Australian Government: Department of Health. Primary Health Networks. Commonwealth of Australia. Accessed 12/02/2022, https://www.health.gov.au/initiatives-and-programs/phn

25. Australian Broadcasting Commission. Postcode data on coronavirus cases reveals Victoria's COVID-19 hotspots. 12/02/2022, Postcode data on coronavirus cases reveals Victoria's COVID-19 hotspots

26. Alsnes IV, Munkvik M, Flanders WD, Oyane N. How well did Norwegian general practice prepare to address the COVID-19 pandemic? *Fam Med Community Health*. Dec 2020;8(4)doi:10.1136/fmch-2020-000512

27. Roehr B. Covid-19 is threatening the survival of US primary care. *BMJ*. Jun 22 2020;369:m2333. doi:10.1136/bmj.m2333

28. Xu Z, Fan J, Ding J, et al. The Impact of COVID-19 on Primary Care General Practice Consultations in a Teaching Hospital in Shanghai, China. *Front Med (Lausanne)*. 2021;8:642496. doi:10.3389/fmed.2021.642496

29. Rawaf S, Allen LN, Stigler FL, et al. Lessons on the COVID-19 pandemic, for and by primary care professionals worldwide. *Eur J Gen Pract*. Dec 2020;26(1):129-133. doi:10.1080/13814788.2020.1820479

30. Russell GM. Is prevention unbalancing general practice? *Med J Aust*. Jul 18 2005;183(2):104-5.

31. Powell Davies G, McDonald J, Jeon Y, Krastev Y, Christl B, Faruqi N. *A narrative synthesis of models of integrated primary care centres/polyclinics*. 2009.

32. Nagel DA, Keeping-Burke L, Pyrke RJL, et al. Frameworks for evaluation of community health centers' services and outcomes: a scoping review protocol. *JBI Database System Rev Implement Rep*. Apr 2019;17(4):451-460. doi:10.11124/JBISRIR-2017-003843

33. Wilson G, Currie O, Bidwell S, et al. Empty waiting rooms: the New Zealand general practice experience with telehealth during the COVID-19 pandemic. *N Z Med J*. Jul 9 2021;134(1538):89-101.

34. Filippi MK, Callen E, Wade A, et al. COVID-19's Financial Impact on Primary Care Clinicians and Practices. *J Am Board Fam Med*. May-Jun 2021;34(3):489-497. doi:10.3122/jabfm.2021.03.200502

35. Krist AH, DeVoe JE, Cheng A, Ehrlich T, Jones SM. Redesigning Primary Care to Address the COVID-19 Pandemic in the Midst of the Pandemic. *Ann Fam Med*. Jul 2020;18(4):349-354. doi:10.1370/afm.2557

36. Scott A. The impact of COVID-19 on GPs and non-GP specialists in private practice. Melbourne Institute of Applied Economic and Social Research; 2020. p. 1-20.

37. Waitzberg R, Quentin W, Webb E, Glied S. The Structure and Financing of Health Care Systems Affected How Providers Coped With COVID-19. *The Milbank quarterly*. 2021;99(2):542-564. doi:10.1111/1468-0009.12530

38. Kippen R, O'Sullivan B, Hickson H, Leach M, Wallace G. A national survey of COVID-19 challenges, responses and effects in Australian general practice. *Aust J Gen Pract*. Nov 2020;49(11):745-751. doi:10.31128/ajgp-06-20-5465

39. Roth C, Breckner A, Moellinger S, et al. Beliefs and practices among primary care physicians during the first wave of the COVID-19 pandemic in Baden-Wuerttemberg (Germany): an observational study. *BMC Fam Pract*. May 6 2021;22(1):86. doi:10.1186/s12875-021-01433-9

40. Basu S, Phillips RS, Phillips R, Peterson LE, Landon BE. Primary Care Practice Finances In The United States Amid The COVID-19 Pandemic. *Health Aff (Millwood)*. Sep 2020;39(9):1605-1614. doi:10.1377/hlthaff.2020.00794

41. Friedman TL. We Need Great Leadership Now, and Here's What It Looks Like. *New York Times*. April 21, 2020. https://www.nytimes.com/2020/04/21/opinion/covid-dov-seidman.html?referringSource=articleShare

42. Renaa T, Brekke M. Restructuring in a GP practice during the COVID-19 pandemic - a focus-group study. *Tidsskr Nor Laegeforen*. Feb 2 2021;141(2)Driftsomlegging ved et fastlegekontor under covid-19-pandemien - en fokusgruppestudie. doi:10.4045/tidsskr.20.0713

43. Donahue KE, Halladay JR, Wise A, et al. Facilitators of transforming primary care: a look under the hood at practice leadership. *Ann Fam Med*. May-Jun 2013;11 Suppl 1:S27-33. doi:10.1370/afm.1492

44. Gerada C. Reflections on leadership during the Covid pandemic. *Postgrad Med*. Sep 2021;133(7):717-720. doi:10.1080/00325481.2021.1903218

45. Westfall JM, Liaw W, Griswold K, et al. Uniting Public Health and Primary Care for Healthy Communities in the COVID-19 Era and Beyond. x. *J Am Board Fam Med*. 2021;34(Supplement):S203. doi:10.3122/jabfm.2021.S1.200458

46. Commonwealth of Australia (Department of Health). Consultation Draft - Future focused primary health care: Australia's Primary Health Care 10 Year Plan 2022-2032. Commonwealth of Australia. Accessed 12/02/2022,

Figure legend Figure 1 COVID-19 in Victoria during 2020. Data Collection Timeline

