Continuing Chronic Care Services During A Pandemic: Results Of A Mixed-Method Study

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Abstract

Background: Patients with chronic disease have seen unprecedented changes to healthcare practice since the emergence of COVID-19. Traditional 'on-site' clinics, have had to innovate to continue services. Whether these changes are acceptable to patients and are effective at care continuation are largely unreported.

Methods: We evaluated the effectiveness of care provision at a re-structured chronic care clinic and elicited the patient experiences of care and self-management. We conducted a convergent, parallel, mixed-methods study. Adult patients attending a chronic care clinic were included. We extracted data from 4,849 clinic visits before and during the COVID-19 pandemic, including operational metrics and attendee profile. We also conducted fifteen interviews with patients from the same clinic using a semi-structured interview guide.

Results: Re-structuring the service, including the introduction of teleconsultations, home-delivery of prescriptions and use of community-based phlebotomy services, served to maintain continuity in care while adhering to COVID-19 containment measures. Qualitatively, five themes emerged. Patients were able to adjust to healthcare practice changes and adapt their own lifestyles, although poor self-management practices were adopted. While most were apprehensive about attending the clinic, they valued ongoing care access and were reassured by the on-site containment measures.

Conclusions: Continuation of routine services is desired by patients and can be achieved through adoption of containment measures, by greater collaboration with community partners and use of technology. Patients adapted to service changes, but poor self-management was evident. To prevent chronic disease relapse, services must strive to innovate rather than suspend services during pandemics.

Introduction

COVID-19 has disrupted healthcare services around the world [1, 2]. The uncertain disease epidemiology (in the early part of the epidemic), the rapid spike in COVID-19 cases [3] and the frequent requirement for hospitalisation [4] quickly overburdened health services [1, 2]. To protect healthcare capacity, countries have had to introduce strict containment measures such as border closures, remote working, and social distancing practices [5, 6]. Healthcare institutions have also had to find additional capacity to treat and contain acute COVID-19 infections, often through reallocation of staff and facilities and suspension of non-urgent appointments and procedures [1, 2, 7]. Diversion of healthcare resources towards acute COVID-19 care has consequently left outpatient and community-based services exposed and vulnerable.

While a reprioritisation of healthcare resources has increased the capacity to manage COVID-19 patients in the short-term, it has disproportionately impacted those requiring less urgent long-term care (i.e., patients with chronic disease). Patients with chronic disease(s) are the highest users of healthcare services [8] needing regular and sustained management by healthcare providers to maintain disease control. Although deferral of appointments for patients with chronic disease is advantageous, in that it

keeps a high-risk group away from clinics and frees up resources, it risks negatively impacting disease control. Proper access, coordination and continuity of care are essential to effective chronic disease management [9]. Without proper care and an inability to self-manage, uncontrolled chronic disease can lead to emergency department visitations and hospital admissions [10, 11]. Thus, moving resources away from chronic care towards COVID-19 management may inadvertently place burden elsewhere in the health system.

In Singapore, several containment measures were introduced, which impacted healthcare and everyday life. The first set of COVID-19 containment measures were introduced in February, closely followed by a country wide 'lock-down' (locally known as the 'circuit-breaker') in early April 2020 [6]. During lock-down strict rules were applied, including the need for residents to remain indoors except for essential trips, wearing of masks while outside, working or schooling from home and no interaction with those in other households [6]. Operational changes to improve safety were also introduced within local healthcare institutions, such as deferment of non-urgent care and introduction of teleconsultations [12–14].

At Alexandra Hospital, an outpatient chronic care clinic has strived to maintain safe access to care (since COVID-19 appeared) by implementing containment strategies. Patients visiting the clinic undergo symptom screening prior to clinic entry, accompanying carers are limited to one and the seating arrangement in the waiting area has been redesigned to maintain social distancing [15, 16].

Teleconsultations and home-delivery of prescriptions are now commonly offered in lieu of face-to-face appointments and options for blood tests in community clinics rather than the hospital clinic are available [15, 16]. While these measures have worked to protect patients, the wider implications of these practice changes and community containment strategies are not entirely known.

The purpose of this study was to investigate if effective care provision was sustained following restructuring of chronic care services, to accommodate COVID-19 containment measures. We also sought to explore the lived experiences of those attending the redesigned clinic. The mixed-method approach enabled us to obtain greater breadth and depth of understanding from the results. The study had two aims:

1. To investigate if chronic care services were maintained following clinic restructuring

(due to COVID-19).

2. To explore the patient experience of the newly structured chronic care service and their own self-management since COVID-19 emerged.

