

Self-care Behaviours and Technology utilised during COVID-19: Systematic Review

Fareeya Jan Sakur, Kanesha Ward, Neha Nafees Khatri, Annie Y S Lau

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Fareeya Jan Sakur¹ BCom, MPH; Kanesha Ward² BClinSc, MRes; Neha Nafees Khatri² MBBS, MPH; Annie Y S Lau² BE, PhD

¹Australian Institute of Health Innovation Macquarie University, North Ryde AU

²Australian Institute of Health Innovation Macquarie University North Ryde AU

Corresponding Author:

Fareeya Jan Sakur BCom, MPH
Australian Institute of Health Innovation
Macquarie University,
75 Talavera Rd,
North Ryde
AU

Abstract

Background: Self-care behaviours are essential for people living with chronic conditions. However, the outbreak of the COVID-19 pandemic has imposed additional complications into their daily routines. Few studies have analysed how self-care behaviours have changed during COVID-19 and the role of digital technology, especially amongst people with chronic conditions.

Objective: This study aimed to review how self-care behaviours have changed for people with chronic conditions during the COVID-19 pandemic, and what technology they have adopted to manage their conditions during that period.

Methods: A systematic review was conducted using narrative synthesis. Data were extracted from PubMed, MEDLINE, Excerpta Medica database (EMBASE), PsycINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Google Scholar, included studies from December 2019 onwards. Eligible studies focused on adults diagnosed with chronic conditions undertaking any self-care tasks in line with the middle-range theory of self-care of chronic illness (i.e. self-care maintenance, monitoring, and management). Methodological quality of included articles were assessed with a modified version of McMaster Critical Review Forms for Quantitative or Qualitative studies.

Results: In total, 36 primary research articles were included. Changes to self-care behaviours during COVID-19 amongst people with chronic conditions were organised according to middle-range theory of self-care of chronic illness focusing on self-care maintenance (i.e. medication adherence, physical activity, diet control), self-care monitoring (i.e. monitoring signs and symptoms), and self-care management (i.e. consultations with health care providers). Positive self-care behaviours observed include: individuals trying to maintain good glycaemic control during COVID increased their medication adherence in 27% of studies, and diet control improved in 50% of studies. Negative self-care behaviours observed include: decline in physical activities and increased sedentariness observed in 65% of studies; poor diet control in 57% of studies, and self-monitoring of health status dropped in 43% of studies. Use of technology to support self-care of chronic conditions during COVID were reported in 26 studies. Actual utilisation of telehealth in place of physical consultations during COVID was observed in 50% of studies and other digital technology (e.g. social media apps, smartphone apps, online platforms, web browsing)were used in 50% of studies. Telehealth was discussed and recommended as the default technology in delivering future health care services during COVID-19 and beyond in 77% of studies.

Conclusions: The review highlighted the necessity to re-think how models of self-care should continue to address the demands of chronic conditions while being responsive to the imminent threats of infectious diseases. Perhaps the silver lining of COVID-19 is that adoption of digital technology (especially telehealth) amongst a vast cross-section of people with chronic conditions is possible. Future research should investigate effective ways to incorporate evidence-based digital health tools into these new models of self-care that address the challenges of chronic and infectious conditions.

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Original Manuscript



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Fareeya J Sakur¹, BCom, MPH; Kanesha Ward¹, BClinSc, MRes; Neha N Khatri¹, MBBS, MPH; Annie Y S Lau¹, BE, PhD

1. Centre for Health Informatics, Australian Institute of Health Innovation, Macquarie University, North Ryde, Australia.

Corresponding Author:

Fareeya Sakur, BCom, MPH

Centre of Health Informatics, Australian Institute of Health Innovation,
Macquarie University, Level 6, 75 Talavera Road, North Ryde, 2113
AUSTRALIA

Phone : 61 2 850 2400

Email: fareeya.sakur@hdr.mq.edu.au

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Results: In total, 36 primary research articles were included. Changes to self-care behaviours during COVID-19 amongst people with chronic conditions were organised according to the middle range theory of self-care of chronic illness focusing on self-care maintenance (i.e. medication adherence, physical activity, diet control), self-care monitoring (i.e. monitoring signs and symptoms), and self-care management (i.e. consultations with health care providers). Positive self-care behaviours observed include: individuals trying to maintain good glycaemic control during COVID-19 increased their medication adherence in 27% of studies; and diet control improved in 50% of studies. Negative self-care behaviours observed include: decline in physical activities and increased sedentariness observed in 65% of studies; poor diet control in 57% of studies, and self-monitoring of health status dropped in 43% of studies. Use of technology to support self-care of chronic conditions during COVID-19 was reported in 26 studies. The actual utilisation of telehealth in place of physical consultations during COVID-19 was observed in 50% of studies and other digital technologies (e.g. social media apps, smart phone apps, online platforms, web browsing) were used in 50% of studies. Telehealth was discussed and recommended as the default technology in delivering future health care services during COVID-19 and beyond in 77% of studies.

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Keywords:

self-care; self-management; chronic conditions; COVID-19; pandemic; technology; digital health; telehealth

Introduction

Chronic conditions are an ongoing cause of disability, ill-health and premature death worldwide and WHO defines chronic conditions as noncommunicable, of long duration and slow progression.[1] Self-care is essential for people with chronic conditions in order to maintain good control of their conditions.[2] People with chronic conditions need continuity of care to ensure their conditions are well-maintained.[3] However, the public health response to the pandemic (such as lockdown measures, ,social distancing) has significantly disrupted this continuity and thus, affected people with chronic conditions.[4-7]

People with major chronic conditions are not only at a higher risk of COVID-19 infection but also of worsening their chronic disease outcomes during the pandemic.[6-8] Clinical studies in the US and Italy undertaken on COVID-19 patients found the severity rates and death rates among patients with underlying chronic conditions were seven times higher than non-chronic condition patients.[8] From an individual perspective, self-care behaviours have been significantly affected during the pandemic. [5,10] People have had their in-person healthcare appointments converted to teleconsultations,[11] disruptions in their medication supplies,[12] interrupted access to investigative tests (e.g. blood tests) [13] barriers to physical activities,[14] imbalanced diets (e.g. disruptions in access to food sources) [15] routines and supplies to necessities disrupted, and many have experienced social isolation (e.g. not be able to see family and friends), anxiety and mental distress.[14]

The impact of the pandemic on self-care behaviours of people living with chronic conditions, was assessed in two rapid reviews conducted by Kendzerska et al. [2020] and Hartmann-Boyce and Mahtani [2020].[14,16]

To our knowledge, systematic review-based evidence on how chronic disease self-care behaviours have changed during COVID-19, and how people with chronic conditions have adopted the use of technological aids during COVID-19 to sustain their self-care behaviours remains lacking.