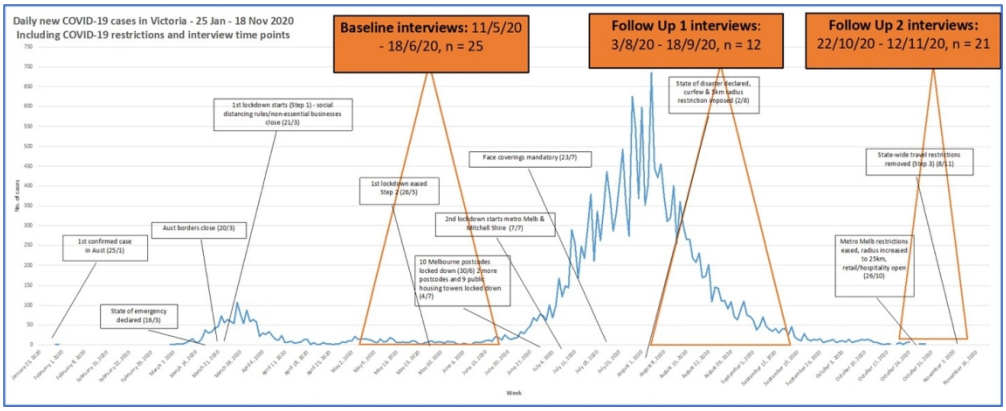

Figure 1 COVID-19 in Victoria during 2020. Data Collection Timeline

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COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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At the Edge of Chaos: A prospective multiple case study in Australian General Practices adapting to COVID-19

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Title page

At the Edge of Chaos: A prospective multiple case study in Australian General Practices adapting to COVID-19

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Abstract

Objectives: The rapid onset and progressive course of the COVID-19 pandemic challenged primary care practices to generate rapid solutions to unique circumstances; creating a natural experiment of effectiveness, resilience, financial stability and governance across primary care models. We aimed to characterize how practices in Melbourne Australia modified clinical and organizational routines in response to the pandemic in 2020-21 and identify factors that influenced these changes.

Design*:* Prospective, qualitative, participatory, case study design using constant comparative data analysis, conducted between April 2020 and February 2021. Participant general practitioner (GP) investigators were involved in study design, recruitment of other participants, data collection and analysis. Data analysis included investigator diaries, structured practice observation, documents and interviews.

Setting: The cases were six Melbourne practices of varying size and organizational model.

Participants: GP investigators approached potential participants. Practice healthcare workers were interviewed by social scientists on three occasions, and provided feedback on presentations of preliminary findings.

Results: We conducted 58 interviews with 26 practice healthcare workers including practice owners, practice managers, GPs, receptionists and nurses; and six interviews with GP Investigators. Data saturation was achieved within each practice and across the sample. The pandemic generated changes to triage, clinical care, infection control and organizational routines, particularly around telehealth. While collaboration and trust increased within several practices, others fragmented, leaving staff isolated and demoralized. Financial and organizational stability, collaborative problem solving, creative leadership, and communication (internally and within the broader healthcare sector) were major influences on practices' ability to negotiate the pandemic.

Conclusions: This study demonstrates the complex influences on primary care practices, and reinforces the strengths of clinician participation in research design, conduct and analysis. Two implications are: telehealth, triage and infection management innovations are likely to continue; the existing payments system provides inadequate support to primary care in a global pandemic.

Strengths and limitations of this study

► Our prospective case study design provided a detailed understanding of the evolution of clinical and organisational routines within Australian general practices of varying models through the first year of the COVID-19 pandemic.

► Our use of GPs as participant investigators overcame the challenges of recruiting and collecting data from practices at a time when external researchers were unable to enter practices due to public health restrictions.

► The credibility of our findings are increased by the multi-method data collection strategy (providing a detailed, intensive exploration of individuals and organisations in context) and our presentation of emergent findings to practice teams.

► Practices were all from Melbourne, the region in Australia that experienced both the highest COVID case numbers and most prolonged and extensive lockdowns during 2020.

► Different practice routines may have emerged in other contexts, such as rural practices and those with no association with a University Department of General Practice.

Table 1: Abbreviations

AOD	Alcohol and other drug
CALD	Culturally and linguistically diverse
CDM	Chronic disease management
CHC	Community Health Centre
FTE	Full Time Equivalent
GP	General Practitioner
MBS	Medical Benefits Schedule
N	Nurse
PPE	Personal Protective Equipment
PM	Practice manager
PO	Practice owner
R	Reception staff
SES	Socio-economic status

INTRODUCTION

The COVID-19 pandemic has challenged healthcare systems[1] and generated major changes in the delivery of primary care.[2] While Australia was spared high COVID-19 mortality during 2020,[3] two-thirds of 2020 COVID cases and nearly 90% of deaths were in the Melbourne metropolitan region (population 5.1 million), following a four-month outbreak. In response, between July and October 2020, the Victorian state government imposed one of the world's most stringent lockdowns.[4]

Both federal and state governments in Australia stressed the importance of primary care to the overall pandemic response. Australian primary care is largely delivered through a network of small, owner-operated general practices. Ten percent of practices are owned by large corporate entities,[5] and most states have a small number of comprehensive primary health care organizations, similar to Community Health Centres (CHCs) in other nations (see Table 1 for a list of all abbreviations).[6] Under Australia's federal government single-payer insurance scheme, the Medical Benefits Schedule (MBS), general practitioners (GPs) are paid a standard amount for each consultation, and can either accept that payment ("bulk-bill"), or charge an additional "co-payment" to the patient.

While complex systems such as primary care are generally robust, [7] situations of instability can generate an 'edge of chaos' state between *"equilibrium and complete disorder where systems have the potential to be most adaptive and creative",*[8] but where *"systems that do not successfully change can become extinct".*[9] The early phase of the pandemic generated such a scenario within Australian general practice.

There is limited research on the experiences of primary care practices providing care within the systemic strains caused by the pandemic. We asked: a) what changes to clinical and organizational routines were made during the first year of the pandemic; and b) what contextual, organizational and individual factors facilitated these changes? We anticipated

that addressing these questions would provide insights into the adaptivity and robustness of the primary care system within Australia.

METHODS

Design: We used a participatory, prospective qualitative case study[10] design, within which GP participant investigators shaped the project, and contributed to data collection and analysis.[11] Design was informed by principles of participatory action research in which processes of planning, action and reflection are conducted in close collaboration with stakeholders and participants (here referring to both GP investigators and practice owners and other staff). [12] Our methodology (including data collection tools, and approach to analysis) has been detailed elsewhere, [12] and data collection is summarised below.

GP investigators comprised four clinician educators (JN, KA, SH and TSS) and two clinician researchers (GR and ES), alongside two social science research fellows (JA and RL) with PhDs and experience in qualitative research. Each investigator was affiliated with a single University Department of General Practice. WM and BC acted as external advisors.