Method

A convergent, parallel, mixed-methods study design was conducted. The mixed-method design was used chosen so quantitative and qualitative data could be collected and triangulated to improve the validity of the findings. Qualitative data were collected and reported according to the COREQ checklist (Consolidated criteria for reporting qualitative research) [17].

The study was approved by the National Healthcare Group Domain Specific Review Board (NHG DSRB: 2020/00303).

Quantitative data collection

Data were extracted from the electronic medical records of the outpatient chronic care clinic at Alexandra Hospital between 10th November 2019 to 7th May 2020. The data were then analysed separately for a 3-month period before COVID-19 measures were implemented (10th November 2019-7th February 2020) and for a 3-month period after clinic restructuring (8th February 2020-7th May 2020). Data included operational metrics from the outpatient chronic care clinic and demographics of the patients attending the clinic during the study period.

Statistical analyses

Analyses were performed in STATA v15.0 (STATA Corp, College Station, Texas, USA). Summary statistics are presented as mean (with standard deviations, SD) or proportions. The patient profile was compared before and after the lock-down period using a two-sample t-test or Chi² test as appropriate.

Qualitative data collection

Qualitative data was collected through fifteen semi-structured interviews with patients between 24th April-2nd June 2020. Patients were recruited from the outpatient chronic care clinic at Alexandra Hospital. Eligible participants were adults (≥ 21 years) with at least one chronic disease. Patients with different chronic conditions were recruited to ensure a breadth of views (i.e., purposive sampling). Participants with cognitive impairment were excluded.

Initially, eligible participants were identified by doctors running the chronic care clinic. Participants willing to participate were consented and their contact details were conveyed to the interviewers. Two female researchers, AB (BDS, MPH) and LSC (BSc, MSc) conducted the interviews in English, Chinese and Malay, as per participant's preference. Both researchers were trained in qualitative research methodologies and were proficient in the language spoken by the participants. The interviewers had no direct or dependent relationship (patient-doctor) with the participants, which could potentially influence responses. Due to COVID-19 containment measures, interviews were conducted remotely via telephone or videoconference (Zoom). Remote interviewing is a suitable alternative when face-to face interviewing is not practical [18, 19]. The interview was conducted between the interviewer and the patient alone or alongside the caregiver. Before the interview commenced, the study aim was reiterated, and permission was sought for audio-recording and transcription of the discussion. A total of twenty-one participants were invited for interview and fifteen interviews were conducted and analysed.

A semi-structured interview guide was initially developed with reference to the chronic care model [9]. The chronic care model describes six components essential in a healthcare system for effective chronic care management. An initial set of questions was then discussed and refined with clinicians who manage chronic disease patients (Supplementary file 1). The interview guide contained a series of open-ended

questions with prompts where necessary. Interviews took between 30 to 50-minutes. After each interview, the interviewers reflected and generated memos to aid with analyses.

Qualitative analyses

All audio recordings were transcribed and translated into English. The accuracy of the translation was checked by a second independent researcher. Data were analysed using a thematic analysis method, which includes coding, and developing sub-themes and main themes [20]. Data were coded according to the meaning of the sentences to identify experiences as perceived by patients. Similar and overlapping sub-themes were then grouped under main themes. Coding was conducted, in MS Office, by JS, AB and LSC independently. Interpretation of each transcript and codes were then discussed as a group and differences in opinion were mutually reconciled. Interviews and coding occurred concurrently until data saturation was reached.

Quantitative and Qualitative synthesis

Data were triangulated by first analysing the quantitative and qualitative results separately. Through discussion, members of the research team (JS, AB, LSC) then compared the key points from the quantitative data to the sub-themes and themes of the qualitative data. Areas of commonality between the quantitative and qualitative results were identified and summarised in text. The approach allowed us to bring explanation and a greater depth of meaning to the quantitative findings.

Results

During the study period, data from n=4,849 clinic visits (2,500 visits before clinic restructuring due to CVOID-19 and 2,349 visits after restructuring) were analysed and fifteen qualitative interviews were conducted.

Quantitative results

Patient volume and demographical profile did not generally alter after clinic restructuring (Table 1). For the top five diagnoses (based on the International Classification of Diseases (ICD)-10[21]), the first four remained the same: (E00-E99) endocrine related, (I00-I99) circulatory related, (M00-M99) musculoskeletal related, (R00-R99) general signs, symptoms and abnormal findings, while the fifth diagnoses before restructuring was (K00-K95) digestive related and after clinic restructuring was (N00-N99) genitourinary related.

Cases were more likely to be treated by consultant grade staff, be referred from other hospitals and a greater number of radiology and laboratory orders were also placed after clinic restructuring. Teleconsultation appointments commenced in February 2020. A total of five appointments occurred in February, increasing to ninety by May 2020.