Objectives

In this study, we will undertake a systematic review to examine how self-care behaviours amongst people with chronic conditions have changed during COVID-19, and the role of digital technology in facilitating those changes. The research questions in this systematic review are: “How have s self-care behaviours amongst people with chronic conditions changed as a result of COVID-19” and “What technological aids have people with chronic conditions used (or adopted) for self-care during COVID-19?”

Methods

Materials and Methods

This systematic review was registered in the International Prospective Register of Systematic Reviews (PROSPERO) with the registration number CRD42021274000.

The review is in compliance with the PRISMA statement.[17] Details of the PRISMA checklist can be found in Appendix 1.

Search Strategy

A modified population, interventions, comparisons, and outcomes (PICO) strategy was used to search, with Population corresponding to “people with chronic conditions”; Intervention as the “self-

management of chronic conditions (and the use of technological aids) during COVID-19”; Comparison is described as “self-management (and the use of technological aids) before COVID-19”, and Outcomes are “changes in self-care behaviours and the use of technology”.

A search from March 6th to March 11th 2021, was conducted in PubMed, MEDLINE, Excerpta Medica database (EMBASE), PsycINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Google Scholar including all articles published from December 2019 onwards. Search terms were designed to capture publications on people living with chronic conditions, their self-care behaviours during COVID-19, and any use of technological aids.

Appendix 2 provides the complete search strategy.

Inclusion and Exclusion Criteria

Articles were eligible if they focused on adults diagnosed with chronic conditions (conditions that limits self-care, requires medical interventions and lasting more than 6 months); included a quantitative and/or qualitative component; focused on reporting self-care tasks during COVID-19, undertaken by people diagnosed with chronic conditions; and/or included use of technology in self-care of chronic conditions and published in the English language from December 2019 onwards.

Articles were excluded if they did not focus on people with chronic conditions (e.g. caregivers or care providers); if study was not COVID-19 related; were purely educational programs to improve self-management of chronic conditions; focused on technology only with no outcome measures; were protocol papers or opinion articles.

Appendix 3 provides the complete criteria.

Study Screening

Appendix 4 provides full details on abstracts, full-text screening, and data extraction. Each abstract was screened independently by 3 reviewers, disagreements were resolved by consensus, and full-text screening was undertaken by 1 reviewer.

Data extraction was led by 1 reviewer and a narrative synthesis was conducted to synthesis the findings of the studies. The 36 included articles were read in full and specific details on self-care behaviours were extracted and organised into the themes of physical control, medication adherence, diet control, monitoring health status and consultations with healthcare providers in a tabular form. Specific items on utilisation and recommendation of technology were extracted and summarised in a tabular form and presented in appendices.

Methodological Quality Assessment

The McMaster Critical Appraisal Tools for Quantitative Studies and Qualitative Studies was used. [53] Each individual component is rated as ‘yes’, ‘no’, ‘not addressed’ or ‘not applicable’. A score of ‘1’ was given to ‘yes’, ‘0’ to ‘no’ and ‘not-addressed’ while items rated as ‘not applicable’ were removed from the total score. Quantitative studies were assessed over eight main components including: study purpose, literature review, study design, sample, outcomes, intervention, results, and conclusions; with the maximum total score being 14. Qualitative studies were assessed over eight components including: study purpose, literature review, study design, sampling, data collection, data analysis, overall rigor, and conclusions; with the maximum total score being 22. Methodological quality score rating did not warrant exclusion of studies.

The results of the assessment of methodological quality are outlined in Appendix 5.

Theoretical Framework

The changes in self-care changes during COVID-19, and the technology utilised by people living

with chronic conditions were reported according to the middle range theory of self-care of chronic illness. This theory of self-care arose from clinical experience caring for persons with heart failure in 2012.[2] Self-care is described as the maintenance of health. A process undertaken through health promotion practices and management of health conditions that can be performed in a healthy or ill state.[2] The focus is on the following three key concepts: self-care maintenance, self-care monitoring, and self-care management.[2]

Figure 1. Middle range theory of self-care of chronic illness model is based upon three key arching concepts of self-care behaviours.[2]