The practices constituted the cases being compared; they were the unit of analysis. Investigators were clinicians at these practices, and social scientists. Data sources were GP investigator observations, practice documents, interviews with practice clinicians and staff, responses to a presentation of interim findings to practices, and reflective interviews with GP investigators.

Setting and participants: The study was set in six general practices of varying size and organizational model in metropolitan Melbourne. Aligned with the participatory approach, practices were chosen from locations where GP investigators based their clinical work. GR and EAS contacted potential participant investigators from GPs who were either current academic staff or recent PhD graduates of the Department of General Practice, prioritising those working within practices of

varying size and organisational model.[12] Practice interview participants included GPs, nurses, practice managers and administrative staff. The GP investigators gained written informed consent from practice participants; the social scientists gained written consent from GP investigators for their reflective interviews. Data were collected between April 2020 and February 2021.

Data collection: The GP investigators used structured diaries to record their experiences. They completed a practice description tool;[13, 14] collated and photographed practice documents, signage and layout, and provided continuing input to data collection. RL and JA conducted semi-structured, in-depth, audio recorded telephone or videoconference interviews (30-60 minutes) with clinicians and administrative staff from each practice at three time points (see Figure 1). Subsequently, each GP investigator was interviewed once in early 2021, to reflect on data collected and their experiences. Interviews focused upon participants' individual experiences, perceived practice responses, and beliefs about factors influencing practice performance. Practice staff were invited to attend live video presentations by investigators of emerging findings at mid and end of project. Responses were collected and informed analysis.

Data management: All digital data was stored on a secure server only accessible by JA, RL and project manager SC. Interviews were professionally transcribed and all identifying information removed. Interview transcripts and observational data (diaries, practice documents and field notes) were coded by JA and RL using NVivo [12, 15] Our iterative coding template was based on concepts from Miller, et al's Relationship Centred Model of Primary Care Practice Development,[16] themes derived from initial reading and familiarisation with the raw data, and further emerging data themes.

Data analysis: Data analysis used a constant comparative approach[17] informed by prior approaches to investigation of primary care practice routines.[14, 18] JA and RL undertook data analysis, which was refined at regular meetings with GR and JN, and at a data retreat[19] with all investigators.

The use of matrices facilitated cross case comparisons.[20] An initial matrix organized summarized data under thematic codes (rows) versus practices (columns). Subsequently, further summarized matrices were used to generate narratives, which described the key elements of changes in each practice. As outlined in the protocol paper, intervention narratives and the matrices were further analysed through cross-case analysis to develop hypotheses to explain the implementation, uptake and sustainability of routine changes that followed the commencement of the pandemic. [12] Secondary analysis on the themes of leadership and staff burden has informed subsequent journal article submissions. Reporting followed Tong et al's consolidated criteria for reporting qualitative research.[21]

Public and patient involvement statement: Given limitations imposed by the pandemic on interaction with members of the community, this research was carried out without patient involvement.

RESULTS

We recruited six of eight practices approached. One practice was part of a federal and state funded Community Health Centre, another was part of a large corporate network and the remainder were general practices of varying size, organizational structure, billing practices and patient characteristics. (See Table 2). All were organizationally and financially stable prior to the pandemic. We conducted 58 interviews with 26 practice staff including practice owners (PO), practice managers (PM), GPs, reception staff (R), and nurses (N) and six interviews with GP Investigators. Data saturation was achieved at the level of each practice and across the sample. The CHC-based

investigator left the practice in August 2020. Subsequently, another GP working at the practice provided liaison, but did not collect data.

Table 2. Participating practices

PRACTICE PSEUDONYM	TYPE OF PRACTICE	LOCATION	BILLING SYSTEM[1]	PRACTICE POPULATION	GPS FTE IN PRACTICE	NURSES FTE IN PRACTICE	ALLIED HEALTH DISCIPLINES
CHC	Community Health Centre	Inner city suburbs	Bulk billing	Lower SES[2], CALD[3], refugees, AOD[4]	6 FTE[5]	5	Numerous health and social care disciplines
SE1	Private General Practice	South-eastern suburbs	Blended	High SES, children and elderly	3.5 FTE	2	Dentist
E	Private General Practice	Eastern suburbs	Blended	High SES, very few CALD	4-5 FTE	1 FTE (3 in total)	Diabetes educator
CBD	Private General Practice	Central business district	Blended	Higher SES, Tourists, Multi-lingual GPs	3.5 FTE	1 FTE (2 in total)	Clinical psychology
SE2	Private General Practice within large corporate	South-eastern suburbs	Bulk billing	Mid to low SES, broad patient mix	14 FTE	3.5FTE	Physiotherapy, dietetics
W	General Practice and Health Hub	Western suburbs	Blended	Low SES, gentrifying	15+ GPs	3.5 FTE	Numerous co-located disciplines including psychology, dietetics, physiotherapy, podiatry.

1 Bulk billing is where clinicians accept the Medicare benefit as full payment for the service. A blended system is where clinicians bulk bill some patients and require a co-payment from others.
2 SES: socio-economic status.
3 CALD: culturally and linguistically diverse patients.
4 AOD: alcohol and other drug patients
5 FTE: Full time equivalent

Our team reflected on the time passage of the pandemic in its first year. We felt that the data would be easier to understand if it were contextualised by stages. The names were approved by consensus, and are intended to provide context through which to understand the broad study findings.

Clinical and organizational routines evolved with the stages of the pandemic, patient demand and changes to MBS telehealth payments. Pre-pandemic plans required for practice accreditation prior to 2020 had minimal influence, and practices struggled with conflicting advice from government and professional organizations at times. Stability of the practice core, functional leadership, organizational model and communication were major influences on the ability of practices to modify routines to complex and unpredictable challenges. We begin by describing the evolution of the pandemic within the practices, followed by an interpretation of the drivers of routine change seen through the lens of the relationship centred model.