Table 1
Patient demographics and clinic operational data before and during the COVID-19 lock-down period

	Before lock-down 10th Nov 2019– 7th Feb 2020 (n=2,500 clinic visits)	During lock-down 8th Feb-7th May 2020 (n=2,349 clinic visits)
Mean age, years (range, SD)	61.53 (18-101,18.28)	60.76 (14-101,18.23)
Female, n (%)	1,348 (54)	1,222 (52)
Ethnicity, n (%)	1,856 (74)	1,736 (74)
Chinese	241 (10)	213 (9)
Indian	211 (8)	229 (10)
Malay	192 (8)	171 (7)
Other		
Marital status, n (%)	1,007 (40)	998 (42)
Married	315 (13)	279 (12)
Single	1,178 (47)	1,072 (46)
Other (unknown etc.)		
First visit, n (%)	739 (30)	687 (30)*
Return visit, n (%)	1,761 (70)	1,592 (70)
Grade of doctor, n (%)	412 (16)	356 (15)
Senior consultant	1,192 (48)	1,317 (56)
Consultant	805 (32)	578 (25)
Associate consultant	91(4)	98 (4)
Non-doctor consultation		
Referral from, n (%)	977 (39)	807 (35)
Polyclinics or community clinics	1266 (51)	1080 (46)
Within Alexandra hospital	211 (8)	431 (18)
Other hospitals	46 (2)	31 (1)
Other clinics/private care		
Number of radiology orders, n	4,253	5,170
Number of laboratory orders, n	14, 431	16,713

Before lock-down	During lock-down
10th Nov 2019– 7th Feb 2020	8th Feb-7th May 2020
(n=2,500 clinic visits)	(n=2,349 clinic visits)
Abbreviation: SD- Standard deviation, *missing data n=70	

Qualitative results

Table 2 presents the demographical profile of the fifteen participants interviewed. Over two thirds of participants had two or more chronic conditions. Ten participants were referred to the outpatient chronic care clinic from the hospital setting, the remaining came from community referrals (i.e., General Practitioner).

Table 2
Qualitative participant profile

n=15	
Mean age, years (range, SD)	61.20 (38-80, 12.90)
Female, n (%)	9 (60)
Ethnicity, n (%)	11 (73)
Chinese	3 (20)
Indian	1 (7)
Malay	
Highest education level, n (%)	1 (7)
No formal/primary level education	7 (47)
Secondary	2 (13)
A Level	5 (33)
Diploma and above	
Marital status, n (%)	11 (73)
Married	3 (20)
Single	1 (7)
Divorced	
Employment status, n (%)	9 (60)
Full-time	1 (7)
Homemaker	5 (33)
Retired or unemployed	

	n=15
Medical history, n (%)	5 (33)
Rheumatoid arthritis	4 (27)
Gout	3 (20)
Systemic lupus erythematosus	3 (20)
Diabetes mellitus	3 (20)
Osteoporosis	2 (13)
Hypertension	2 (13)
High cholesterol	2 (13)
Heart disease	1 (7)
Asthma	
Abbreviations: SD - Standard deviation.	

Five main themes emerged from analysis of the interview data.

Theme 1: Adapting lifestyle in the COVID-19 era.

During the interviews, most of the participants reflected on a great number of changes to their lifestyle because of COVID-19. Adaptations spanned an increase and preference for more home cooking, an avoidance of grocery shopping and adoption of home-exercise.

ID16: "Normally before COVID at least can do some exercise outside but now not outside just do simple exercise at home"

Participants reported feelings of nervousness in catching the disease, particularly if there was an underlying condition. Nervousness appeared to be a main driver of some adaptations. Lifestyle adaptations were also imposed on participants due to the containment measures (i.e., closure of communal spaces, no in-dining, no socialising between households, working from home) or by pressure from relatives concerned for their parents [the interviewees].

ID5: "At the beginning of outbreak, I felt nervous. I have heart disease, SLE, have problems in [my] immune system...stay at home, avoid going out and get infected from people out there"

ID03: "cannot meet family members now since they are staying at different places. There is no physical meet since then [since covid-19]. Only through phone, there is no face-to-face interaction" [households were not permitted to mix during lock-down]

ID15: "The young one will say don't go out if you need anything...but sometimes they buy the thing, it's not what we want"

ID7: "My son also doesn't want us go out, so he will order online"

Theme 2: Finding reassurance from COVID-19 containment measures.

Most participants were generally concerned about the pandemic situation and apprehensive about visiting the clinic but eventually felt comfortable after visiting the doctors in the hospital. For most, containment measures were felt to be sufficient, and they understood their requirement.