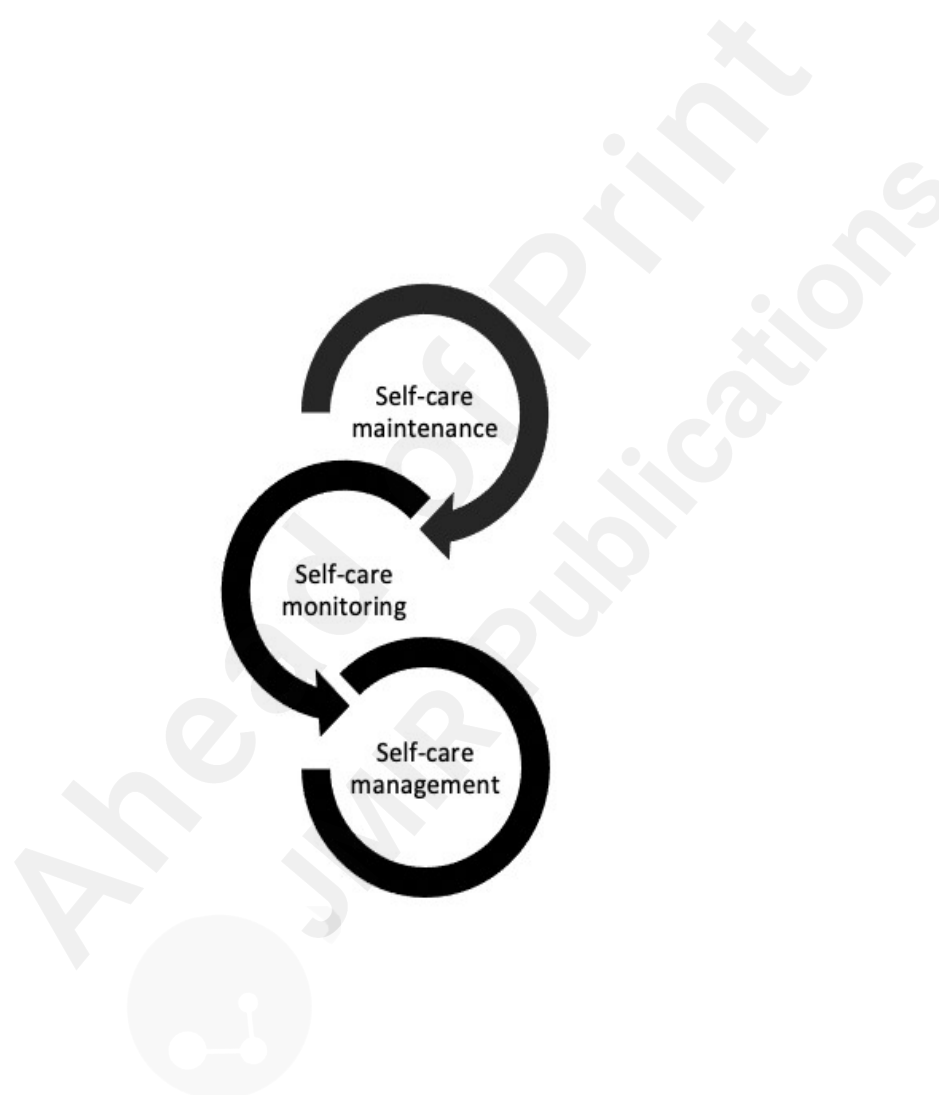


Table 1. The operational definitions and examples of the three key concepts of the middle-range theory of self-care of chronic illness.

Self-care behaviours	Definition	Examples
Self-care maintenance	Behaviours adopted by people to maintain physical and emotional stability for their chronic conditions. They can be strategies set by the individuals alone or based upon	Combining 15 mins of post-meal walking with 30 mins of

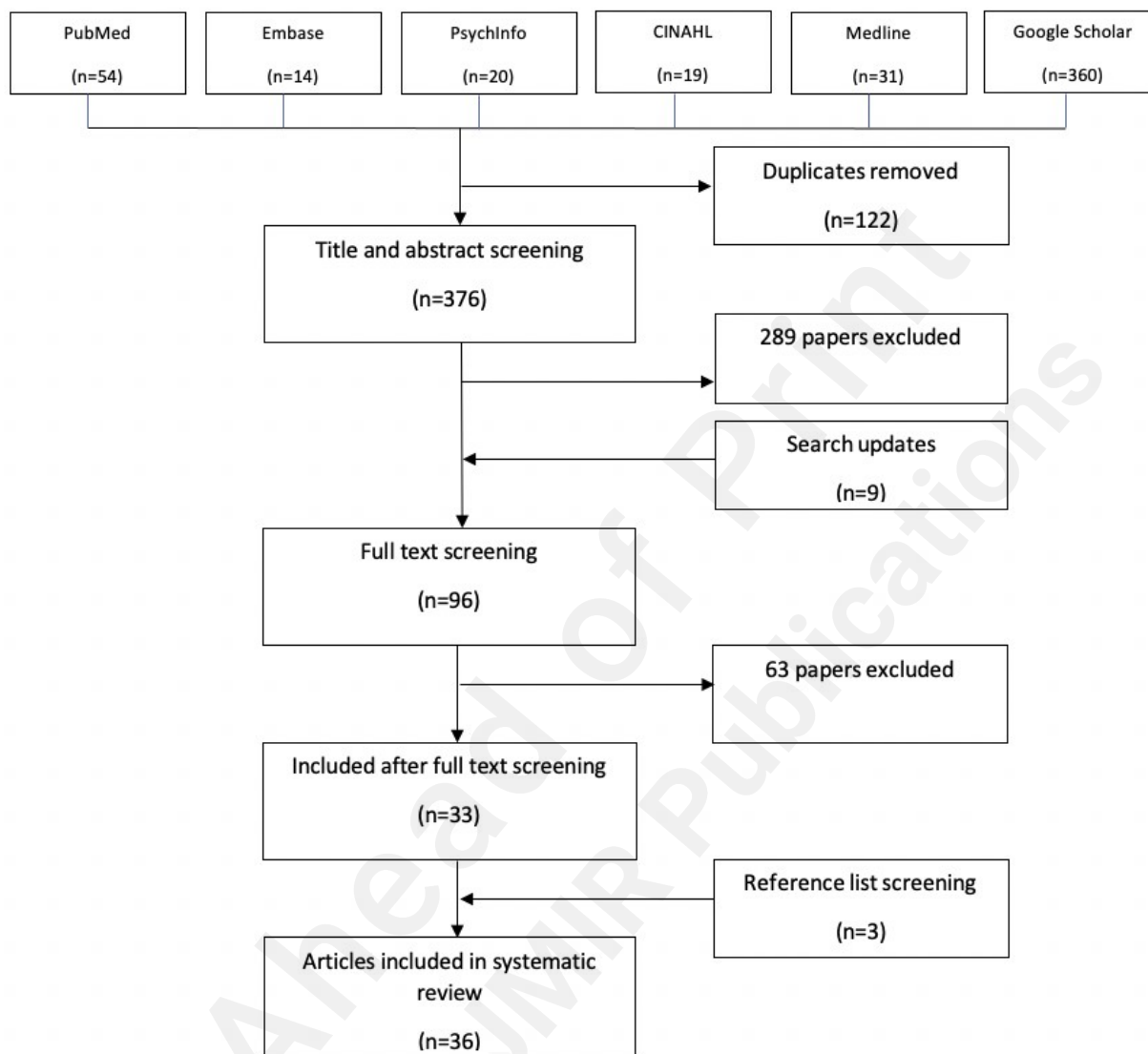
	recommendations determined between individuals and their health care providers. These behaviours can be related to lifestyle such as diet control, physical exercise and taking prescribed medications.[2,9]	resistance training.
Self-care monitoring	Is a process that involves routinely observing for changes in signs and symptoms with vigilance and acting accordingly.[2,9] It encompasses systematic and routine monitoring. Individuals that are skilled in monitoring their symptoms and communicating it to their health support team help produce the best health outcomes.[2,9]	Checking their blood glucose levels daily.
Self-care management	Evaluating changes in signs and symptoms (from both emotional and physical wellbeing perspectives) that are present due to sickness, treatments undertaken, or the environment. If a response is needed, then a treatment plan can be sought, implemented and evaluated. The efficacy of the treatment plan in achieving the desired health outcomes is assessed on an ongoing basis, between the individual and their healthcare team. [2,9]	During monitoring, if blood glucose levels are elevated, then a treatment plan can be set in consultations with the health care provider.