Early chaos (February 2020 - April 2020)

Practices began to be aware of the pandemic's implications in February 2020:

> *We expected to be overwhelmed with very sick people and we were basing that on what was happening in other countries… we had plans for home palliation, staggered staff shifts in case one shift was infected and the Health Department ordered everyone on that shift to disappear, so week on, week off. (CHC GP2)*

The subsequent weeks were chaotic, as workplaces changed overnight:

> *For two weeks at the very beginning, like early-mid March, it was absolute chaos. Just in terms of the volume of patients that were calling non-stop. Mostly phone calls, and mostly people really desperately wanting testing…. At first it was like*

very overwhelming, but then it became a new norm to just, "This is the new thing. Do it. Adapt, adapt, adapt." (CBD R)

Many staff became increasingly frustrated by shortages of Personal Protective Equipment (PPE) and changing advice from government and professional bodies. They were concerned for their safety and that of their families and about the potential impact of rapid community transmission. The MBS broadened eligibility for telehealth consultations (previously limited to rural and remote areas), allowing some older GPs and other vulnerable staff to work from home, which increased the complexity of receptionists' work.

Emerging stability (May 2020 - June 2020)

With cases falling, Victoria's community lockdown was lifted in late May. After the early disruption, the impact was less than feared:

The initial tension, anxiety, shock where people saw the horrendous news items from overseas: you could sense that in the doctors here, and the staff. … so initially there was a run for shelter.. … People feel as if things are well controlled and reasonably calm at the moment in terms of illness. (SE2 GP)

All practices had incorporated fundamental changes to their work routines (see Table 3):

i) K*eeping staff and patients safe.* Once problems sourcing PPE were partially resolved, practices began to prioritise creation of a COVID-19 safe workplace. Clinicians began wearing scrubs, room ventilation and cleaning was improved and physical barriers and isolation areas were introduced. These came with major changes in screening, triage and booking routines. Online appointment booking was paused or amended at all practices – reception staff screened all patients for COVID-19 infection risk by telephone, while informing them about requirements relating to safety, telehealth and billing. These infection control approaches varied between practices.

ii) Re-aligned clinical work. Telehealth had major impacts on clinical care delivery. Telephone, rather than video, consultations predominated due to GP preferences and some patient technological constraints. There was significant concern about patient unwillingness to attend in person, and GPs often viewed telehealth as inadequate for delivering quality care, especially for systematic chronic disease management (CDM).

iii) Practice management. To limit virus transmission risk, practice staff began communicating differently with each other. (See Table 4) Face to face meetings ceased, replaced by emails, and in some practices, smart phone apps and virtual meetings. Formal practice meetings were mostly held infrequently. Practice owners in the small private practices made decisions to change routines, often unilaterally. GPs became increasingly concerned about losing income due to reduced patient demand and an initial government mandate to bulk bill all telehealth consultations.

Table 3. Key pandemic generated modifications to safety, clinical, workflow and practice management routines.

WORKFLOW ROUTINE	DEFINITION	DESCRIPTION OF CHANGES
1 KEEPING STAFF AND PATIENTS SAFE	Procedures to reduce infectious disease transmission	Increased PPE use; enhanced cleaning practices by external cleaners and practice staff. Patient waiting routines e.g. changed waiting room layout; wait in their car/outside until appointment times. Booking processes: All practices paused patient ability to make appointments online. Receptionists began to check respiratory symptoms and travel/contact history during patient booking for appointments by telephone and on arrival. Staff-to staff contact reduced greatly: such as closed lunch rooms, lunch to be eaten in rooms and in some practices the wearing of surgical scrubs. *(Impacts on routine 3)*
2 RE-ALIGNED CLINICAL WORK		
2.1 TELEHEALTH	Procedures for conducting consultations via phone or video, rather than face to face.	All practices began using telehealth for many consultations – enabled by changed MBS funding for telehealth (previously limited to rural and remote areas). All practices remained open for face to face consultations (usually with almost all GPs on site). Most GPs provided telehealth from the practice, but some worked from home when isolating or unwell or if they had personal risk factors such as advanced age or chronic disease: • Difficulties due to lack of required technology at home; providing access to patient data base, printing, faxing and billing. • At CHC all but two GPs worked from home; management provided home technology. GPs overwhelmingly used phone rather than video: • Reluctance to use video due to difficulties with logistics, practices' technology, and perceived ability for patients and/or GP to access and use technology. Receptionists needed to be aware of significantly modified billing schedule.
2.2 CASE MANAGEMENT CHRONIC ILLNESS/ CARE CONTINUITY	Procedures for management of patients' ongoing health conditions	All practices initially paused: Chronic Disease Management recalls; cervical cancer screening; 45-49 and 75+ year old health checks: • Major concerns about missed diagnosis with telehealth and patient reluctance to attend GP and/or hospital. Different approaches and timing for resuming chronic disease management follow ups – often financially driven in view of falling practice income:

		• Primarily conducted via phone or video with the assistance of the practice nurse.
3) PRACTICE MANAGEMENT	Procedures for coordination between practice staff	Staff meetings: Pre-existing large variation between practices in frequency and attendance: Shift to online meetings: excludes some, but includes others. Some practices increased meetings, others decreased them. Major loss in collegiality: Infection control obstructs social interaction and makes it more difficult to gain second opinions from practice colleagues. Especially where many staff work from home (as in the CHC) Online forums, meetings, phone calls assist, but exclude non-GPs in some practices.

Table 4. Practice meetings and communication.

Practice	Meeting routines				Communication Tools
	Pre COVID	**Early Chaos**	**Emerging Stability**	**2nd Wave**	
CHC	Monthly / as required- all staff	Twice weekly	Weekly Zoom (open to all staff, most attend, even on days off for some). Increased attendance from pre-pandemic.	As previous	Set up WhatsApp group at start of COVID-19 (for general staff communication)
SE1	GPs every 2 to 3 months, decided by owner.	Weekly Zoom from May 2020. Generated by employed doctor advocacy.	Weekly Zoom – only GPs.	As previous	WhatsApp group for GPs at start of COVID-19
E	Every 1 or 2 months	Fortnightly by zoom; Nurses and receptionists not usually included	No change	At peak of 2nd Wave, no meetings; leadership making all decisions.	Most communication by email
CBD	Monthly	Weekly, sometimes only GPs, sometimes Nurses. Also smaller informal meetings amongst GPs every morning	Nurses stopped attending	As previous	WhatsApp group prior to COVID-19 but used more often during pandemic. WeChat group added.
SE2	No all-staff meetings - off site managers only, no GP meetings, reception and nursing team have separate meetings	1 GP meeting in March 2020, clinical investigator stepped up to clinical director, started regular meetings of PM, head nurse and medical director	No change	No change	Medical director set up WhatsApp group for GPs in July to communicate changes to protocols, share thoughts, information - informal, not seen as good replacement for meetings
W	Partners meet 1-2 times a month, GPs monthly lunch meeting, AGM	All staff weekly or fortnightly	No practice wide meetings since late March 2020	As previous	Couple of WhatsApp groups, delegated nurse and doctor inactive during COVID-19