ID8: Of course, they are necessary. To protect yourself your family and others. You never know when the person next to you may...show no symptoms"

ID7: "At beginning, really worried. After first and second visits, I felt like...knowing that they are doing precaution measures, then won't felt so scared"

While participants were knowledgeable about COVID-19 and precautionary measures, the clinic was not viewed as a source of information or advice regarding COVID-19.

ID2: "They did not specifically explain, but we will understand by ourselves"

[in relation to COVID-19 information provision by the clinic]

ID11: "I mean it will be good if we have more information with regards to what precautions other than the very general precautions that we should take"

Theme 3: Accessibility of Healthcare despite COVID-19.

Participants described generally positive experiences reflecting continued access and continuity of care in the clinic. Most participants stated that their appointment frequency was unchanged, although many participants appointments were temporarily moved to another institution (physicians were prohibited from practicing at multiple institutions during lock-down). While the continued access to care was viewed favourably and participants were generally satisfied, there was some frustration at the inconvenience of changing location.

ID7: "Still can go see doctor."

ID11: "err of course it is inconvenient, but ermmmm I guess if it really is for some good reason then I'm fine with it"

Due to COVID-19, many healthcare institutions utilised teleconsultations, which were largely accepted as a substitute to clinic consultation.

ID12: "yeah I think, it's a good idea, then we save traveling, and it's safer also"

In other cases, a lack of technological 'savviness', the lack of 'personal touch' and scepticism regarding its effectiveness were reported as barriers to adoption. Context also appeared to be important to the acceptability of teleconsultation.

ID15: "I rather go there and wait for the doctor to see me...for this skill [using teleconference], it's quite difficult, all the time I got to get someone to help me"

ID7: "If my condition allows, then I will accept. If my condition get worse, then cannot"

ID14: "I think there won't be any personal interaction and it would be like you're talking to the machine even though the doctor is zooming you (Laughs). I prefer to talk face to face...because you can see the reaction of the person"

Theme 4: Anxiety due to COVID-19.

Participants on one hand reported feelings of anxiety for themselves and others and on the other hand were sympathetic to the status of the healthcare workers. Their concerns for the future, the economic impacts of COVID-19 and the stress imposed on healthcare workers were also expressed.

ID16: "I hope everything will be fine, pity for other people, for children that they cannot go out gather with friends"

ID17: "Due to the economy so bad, I don't want to see it continue...because let's say if I continue, so many months or half a year to work from home, it really affects is very challenging, umm in terms of I don't know whether my work, it can keep on"

Feelings of negativity and frustration with the current situation were common and a strong desire for things to return to normality post COVID-19.

ID13: "I also hope that this disease faster goes away, everyone can go back to normal life. I hope everything will be fine after this no more lock-down or this thing hopefully things will be turn back to normal"

Theme 5: Resilience in lock-down.

A strong sense of resilience surfaced in the interviews. Participants adapted to the changed situation using various coping strategies. Many adopted technological solutions (e.g., telecommunications) so they could continue to socialise while avoiding activities perceived as high risk.

ID15: "Because now of covid-19 we are not suppose to meet in church, then no choice lah...sometime attend on YouTube lah, the sermon on Youtube"

ID14: "I have two good friends and we meet once every month. But now that has been banned, so we contact through phone"

("lah" is a commonly used phrase in local English dialect (often termed Singlish) which may mean an affirmation, dismissal, or exclamation in different contexts.)

Trust in the government's actions and an understanding that 'the restrictions are for our own good' also helped participants accept the situation and remain resilient.

ID7: "Our Singapore did very well in term of precaution measures, my feeling like become more calm. At the beginning, will feel nervous. But now government will control it, so we won't feel so worried now"

Discussion

We investigated the continuity of chronic care services (following clinic re-structuring) and explored the experiences of those attending the redesigned clinic. We used a mixed-method approach, combining clinic data with qualitative interviews exploring how patients experienced care services and self-managed. We found that restructuring of the clinic (to enhance safety) had little impact on the clinic's operational metrics. No substantial changes in the number of appointments, type of attendee (age, sex, ethnicity, marital status, diagnoses) or type of hospital visit (first or follow-up) were observed. Interviewed patients expressed satisfaction in continued access to routine healthcare services. Participants valued the ability to proceed with appointments as per normal (despite COVID-19) and adapted to changes in the clinic set-up.