Results

Screening process

The database search retrieved 498 publications and 122 duplicates were removed. After title and abstract screening 289 publications were removed. Search updates led to 9 publications been included in the screening. After full text screening 63 publications were excluded, leaving 33 included articles. A further 3 articles were identified by searching the reference lists of included articles. The entire screening process concluded with the inclusion of 36 original research publications.

The literature selection process is outlined in Figure 2. Appendix 4 provides more details about the screening process

Figure 2. Number of articles included at each stage of the screening process.

Characteristics of Included Articles

Thirty-six original research publications were included in the systematic review. The most common research strategy employed was semi-structured online interviews. The majority of studies were conducted in India (n=10), followed by UK (n=5), USA and Brazil (n=4), Spain (n=3), Hong Kong, and Arab states (n=2), and Pakistan, Israel, Denmark, Poland, Canada, Saudi Arabia, Australia (n=1).

Over 28 health conditions were studied in the included articles, these included: diabetes mellitus (n=26), hypertension (n=8), cancer (n=7), cardiovascular diseases (n=6), chronic heart diseases (n=6), respiratory conditions (n= 6), chronic kidney diseases (n=5) and chronic obstructive pulmonary disease (n=4).

The different health conditions included in the articles are further outlined in Appendix 6. The conditions most frequently stated in included studies are diabetes mellitus (n=26), hypertension (n =8) and cancer (n= 7).

The self-care behaviours included in the articles are provided in Appendix 7. Technology stated in included articles are outlined in Appendix 8. Appendix 9 provides more information on the included articles.

Table 2. Characteristics of included articles



Year	Medical condition(s)	Technology	Size	Sample	Age	Gender	Nationality
2020	Type 2 diabetes mellitus and one comorbidity	Not stated	394	20-60+	169:225		Saudi Arabia
2020	Type 2 diabetes mellitus	Support platforms	2510	54	1310:1200		India
2021	Diabetes mellitus	Not stated	108	56.3	60:48		India
2020	Diabetes mellitus and other NCDs	Telehealth	1562	18-80+	371:1189		Brazil
2020	Multimorbidity	Not stated	6149	50-80+	N/A		Brazil
2020	Cardiometabolic, autoimmune, respiratory and cancer	Telehealth	342	45-64	643:293,		USA
2020	Hypertension, diabetes cardiovascular diseases and hyperlipidaemia	Telehealth	765	18-64	N/A		Hong Kong
2020	Hypertension, diabetes, cardiovascular disease, cancer and other diseases	Not stated	249	64	N/A		Brazil
2020	Cardiovascular, cancer, Mental health, metabolic, chronic diseases and other diseases	Social media platforms	315	18-85+	402:624		Israel
2020	Diabetes, chronic respiratory diseases, chronic heart diseases and chronic kidney diseases	Telehealth	1038	54.6	402:624		UK
2020	Colon or rectal cancer	Online platforms	30	72.1	13:17		Canada
2021	Inflammatory rheumatic diseases, associated comorbidities, lung diseases,	Telehealth	12789	39-80+	4423:8366		Denmark

Medical condition(s)	Technology	Size	Sample	Age	Gender	Nationality	Study author(s)
Diabetes mellitus	Not stated	124	23	21:103	Poland		Alshareef et al.
Hypertension hyperlipidemia asthma, migraine, cancer, Type 2 diabetes, respiratory conditions	Telehealth	2210	55+	424:1781	USA		Anjana et al.
2 or more chronic conditions (diabetes, cancer, musculoskeletal issues and mental health)	Telehealth	30	54 & 88	13:17	Australia		Bala et al.
Type 1, type 2 and gestational diabetes and comorbidities	Telehealth	1510	41.6	own: 4963:543,	India		Barone et al.
Diabetes mellitus	Not stated	343	55	233:110	India		Batista et al.
Obesity, hypertension, varicose veins of lower extremities, chronic bronchitis, diabetes type 2 and other diseases	Not stated	163	18-64	47:113	Spain		Burton et al.
Epilepsy	l apps/platformsTelehealth	94	36	47:47	USA		Chan et al.
Chronic pain	Telehealth	14535	41.7	own: 7498:968,	USA		da Silva et al.
Diabetes, kidney disease and heart disease	Not stated	100	65+	54:46	India		Elran-Barak & Mozeikov
Chronic pain: musculoskeletal, headache and orofacial, neuropathic visceral, cancer,	Web browsing	502	18-89	60:442	Spain		Flint et al.
Diabetes mellitus	Telehealth	350	57	274:76	India		Galica et al.
Type 1 diabetes mellitus	platformsOnline platforms	30	22.8	8:7 (ratio)	India		Glintborg et al.
Diabetes, cancer, chronic lung diseases, chronic heart disease, chronic kidney disease and other diseases	Telehealth	600	55	295:305	India		