Negotiating a second wave (July 2020 – October 2020)

In early July, rapidly increasing cases led to a strict four-month metropolitan Melbourne lockdown.[22] Despite case numbers reaching 700 per day, many participants across the practices felt their earlier changes had prepared them for the challenge. Clinicians became increasingly concerned about missed diagnoses and late presentations:

> *[A patient has] really deteriorated in the last six weeks. … I've had several telephone calls to persuade him to go into hospital, and eventually he did yesterday. I got him to agree to some blood tests… his liver has packed up. And he's jaundiced and I don't know if he will survive, but at least he's gone in. And if he hadn't have gone in, I would have said, "Oh no, what do I do now?" … He would have died at home. (CHC GP1)*

Patients embraced telehealth, causing dilemmas for clinicians in maintaining quality care as a 'balance' between bringing patients to a potentially infectious location and dealing with the uncertainties of remote clinical care:

> *We've put all sort of strict guidelines around what we think's suitable for telehealth and what's not. So, things like say mental health plans, basic administrative things like repeat scripts…referrals to other specialists... do that over the phone. But as soon as they start saying, "I've got abdominal pain," or, "I've got this thing on my arm, I'm not sure what it is," they've got to come in and have an appointment. (SE1 PO)*

Three practices began managing COVID-19 testing clinics:

> *… we took over screening [from the Department of Health, because] They were taking up to two weeks to get a positive result to a patient. … that was a significant increase in workload…. I pretty much worked seven days a week. I*

think for three months I didn't have a day off, there were just lots of results coming through, notifications. The time taken to notify one positive result, to notify the Department of Health, could take one staff member two to three hours …. (CHC GP2)

As the lockdown continued, financial pressures from decreased practice income increased. New staff vacancies were unfilled, and staff and clinicians were asked to take annual leave or reduce working hours. The privately owned practices sought to diversify income; training nurses in remote CDM, systematically calling patients for recall (most practices); or providing COVID-19 testing for asymptomatic travellers (CBD). The corporate's regional management modified CDM 'targets' to increase income. As cases rose, the CHC assumed responsibility for managing the pandemic response at nearby public housing towers, which required significant staffing resources and eventually attracted additional state government funding.

Entering a new normal (November 2020 – February 2021)

Strict lockdown ended in late October 2020 and heralded an uneasy optimism. With new routines embedded, staff reflected on the consequences of the strain of the experience:

We're all pretty exhausted. And I've noticed - especially the past couple of months, I personally have been very, very short with patients. … I don't indulge anyone at all anymore. I just say straight up this is how we work, you could come, you could not come. That's it. I'm not going to spend 10 minutes on the phone with you convincing you because I have so much work to do. (CBD R)

Understanding the change

Our data showed that the characteristics of and variations between the practices in the organization and delivery of clinical care were driven by the health policy environment, local ecology and each practice's core and adaptive reserve.[10]

Health Policy Environment

While the Australian federal government provided no specific financial support to general practices during the pandemic, the impact was ameliorated by its 'JobKeeper' wage subsidy[23] and the introduction of MBS payments for telehealth. JobKeeper was only accessed by staff from one practice (CBD), but all made extensive use of telehealth. The federal government's Primary Health Networks[24] distributed some PPE as the months passed, although practices continued to need to source these privately. While practices were aware of, and often attentive to, a steady stream of government, Primary Health Networks and professional organization advice, shifting guidance with inadequate notice made it difficult to forge a consistent path.

Local Ecology

The pandemic's impact varied across metropolitan Melbourne – neighbourhoods surrounding practices W and CHC had four times as many COVID-19 infections compared to the other practices.[25] Practice W's (federally funded) on-site COVID-19 testing clinic was established prior to the first local infection, and was viewed as critical in keeping the general practice environment 'safe'. The rising incidence of COVID-19 in public housing towers close to the CHC led to extensive outreach services. The extensive changes adopted by the other practices were unrelated to local infection rates, although the CBD practice created a COVID-19 testing clinic to meet the needs of its overseas worker clientele who were required to obtain COVID-19 tests prior to returning home.

Practice core

The lack of formal external support or meaningful pandemic planning left the private practices internally focussed and needing to generate their own solutions to the pandemic challenges. The solutions and their uptake reflected the practices' organizational models and their leaders' internal models.

For example, the structure within SE2's corporate model (where early decision making was made by off-site regional managers) compounded local leaders' frustration and made it difficult for the practice to address the demands of the pandemic.

For all practices the introduction of MBS telehealth payments eased financial pressures that emerged with patients' increasing reluctance to seek face to face care. This required new routines to manage acute illness, plan prevention, and monitor CDM. Nevertheless, as the pandemic continued, financial pressures continued, with most practices reporting a 25-60% fall in income and adjustments to staffing to offset losses.

Government financial regulations generated some perverse incentives. During early pandemic phases, government funded telehealth consultations could not attract co-payments. As a result, several of the private practices began to encourage patients to attend the practice for face-to-face consultations, which still attracted private co-payments.

Adaptive reserve

Internal motivations were similar between practices. The early preoccupation was with a safe workplace focussed on structural changes, modifications to patient flow and an ongoing need for triage. As time passed, work was driven by desires to maintain both financial viability and quality clinical care. Most practice staff were increasingly concerned about their patient cohort's welfare, especially those with mental health conditions or complex chronic disease.

Leaders were key to adaptive reserve in the four privately owned practices and were critical to the maintenance of services in the CHC and the corporate practice. Within the CHC's complex external governance structure, management resources were rapidly redirected to the general practice, with decision making mostly devolved to managers and staff members close to the general practice level.