Before attending the clinic, many participants reported a sense of apprehension as to what to expect, ultimately this did not deter patients from their appointment (as demonstrated by similar appointment numbers during the two periods). Rather, participants eventually felt reassured by the safety measures in place at the clinic. The fact that patients were well informed about COVID-19 and understood the need for the associated containment measures likely influenced clinic attendance positively. While we found patients understood how and why COVID-19 is being managed, they did not view the hospital clinic as a source for COVID-19 related information. This fits with a recent survey (in Singapore), which reported social media, television programmes and friends and/or colleagues are the main sources of COVID-19 related information [22]. While we did not explore the accuracy of the COVID-19 information patients obtained in this study, the well reported spread of misinformation, (particularly through social media) cannot be ignored [23]. Clinic visits may be an ideal opportunity for healthcare providers to play a larger role in providing reliable and accurate information to patients, although a few barriers remain. Identifying who would benefit and tailoring information to individuals takes time. Additionally, COVID-19 related information is continually evolving while clinic visits are spaced in time, providing timely communications therefore becomes problematic.

For patients not physically attending clinic, video teleconsultation became an option as part of clinic restructuring. Patients recognised the need and benefits of this approach, reporting on the convenience of remote appointments and the ability to feel safe by staying away from the hospital. Conversely, some doubted the technology due to a perceived lack of skill or support at home, a belief that teleconsultation is impersonal or ineffective and that teleconsultation is only 'OK' while COVID-19 persists. From the providers perspective adoption of teleconsultation is desirable to avoid physical contact with the health system (reducing risk of infection) and to minimise the use of scarce personal protective equipment [24]. Global data indeed reflects an accelerated adoption of teleconsultation by health systems [25] but well reported patient-related barriers still remain [26]. The interviews in this study highlight the importance of context when adopting new solutions. Effective and safe use of remote care requires a clear understanding of each patient's unique situation and when remote appointments can be used appropriately. Policies developed on virtual care must acknowledge that video teleconsultation is not appropriate for every patient or circumstance, a point reflected in our interviews.

Outside of the healthcare setting, patients reflected on the many lifestyle adaptations they made for themselves or experienced in the community. Patients perceived that they were able to adjust well during the COVID-19 outbreak. However, it was apparent that many of the reported lifestyle adaptations were poor substitutes. For instance, when residents were advised to remain indoors as much as possible during lock-down, many stopped exercising or if home-exercise was performed the intensity reduced. Some reported a loss of autonomy with families not wanting their senior parents [interviewees] to leave home or shop for themselves. Participants also mentioned a reduction in food choice (when home-cooking) or having to use fewer fresh ingredients due to stockpiling. COVID-19 related anxiety also appeared to play a role in how participants adapted their lifestyle. Many reported that they did not need to worry if they stayed at home, but this came at the cost of not socialising or exercising. While it is encouraging that patients were able to adapt their lifestyles, adoption of poorer habits are concerning. Effective disease control requires good self-management, as recognised in Wagner's chronic care model [9]. Patients with chronic disease must be supported to continue healthy self-management practices, even during disease outbreaks.

While our study has many strengths, the analysis was based on data from one institution, practices and patient experiences may be different depending on where care was received and may not reflect the whole of Singapore. We retrospectively extracted data from the clinic records, as such, not all variables of interest were available. Due to the duration of the study, we are also unable to comment on the long-term consequences of COVID-19 related changes in lifestyle and healthcare practices on disease control.

Conclusion

COVID-19 has caused profound changes to the delivery of routine healthcare for chronic disease patients, as well impacting everyday life. Through careful adoption of containment measures, greater collaboration with community partners and use of technology, continuation of routine outpatient services is feasible and desired by patients. Patients are adaptable to changes in clinic structure and many of the

service innovations have enhanced care beyond the pandemic. We also found adoption of poor lifestyle practices, emphasising the important role health care providers must play in continued self-management support. To prevent disease relapse, services must strive to innovate rather than suspend services during pandemics.

Abbreviations

COREQ: Consolidated criteria for Reporting Qualitative research

ICD: International Classification of Diseases

SD: Standard Deviation

Declarations

Ethics approval and consent to participate: The study was approved by the National Healthcare Group Domain Specific Review Board (NHG DSRB: 2020/00303). Each participant was informed about the study and signed a written informed consent form before the interviews.

Consent to publish: Not applicable. No identifiable participant data is present.

Availability of data and materials: The data are available from the corresponding author upon reasonable request.

Competing interests: The authors declare no conflict of interest.

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Author contributions: JS developed the original concept. JS, LSC and AB conducted the analysis. JS, LSC, AB, GG, AM, GG and YK contributed to interpretation of the data and writing of the manuscript. All authors read and approved the final manuscript.

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Supplementary Files

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- [Supplementalfile1Interviewguide.docx](#)