Technology	Sample size	Age (years)	Gender	Nationality	Study author(s)	Year
Telehealth services	9515	17-80+	2953:6562	UK	Grabia et al.	2020
Telehealth	100	68	76:24	Spain	Javanparast et al.	2021
Online platforms	9190	35 & 69	1914:7143, Unknown: 133	UK	Khader et al.	2020
Not stated	181	18-55+	109:72	Pakistan	Kovil et al.	2020
Telehealth	773	47.9	249:516, Unknown: 4	UK	López-Sánchez et al.	2021
Telehealth	1734	57.8	861:873	India	Miller et al.	2020
Apps/platforms	41	56.3	25:16	India	Mun et al.	2021
Telehealth	1406	18+	N/A	India	Nachimuthu et al.	2020
Telehealth	463	N/A	217:246	UK	Nieto et al.	2020
Telehealth	583	70.9	160:423	Hong Kong	Olickal et al.	2020
Media platforms	2163	40	217:1564	15 Arab Countries	Pal et al.	2021
Telehealth					Pati et al.	2021

Study author(s)	Year	Medical condition(s)
Philip et al.	2020	Long-term respiratory conditions, chronic obstructive pulmonary diseases, bronchiectasis, interstitial lung disease and other diseases.
Pleguezuelos et al.	2020	Chronic obstructive pulmonary disease
Rogers et al.	2020	Type 2 diabetes, lung disease, cancer, stroke, heart diseases, obesity and hypertension
Saqib et al.	2020	Diabetes, mental health, hypertension and more than one chronic condition
Sauchelli et al.	2021	Type 1 and type 2 diabetes
Singh et al.	2021	Diabetes mellitus, hypertension, cardiovascular disease, chronic kidney disease and chronic obstructive pulmonary disease
Singh et al.	2021	Diabetes mellitus, hypertension, heart disease, chronic kidney disease, stroke, chronic obstructive pulmonary disease, anxiety/depression
Tiwari et al.	2020	Type 2 diabetes
Thorpe et al.	2021	Epilepsy, diabetes, heart conditions, respiratory conditions and mental health
Wong et al.	2020	Diabetes, cardiovascular and respiratory conditions, depression, and anxiety disorders
Ziadé et al.	2020	Chronic rheumatic diseases

Self-care behaviours adopted by participants

People living with chronic conditions are embodied with the responsibility for their daily care and actively engage in tasks essential for long term management of their conditions.[2,9]

Self-care behaviours observed in included studies are organised according to the middle range theory of self-care of chronic illness. These include self-care maintenance (i.e. medication adherence, physical activity, diet control), self-care monitoring (i.e. monitoring signs and symptoms), and self-care management (i.e. consultations with health care providers). Technology reported in these studies was organised according to technology utilised for self-care during COVID-19 and technology recommended for self-care during and beyond COVID-19. Results of self-care behaviours found in included articles are illustrated in table 3.

Table 3. Results of included articles (n=36)

Self-care behaviours	Increase reported in studies		Decrease reported in studies	
	(n)	(%)	(n)	(%)
Self-care maintenance				
(Medication adherence (n=15))	4	27	8	53
Physical activities (n= 20)	7	35	13	65
Diet control (n=14)	7	50	8	57
Self-care monitoring				
Self-monitoring of signs and symptoms (n=7)	4	57	3	43
Self-care management				
Consultations with healthcare providers (n=23)	13*	57	23	100
<i>(Replaced with telehealth)*</i>				

Expanded results of self-care behaviours and technology adopted /recommended in included articles are outlined in Appendix 10

Self-care maintenance

Medication adherence

Fifteen studies reported on medication adherence during COVID-19.[18, 19, 21, 22, 25, 29, 33, 36, 39, 41, 43, 48, 49, 50, 52]. Increase in medication adherence among participants trying to maintain good glycemic control during the pandemic was reported in 27 % [18, 19, 29, 33] of the 15 studies. Participants had difficulties in sourcing medication due to supply shortages in 53% [22, 21, 25, 36, 41, 48, 49, 52] of studies with people in rural areas faring worse.[48]

In one study, participants reported lower levels of medication adherence due to store closures, fears of contacting the virus if they went outside, and difficulties in purchasing caused by financial constraints due to job losses.[49] Few studies reported on difficulties in obtaining prescription renewals among participants due to cancellations of physical consultations. Telehealth was used in some studies for prescription renewals with health care professionals.[36, 43, 52]

Physical Activities (PA)

Twenty studies reported on PA during the pandemic.[18, 20, 21, 26, 27, 28, 30, 33, 34, 35, 37, 38, 39, 41, 43, 44, 45, 46, 47, 48] 35% [20, 34, 37, 38, 43, 44, 45] of the 20 studies reported on continual or increase in PA among participants in their studies. Disruptions in routines, fears of going outdoors, lack of motivation and increased anxiety and stress during COVID-19 led to decline in PA in 65% [18, 21, 26, 27, 28, 30, 33, 35, 39, 41, 46, 47, 48] of the 20 studies.

Participants in a study that measured PA exclusively [26] reported that 71.5% of Brazilian adults were not meeting the minimum PA recommendations. The study revealed that increasing age and multimorbidity had a positive association with increased sedentary risk during the pandemic.

Diet control

Fourteen studies reported on dietary habits during the pandemic.[18, 19, 20, 21, 27, 30, 33, 34, 38, 40, 41, 47, 48, 49] 50% [19, 20, 21, 30, 34, 38, 40] of the 14 studies reported improved diet management among their participants by reason of increased time availability, with more meals prepared at home and lockdown restrictions limiting takeaway consumptions among participants.

There was an association between better diet control and improved glycemic control reported among participants. [19, 20, 30, 34, 38, 40] Poor diet control was found in 57% [18, 21, 27, 33, 41, 47, 48, 49] of the 14 studies with participants reducing their consumption of fresh fruit and vegetables due to; unavailability with disruptions to supplies and reduced frequency in shopping to minimise exposure during the pandemic. Increase in unhealthy food consumption was due to multiple factors; more sedentary time at home and changes in mood including lack of motivation, boredom, increased anxiety, and stress.