By contrast, at the four private practices, practice owners made most of the decisions, often with minimal consultation with nurses, receptionists and contractor doctors:

> *The practice principals have been taking a lot of unilateral decisions recently and there has not been a doctors' meeting for quite some time now. They even sent out an email asking for all the discussion to cease as they would be making the decisions from now on. I'm a bit worried it got everyone offside. (de-identified)*

Professional roles remained isolated and few leaders sought information from outside their own professional group. Pre-pandemic hierarchies between the owners and clinical and administrative staff were maintained and sometimes reinforced. Despite needing to "*take on the lion's share of the infection control and cleaning and [having] very high risk interactions*" (*de-identified*), nurses were rarely included in decision making.

The data suggested occasional evolution of leadership approaches. The corporate practice (SE2) began with key decisions being made by the practice's regional management team. Practitioners and staff feelings of disempowerment improved when a local leadership team was formed comprising the practice manager, a senior nurse and a medical lead. However, several changes to routines (such as temperature testing all patients) were later overturned by regional leaders on cost grounds.

In the early months of the pandemic, contractor GPs in one practice felt the practice leadership was not "*taking it seriously enough*" *(de-identified N)*. Following a formal presentation of the non-owner GPs' concerns to management, the practice transformed to become more collaborative, with weekly meetings and extensive use of social media for communication. However, nurses and administrative staff remained isolated from decision making:

A: No, the weekly meetings are not everyone. They're just the GPs. They do a Zoom meeting now.

Q: But not with you?

A: No, not with us. So that's what I'm saying, we just get things told to us in the corridor. (de-identified participant N)

DISCUSSION

Despite Melbourne's pandemic experience being the worst in Australia in 2020, practices were spared the staff deaths or multiple practice closures experienced overseas. The study practices mirrored international transformations of clinical, organizational and infection control routines. As elsewhere, PPE was difficult to access,[26] practice income fell[27] and practitioners worried about reduced face-to-face consultation[28] and the potential impact on patients with chronic health conditions.[29]

Unanticipated crises, like a pandemic, can uncover the strengths, flexibility and fragility of organizations and the systems in which they are embedded.[7] The pandemic acted as a natural experiment of the effectiveness of models of care predominant in Australian general practice. We believe our data emphasises the fragility of the organizational models, financial security and support underpinning Australian primary care.

Models of care

Our study data highlighted the potential of the CHC model to bridge the gap between primary care and public health.[30] Victoria's CHCs incorporate a focus on prevention, health equity and the social determinants of health.[31] The combination of the CHC's community focus and secure state funding helped it meet its mandate of addressing the evolving needs of local communities. By contrast, most of the private practices lacked the structural or organizational ability to go much beyond maintaining basic practice functions. They were isolated, internally preoccupied and, while provided with

extensive information, generally left to negotiate the challenges of the pandemic alone. SE2's remote governance and lack of internal management compounded workforce fragmentation and demoralisation, and made it difficult for the practice to align with evolving demands. Practice W was a partial exception, as its size, active leadership and community connection was reflected in the decision to host a federally funded COVID-19 testing facility.

The relative financial security of the CHC funding model and the explicit links with state health services highlighted the potential of the CHC to address local needs of vulnerable communities. Models similar to CHCs are widespread in North America and have been important in delivering quality care to underserved populations.[32] Given the disproportionate impact of the pandemic on vulnerable communities, and the importance of primary care to population health, future health planning should explore the potential for either expanding the coverage of the CHC model or exploring ways to incentivise the incorporation of CHC-like functions into private primary care delivery.

Financial security

As elsewhere,[33-35] all our participating practices were financially challenged by the pandemic. A recent survey found that 65% of Australian GPs, particularly in urban and more affluent areas, experienced reduced income in the early months of the pandemic.[36] Similar early financial impacts were reported in many other nations,[37 38 39] with losses per FTE physician in the USA estimated as over $65,000 in 2020. Waitzberg observed that dramatically decreased income from patient visits combined with minimal direct governmental control "reverses the conventional financial positions of payers and providers and acts as a further hurdle to prioritizing public health".[37]

Given the fee for service payment model for GPs in private businesses and the CHC, our participants unsurprisingly had a preoccupation with financial security and modifying routines to maintain income and avoid practice closures. This challenge could have been addressed by directed government financial support.

Some degree of practice-directed financial support could be considered in future pandemics. Even relatively small capitated payments from payers (i.e. the federal government in Australia) could be used to mitigate losses and keep practices open.[40]

Leading change at the practice level

It has been suggested that COVID-19 highlights the weak points in systems, but also provides an opportunity for transformation.[41] While practices in this study were all able to realign their organizational and clinical routines, transformation was constrained by hierarchical leadership structures, rigid financial models and pervasive professional boundaries.

As others have found, our data identified isolated examples of increased collaboration,[42] and, at times (especially within the CHC) evidence of visionary, operational, and distributed leadership.[43] However, overall our data supported Gerada's contention that practices can both "crave" for authoritative leaders at times of distress, but also find such approaches to be disempowering.[44] Practice models and financing provided minimal incentives for leaders to be attentive to the local environment,[16] or open to creating links between organizations.[45]

Limitations

While data was collected from a range of organizational models, these were within a single Australian metropolitan area in the first year of a moderate COVID-19 pandemic. It is feasible that different routines would have emerged in practices in a different health policy or local environment context, such as rural practices, those not faced by a metropolitan area lockdown, and with no association with a University Department of General Practice. While it was possible that key routines were not revealed, our external investigators, iterative approach and inclusion of international experts decreased this possibility.

The GP investigators were involved in recruitment and data collection in their practice, and were closely involved in data analysis. Their views are inevitably influenced by their personal experiences

of practice dynamics. This adds important insights into practice functioning, but also has the potential to override the views of other practice participants. This possibility is countervailed by two key factors. 1) The vast majority of data analysis, including all coding of data, was undertaken by the social scientists. 2) Feedback sessions by practice staff on interim data provided member-checking of data validity.

Conclusion

Our study represented a natural experiment of the resilience, financial stability and governance within models of primary care in Australia. We found a fragile primary care sector that struggled to be fit for purpose in dealing with a pandemic. Practice isolation and financial strain were early and pervasive challenges to practice security. Leadership was critical, but many routine changes followed both financial and clinical priorities. Nevertheless, innovations in telehealth, triage and infection management are likely to be long lasting.

The Australian federal government's 10-year vision for improving primary care[46] highlights the importance of leadership at all levels and reconsideration of federal and state responsibilities in supporting general practices. Our findings point to the potential value of models such as the CHC for organizing and delivering care to highly vulnerable populations, and to the key role of practice leaders. The significant financial burdens experienced by several practices raises concerns as to the abilities of a purely fee for service system to both innovate and manage the critical primary care challenges of a global pandemic.

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Contributors GR led the project. GR, ES, JN, KA, TS-S and SH acted as participant investigators. BFC and WLM provided expert advice. JA and RL conducted and coded interviews and led data analysis.

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References

1. Hick JL, Biddinger PD. Novel Coronavirus and Old Lessons — Preparing the Health System for the Pandemic. *New England Journal of Medicine*. 2020/05/14 2020;382(20):e55. doi:10.1056/NEJMp2005118

2. Huston P, Campbell J, Russell G, et al. COVID-19 and primary care in six countries. *BJGP Open*. Sep 8 2020;doi:10.3399/bjgpopen20X101128

3. Braithwaite J, Tran Y, Ellis LA, Westbrook J. The 40 health systems, COVID-19 (40HS, C-19) study. *Int J Qual Health Care*. Feb 20 2021;33(1)doi:10.1093/intqhc/mzaa113

4. Boroujeni M, Saberian M, Li J. Environmental impacts of COVID-19 on Victoria, Australia, witnessed two waves of Coronavirus. *Environ Sci Pollut Res Int*. Mar 2021;28(11):14182-14191. doi:10.1007/s11356-021-12556-y

5. Erny-Albrecht K, Bywood P. *Corporatisation of general practice – impact and implications.* 2016:1-53. *PHCRIS Policy Issue Review*.

6. McDonald J, Ward B, Lane R, et al. How are co-located primary health care centres integrating care for people with chronic conditions? *International Journal of Integrated Care*. 2017;17(3)doi:10.5334/ijic.3163

7. Carmeli A, Schaubroeck J.Crisis-Preparedness: The Importance of Learning from Failures. *Long Range Planning*. 2008/04/01/ 2008;41(2):177-196. doi:https://doi.org/10.1016/j.lrp.2008.01.001

8. Plsek PE, Greenhalgh T. Complexity science: The challenge of complexity in health care. *BMJ*. 2001;323(7313):625-8.

9. Miller WL, Crabtree BF, McDaniel R, Stange KC. Understanding change in primary care practice using complexity theory. *J Fam Pract*. May 1998;46(5):369-76.

10. Yin R. *Case study research: Design and methods (3rd ed.).* Sage; 2003.

11. van Buul LW, Sikkens JJ, van Agtmael MA, Kramer MHH, van der Steen JT, Hertogh CMPM. Participatory action research in antimicrobial stewardship: a novel approach to improving antimicrobial prescribing in hospitals and long-term care facilities. *Journal of Antimicrobial Chemotherapy*. 2014;69(7):1734-1741. doi:10.1093/jac/dku068

12. Russell G, Advocat J, Lane R, et al. How do general practices respond to a pandemic? Protocol for a prospective qualitative study of six Australian practices. *BMJ Open*. 01-Sep-2021 2021;11(9):e046086. doi:10.1136/bmjopen-2020-046086

13. Balasubramanian BA, Chase SM, Nutting PA, et al. Using Learning Teams for Reflective Adaptation (ULTRA): Insights From a Team-Based Change Management Strategy in Primary Care. *Ann Fam Med*. September 1, 2010 2010;8(5):425-432. doi:10.1370/afm.1159

14. Lane R, Russell G, Bardoel EA, et al. When colocation is not enough: a case study of General Practitioner Super Clinics in Australia. *Aust J Prim Health*. Aug 17 2016;doi:10.1071/PY16039

15. *NVivo qualitative data analysis software. Version 12.* 2018.

16. Miller WL, Crabtree BF, Nutting PA, Stange KC, Ja√©n CR. Primary Care Practice Development: A Relationship-Centered Approach. *The Annals of Family Medicine*. May 1, 2010 2010;8(Suppl 1):S68-S79. doi:10.1370/afm.1089

17. Glaser BG. The Constant Comparative Method of Qualitative Analysis. *Social Problems*. 1965;12(4):436-445. doi:10.2307/798843

18. Russell G, Advocat J, Geneau R, et al. Examining organizational change in primary care practices: experiences from using ethnographic methods. *Fam Pract*. Dec 1 2011;doi:cmr117 [pii] 10.1093/fampra/cmr117

19. Strauss AL. *Basics of qualitative research : techniques and procedures for developing grounded theory*. 2nd ed. ed. Thousand Oaks : Sage Publications; 1998.

20. Miles MB, Huberman AM, Saldana J. *Qualitative data analysis : a methods sourcebook*. Third edition. ed. Thousand Oaks, Californinia : SAGE Publications, Inc.; 2014.

21. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. Dec 2007;19(6):349-57. doi:10.1093/intqhc/mzm042

22. Australian Broadcasting Commission. Melbourne placed under stage 4 coronavirus lockdown, stage 3 for rest of Victoria as state of disaster declared. ABC. Accessed 13/02/2022, Melbourne placed under stage 4 coronavirus lockdown, stage 3 for rest of Victoria as state of disaster declared

23. Australian Government: Treasury. JobKeeper Payment. Commonwealth of Australia. Accessed 13/02/2022, https://treasury.gov.au/coronavirus/jobkeeper

24. Australian Government: Department of Health. Primary Health Networks. Commonwealth of Australia. Accessed 12/02/2022, https://www.health.gov.au/initiatives-and-programs/phn

25. Australian Broadcasting Commission. Postcode data on coronavirus cases reveals Victoria's COVID-19 hotspots. 12/02/2022, Postcode data on coronavirus cases reveals Victoria's COVID-19 hotspots

26. Alsnes IV, Munkvik M, Flanders WD, Oyane N. How well did Norwegian general practice prepare to address the COVID-19 pandemic? *Fam Med Community Health*. Dec 2020;8(4)doi:10.1136/fmch-2020-000512

27. Roehr B. Covid-19 is threatening the survival of US primary care. *BMJ*. Jun 22 2020;369:m2333. doi:10.1136/bmj.m2333

28. Xu Z, Fan J, Ding J, et al. The Impact of COVID-19 on Primary Care General Practice Consultations in a Teaching Hospital in Shanghai, China. *Front Med (Lausanne)*. 2021;8:642496. doi:10.3389/fmed.2021.642496

29. Rawaf S, Allen LN, Stigler FL, et al. Lessons on the COVID-19 pandemic, for and by primary care professionals worldwide. *Eur J Gen Pract*. Dec 2020;26(1):129-133. doi:10.1080/13814788.2020.1820479

30. Russell GM. Is prevention unbalancing general practice? *Med J Aust*. Jul 18 2005;183(2):104-5.

31. Powell Davies G, McDonald J, Jeon Y, Krastev Y, Christl B, Faruqi N. *A narrative synthesis of models of integrated primary care centres/polyclinics*. 2009.