Self-care monitoring

Self-monitoring of signs and symptoms

Seven studies reported on participants monitoring their diabetes mellitus. [18, 19, 20, 30, 33, 34, 38] Regular compliance or increase in monitoring of blood glucose levels during the pandemic among participants was found in 57% [18, 19, 30, 33] of the 7 studies. Decline in monitoring of blood glucose levels among participants were due to difficulties in sourcing testing strips and lack of knowledge barriers in 43% [20, 34, 38] of 7 studies.[20]

Self-care management

Consultations with health care providers

All twenty-three studies that examined access to health care providers during the pandemic found disruptions to health care services, with postponement or cancellations of consultations noted among their participants.[19, 21, 22, 23, 25, 29, 31, 32, 33, 36, 37, 41, 42, 43, 44, 46, 47, 48, 49, 50, 51, 52, 60] In the 23 studies that reported on access to health care providers, 57% [19, 21, 24, 28, 29, 32, 33, 40, 44, 48, 50, 52, 60] of these studies revealed participants utilised telehealth services in place of physical consultations with their health care team. 13% [22, 37, 47] of studies found that difficulties in accessing health care services during the pandemic then led to issues with glycemic

control among the individuals. Results of technology utilised in included studies in are illustrated in table 4



Technology

Table 4. Use of technology for self-care of chronic conditions in included studies (n=26)

Technology	Reported in studies	
	(n)	(%)
Telehealth utilised during COVID among participants	13	50
Other digital technology (television, social media apps, smart phone apps, online digital health tools, online platforms, web browsing)	13	50
Role of telehealth discussed and recommended	20	77

Technological aids utilised

Twenty-six studies discussed the role of technology during COVID-19 to support individuals' self-care of chronic conditions.[19, 21, 22, 24, 25, 27, 28, 29, 31, 32, 33, 36, 37, 39, 40, 41, 42, 43, 44, 45, 47, 48, 50, 51, 52, 60] 50% [19, 21, 24, 28, 29, 32, 33, 40, 44, 48, 50, 52, 60] of the 26 studies reported on the usage of telehealth, due to in-person consultations been replaced with telephone or video consultations. Participants used telehealth for prescription renewals, test results discussion or simple follow-ups. Majority of participants in these studies [19, 21, 24, 28, 29, 32, 33, 40, 44, 48, 50, 52, 60] expressed it allowed continuity of care for them during the pandemic, and the support helped them maintain their self-care behaviours and that they would continue using it in the future.

Use of television, social media apps, smart phone apps, online digital health tools, online platforms and web browsing was found in 50% [19, 21, 24, 27, 31, 28, 39, 41, 43, 45, 48, 52, 60] of the 26 studies. One [28] reported people living with diabetes and liver disease were the highest users of social media, while video consultations were mostly used by people living with chronic liver diseases and neurological conditions in their population sample.

The role of telehealth was discussed and recommended in the future delivery of health care services

in 77% [19, 21, 22, 24, 25, 28, 32, 33, 36, 37, 39, 40, 42, 44, 47, 48, 50, 51, 52, 60] of the 26 studies especially for people living in rural areas [40, 42]. According to one study [31] effective intervention strategies are needed, to improve digital literacy among elderly people living with chronic conditions to facilitate their participation and presence in digital health.

Telehealth was the most utilised technology, followed social media apps (Facebook), Messaging apps (WhatsApp, Messenger, and WeChat), online platforms for education and exercise (YouTube and online exercise platforms) and web browsing (Google).

Appendix 11 provides details on types of technology utilised and/or recommended in the included articles.

Discussions

Principal findings

To our knowledge, this is the first systematic review of changes in self-care behaviours in people with chronic conditions and the technological aids they adopted in managing their conditions during COVID-19.

The purpose of this systematic review was to analyse the existing literature on how self-care behaviours have changed during COVID-19, and the range of technology adopted by people with chronic conditions in managing their conditions during the pandemic. Our results indicate that the lives of people with chronic conditions were altered by the course of measures imposed to contain the spread of COVID-19, with disruptions to their daily routines challenging their self-care behaviours. The lockdown resulted in both favourable and unfavourable changes in self-care behaviours which could have short- and long-term effects on health.

Positive self-care behaviours that resulted from the lockdown were found among individuals motivated to keep good glycemic control, and those who maintained or increased their medication adherence during COVID-19. Improved diet control resulted from an increase in home cooking, consumption of less takeaways and timely meals. Cancelled physical consultations were replaced with telehealth to allow continuity of health care services.

Negative self-care behaviours that resulted from the lockdown were from fluctuations in medical supplies, difficulties in sourcing prescriptions and financial constraints impacting medication adherence. Reduction in fresh produce consumption due to supply issues and lack of motivation lead to poor diet control. Significant decline in physical activities and increased sedentariness was found among participants in most studies during lockdown. In-person visits for routine consultations were postponed or cancelled. Access to health care services was facilitated by telehealth through phone or video consultations to allow continuity of care during the pandemic. However, in some developing countries proactive reach out to people with chronic diseases during the pandemic with telehealth was rare.[20, 23, 26, 38, 46, 49]

The role of technology in the home setting to manage chronic conditions remains low with telehealth being the most frequently utilised technology during COVID-19, followed by internet browsing, social media platforms and messaging apps. There is a lack of studies focusing on the effects of eHealth, mHealth and health apps in the delivery of health care services or management of self-care during COVID-19, which presents an opportunity for future research in this area.

Strengths and Limitations

This review has several strengths. We developed and followed a rigorous and predefined protocol that was registered with PROSPERO database at the beginning of the study. To ensure sensitivity and specificity, we did an extensive search strategy of literature with the help of a clinical librarian. Eligibility criteria was objectively stated and applied in the screening of each article by three independent reviewers and there was substantial agreement with the full text screening results.

There were some limitations in the review, as only articles published in English were included as we did not have access to studies in other languages. The use of validated instruments to measure the effect of COVID-19 public health measures on self-care behaviours across all studies was limited. The review focused only on self-care behaviours undertaken by people living with chronic conditions, leaving out the caregiver's role in managing self-care. Only four studies used qualitative approaches and there is a need to increase the use of qualitative methodology in self-care research, to gain more insights or context on the circumstances involved.

It is important to note that search of databases used search keywords as chronic conditions, multimorbidity and not the exact diagnosis terms which may result in excluding articles that use exact diagnosis terms (e.g., diabetes, cardiovascular). The majority of studies examined technology that will enable communications with people with chronic conditions and their health care provider. However, the use of other digital tools that help in monitoring and providing aids in managing their conditions was limited. There is a need for further research on the use of other types of technology and how it was utilised in the management of self-care in the home environment.

Comparison With Existing Literature

A recent review focusing on lifestyle changes during COVID-19,[56] found increased consumption of unhealthy food and decline in physical activities across various populations groups. The utilisation of telehealth was widespread, and the review proposed the use of virtual networks in the future delivery of healthcare services which is in line with our findings.

Kendzierska et al.[2021] focused on chronic disease management in the primary and speciality care settings. There were concerns that medicine shortages during COVID-19 and decline in physical activity found among people with chronic conditions could exacerbate their conditions. Implementation of telemedicine during the pandemic outbreak has been associated with many barriers especially among elderly patients with digital literacy being a common issue, as we observed in our included study.[14]

Most reviews on people with chronic conditions during the pandemic analysed the prevalence of chronic conditions in patients diagnosed with COVID-19 and the adverse clinical outcomes associated with the population group. Increased age and underlying chronic conditions were the strongest predictors of longer hospitalisations or mortality rates among patients diagnosed with COVID-19.[57, 58, 59]

In our review the lived experiences of people with chronic conditions and how they managed their self-care behaviours during the pandemic were examined, and the role of digital technology in facilitating it.

Implications

The COVID-19 experience provides an opportunity to rethink what worked and did not during the pandemic, and to better prepare for future pandemics or health threats.

Key Implications One: Self-care behaviours

The evidence from this review shows that certain groups of people with chronic conditions, managed to improve or continue with their self-care behaviours amid the pandemic while others struggled to manage it. There is a need for in-depth study on how certain population groups were able to maintain this behaviour and the coping strategies they adopted.

These findings can be drawn upon to enhance current self-care interventions to further empower and support these individuals in sustaining their self-care capabilities. It can help individuals to independently cope with self-care behaviours and maintain positive health outcomes, particularly in circumstances when health care resources are redirected towards infectious disease control.

Further research is required upon on why certain individuals failed to engage in effective self-care behaviours during COVID-19. The factors or barriers that affected this adverse behaviour needs to be investigated. The findings can be used to develop successful strategies or interventions, to reinforce better health-promoting behaviours and increased adherence to self-care behaviours among this population group. As the experiences of COVID-19, have shown how integral self-care is in chronic conditions management. The health care system should use this opportunity to work on a systemic approach to tackle health inequities and incorporate self-care management into the fabric of health care services. Health care professionals also need to evaluate how able individuals are in understanding the information on self-care behaviours provided to them, and their capability to engage in self-care independently.

Hence, health care professionals should tailor self-care advice and planning to the individual's level of understanding, their capacity, and the context they are in to be effective and sustainable long-term.

Key Implications Two: Digital technology adoption

The COVID-19 outbreak has changed the conversation on digital interventions in health care services. The rapid adoption of telehealth, and the tidal of acceptance by individuals and health care providers in delivery of healthcare services, has led to telehealth emerging as the silver lining of the pandemic. It has re-envisioned chronic care management and opened up opportunities of utilising evidence-based digital health interventions, that can promote and support self-care capabilities among people with chronic conditions now, and in any future public health crisis.

The reassignment of the health care resources during COVID-19 on prioritising communicable diseases care, severely disrupted chronic care management with cancelled or postponed health care services. This led to a backlog of routine services and a decline in screening and preventive care that could later exacerbate health risks and strain the health care system. Care pathways need to be reconfigured to allow new models of health care to treat both communicable and chronic diseases continuously. Embedding and accelerating digital changes in chronic care management can instigate individuals and health care providers to work on solutions that allow chronic care management to be maintained alongside communicable diseases in future pandemics or health threats. Future digital health interventions should consider the influence of family and friends in the health management of people with chronic condition. They play a major role in supporting or assisting individuals with making daily decisions about medications, symptoms management, helping coordinate health care services and facilitate healthy behaviour changes. It is important that newer digital health interventions recognise and provide digital solutions for all members of the individual care team for optimal health outcomes.

There is a lack of research on vulnerable populations groups (i.e. elderly, indigenous communities and disabilities groups) who are at a greater risk from COVID-19 and associated population health implications. These population groups must be the focus of future studies, with evaluations of their

lived experiences of self-managing their chronic conditions and utilisation of technology during COVID-19. Any disparities identified in access, digital literacy and equity should be appropriately addressed. The lessons of the pandemic should not be lost; they should be used to build new approaches in chronic self-management.

Conclusions

This review provided insights into how people with chronic conditions managed their self-care behaviours during COVID-19, and the types of technology utilised during that period. In our systematic review, we found that the measures imposed to mitigate the spread of COVID-19 virus did have an impact on people with chronic conditions and their self-care capabilities, resulting in decline of physical activities and self-monitoring of signs and symptoms, increase in unhealthy food consumption, and difficulties in medication adherence.

There are concerns that if these negative self-care behaviours are sustained post-pandemic, they could lead to further health complications among people with underlying chronic conditions and burden the over-stretched health care system.

The lived experiences of COVID-19 should become a catalyst for adoption of a new model for health care, that is flexible to respond to both chronic and infectious diseases. It should recognise and have measures in place to support and enhance self-care capabilities among people with underlying chronic conditions during the pandemic and for future health threats. The use of digital technology (telehealth, online platforms, and messaging apps) connected individuals to health care services and changed the way they receive care during the pandemic. This highlights the need for further research into incorporating and leveraging evidence-based digital health tools into newer models of healthcare that can engage and motivate individuals in the effective management of their self-care behaviours and allow continuity of healthcare services in any situation.