32. Nagel DA, Keeping-Burke L, Pyrke RJL, et al. Frameworks for evaluation of community health centers' services and outcomes: a scoping review protocol. *JBI Database System Rev Implement Rep*. Apr 2019;17(4):451-460. doi:10.11124/JBISRIR-2017-003843

33. Wilson G, Currie O, Bidwell S, et al. Empty waiting rooms: the New Zealand general practice experience with telehealth during the COVID-19 pandemic. *N Z Med J*. Jul 9 2021;134(1538):89-101.

34. Filippi MK, Callen E, Wade A, et al. COVID-19's Financial Impact on Primary Care Clinicians and Practices. *J Am Board Fam Med*. May-Jun 2021;34(3):489-497. doi:10.3122/jabfm.2021.03.200502

35. Krist AH, DeVoe JE, Cheng A, Ehrlich T, Jones SM. Redesigning Primary Care to Address the COVID-19 Pandemic in the Midst of the Pandemic. *Ann Fam Med*. Jul 2020;18(4):349-354. doi:10.1370/afm.2557

36. Scott A. The impact of COVID-19 on GPs and non-GP specialists in private practice. Melbourne Institute of Applied Economic and Social Research; 2020. p. 1-20.

37. Waitzberg R, Quentin W, Webb E, Glied S. The Structure and Financing of Health Care Systems Affected How Providers Coped With COVID-19. *The Milbank quarterly*. 2021;99(2):542-564. doi:10.1111/1468-0009.12530

38. Kippen R, O'Sullivan B, Hickson H, Leach M, Wallace G. A national survey of COVID-19 challenges, responses and effects in Australian general practice. *Aust J Gen Pract*. Nov 2020;49(11):745-751. doi:10.31128/ajgp-06-20-5465

39. Roth C, Breckner A, Moellinger S, et al. Beliefs and practices among primary care physicians during the first wave of the COVID-19 pandemic in Baden-Wuerttemberg (Germany): an observational study. *BMC Fam Pract*. May 6 2021;22(1):86. doi:10.1186/s12875-021-01433-9

40. Basu S, Phillips RS, Phillips R, Peterson LE, Landon BE. Primary Care Practice Finances In The United States Amid The COVID-19 Pandemic. *Health Aff (Millwood)*. Sep 2020;39(9):1605-1614. doi:10.1377/hlthaff.2020.00794

41. Friedman TL. We Need Great Leadership Now, and Here's What It Looks Like. *New York Times*. April 21, 2020. https://www.nytimes.com/2020/04/21/opinion/covid-dov-seidman.html?referringSource=articleShare

42. Renaa T, Brekke M. Restructuring in a GP practice during the COVID-19 pandemic - a focus-group study. *Tidsskr Nor Laegeforen*. Feb 2 2021;141(2)Driftsomlegging ved et fastlegekontor under covid-19-pandemien - en fokusgruppestudie. doi:10.4045/tidsskr.20.0713

43. Donahue KE, Halladay JR, Wise A, et al. Facilitators of transforming primary care: a look under the hood at practice leadership. *Ann Fam Med*. May-Jun 2013;11 Suppl 1:S27-33. doi:10.1370/afm.1492

44. Gerada C. Reflections on leadership during the Covid pandemic. *Postgrad Med*. Sep 2021;133(7):717-720. doi:10.1080/00325481.2021.1903218

45. Westfall JM, Liaw W, Griswold K, et al. Uniting Public Health and Primary Care for Healthy Communities in the COVID-19 Era and Beyond. x. *J Am Board Fam Med*. 2021;34(Supplement):S203. doi:10.3122/jabfm.2021.S1.200458

46. Commonwealth of Australia (Department of Health). Consultation Draft - Future focused primary health care: Australia's Primary Health Care 10 Year Plan 2022-2032. Commonwealth of Australia. Accessed 12/02/2022,

Figure legend Figure 1 COVID-19 in Victoria during 2020. Data Collection Timeline

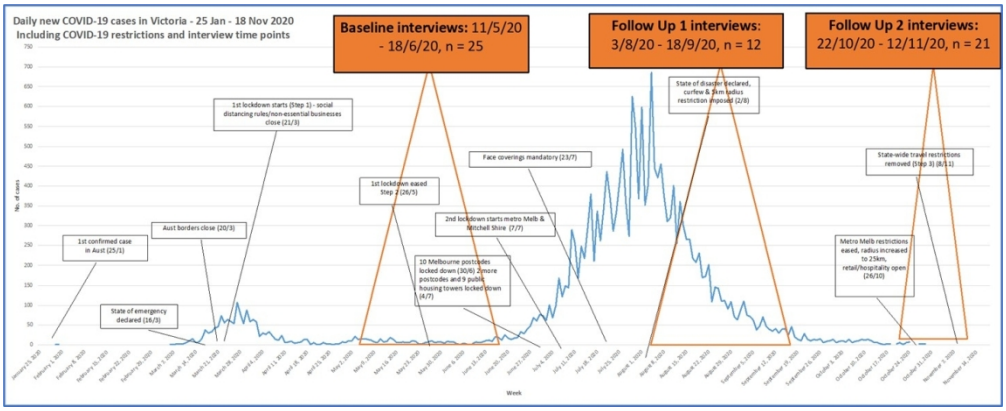

Figure 1 COVID-19 in Victoria during 2020. Data Collection Timeline

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COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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