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Authors Contributions

FS designed the study, developed the search strategy, conducted the searches, screened the retrieved papers, extracted relevant information, and drafted the paper as the first author. UR, KW and NK contributed towards screening. AL contributed throughout the paper starting from conceptualisation to editing subsequent drafts of the paper.

Conflicts of Interests

The authors would like to declare no conflicts of interest.

Appendices:

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PRISMA 2020 checklist.

Multimedia Appendix 2

Search strategy.

Multimedia Appendix 3

Inclusion and exclusion criteria.

Multimedia Appendix 4

Search and screening process.

Multimedia Appendix 5

Methodological quality assessment.

Multimedia Appendix 6

Health conditions stated in included studies

Multimedia Appendix 7

Self-care behaviours included in the studies

Multimedia Appendix 8

Technology stated in included studies.

Multimedia Appendix 9

Characteristics (original research articles).

Multimedia Appendix 10

Results.

Multimedia Appendix 11

Technology utilised and recommended.

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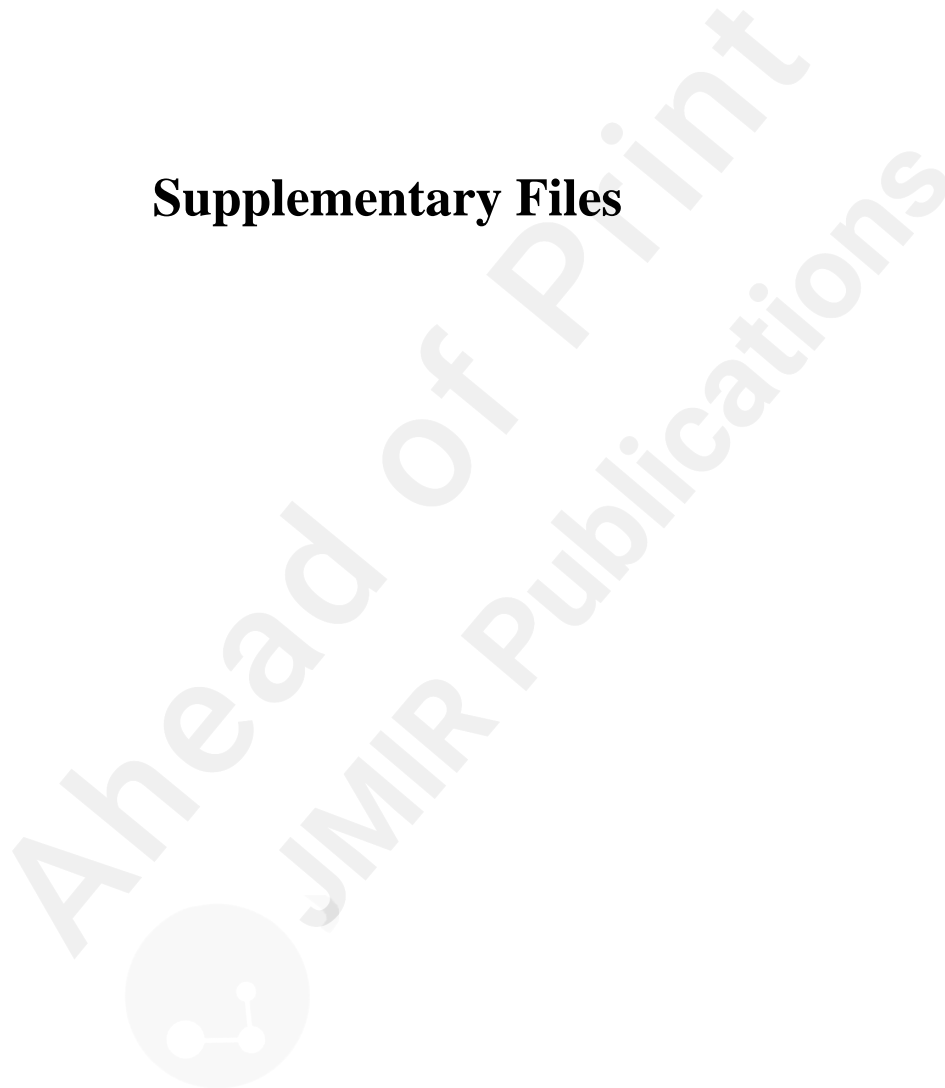
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Supplementary Files



Multimedia Appendixes

PRISMA 2020 checklist.

URL: <http://asset.jmir.pub/assets/466bb048be78764e942a11a5018c6cac.docx>

Search strategy.

URL: <http://asset.jmir.pub/assets/bedcf7eb2d6fe3f75d582304a1a18b18.docx>

Inclusion and Exclusion criteria.

URL: <http://asset.jmir.pub/assets/d110d13807ec6caa13918fe4ac6e2eb6.docx>

Search and screening process.

URL: <http://asset.jmir.pub/assets/f35025364b408a39f48d98e44c813b6d.docx>

Methodological quality assessment.

URL: <http://asset.jmir.pub/assets/f3788aa12d7c24618f88a3b5741ce86c.docx>

Health conditions stated in included studies.

URL: <http://asset.jmir.pub/assets/986b9d6abe434beb46f82893a6180e31.docx>

Self-care behaviours included in the studies.

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Technology stated in included studies.

URL: <http://asset.jmir.pub/assets/385bed2927c8d793aaa3f08750ab1e04.docx>

Characteristics of included studies.

URL: <http://asset.jmir.pub/assets/41e0b3a4c42dd43c2c5ea9859c485d79.docx>

Results.

URL: <http://asset.jmir.pub/assets/f8e0b7babe41d13611a7222d77006440.docx>

Technology utilised and recommended.

URL: <http://asset.jmir.pub/assets/942dd26188ec33c3062936c30cdc27b9.docx>