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Survey-reported medication changes among older adults during the SARS-CoV-2 (COVID-19) pandemic

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ABSTRACT

Background: Speculation on benefits and harms of prescription, over-the-counter and complementary medications has been widespread during the SARS-CoV-2 (or COVID-19) pandemic. This community-based survey assessed self-reported changes in medications including those stopped, started, or if access had been impacted. **Methods:** A survey was collected via Research Electronic Data Capture (REDCap). The survey was advertised in the community through social media, email lists, websites, and post-cards. Survey responses were collected between 5/21/2020 and 6/24/2020. Variables included demographic characteristics such as age, sex, race, marital status, education, employment, income, and community type. Questions related to medication changes included: “Have you started any medication due to COVID-19?”, “Have you stopped any medication due to COVID-19?” and “Have you had issues getting your prescription medications?”. Respondents aged 50 years or older were included.

Results: There were N = 1397 responses of which 1169 were older adults ≥ 50 years-old. Of these, 1141 responded to the medication changes survey questions and 28 had missing responses and were excluded from the survey sample for this analysis. Among these, 31 (2.7%) reported a medication change included 5 (0.4%) reported stopping a medication, 18 (1.6%) reported starting a medication, and 8 (0.7%) reported trouble obtaining medications. Medications started included mostly vitamins or other supplements including zinc (n = 9), vitamin C (6), and other supplements (3). Among prescription medications, antidepressants and anti-anxiety medications (4) were reported as well as aspirin (1), losartan (1), and low dose naltrexone (1). One respondent reported unidentified homeopathy. There were no significant differences between those with medication changes and those with none.

Conclusions: In this community-based survey sample of over one thousand older adults, only a small percentage (2.7%; n = 31) reported any changes to medications during the pandemic. As essential workers during this crisis, pharmacists have played a critical role in providing medication information and continued access.

Introduction

How common medications may influence an individual’s risk of infection or disease severity has remained an underlying theme during the SARS-CoV-2 (or COVID-19) pandemic.^{1,2} Many conventional prescription and over-the-counter medications, dietary supplements, and vitamins have been discussed as preventative or curative options for COVID-19. Conversely, many medications have also been implicated as contributing to the risk of infection and disease severity. Hypotheses on how these effects occur relate to potential viral targets, pharmacological properties, and other associations found in observational studies have

led to intense attention for certain medications. These medications include, among others, ibuprofen, renin-aldosterone system antagonists, hydroxychloroquine, azithromycin, and zinc. These benefits and harms, whether true or not, have been widely discussed, debated, and politicized across lay and social media. At the same time, there has been a persistent concern over continuity of medication supplies in pharmacies and interruptions in access to medical care.³

Media headlines of peer-reviewed or pre-print scientific studies led to increasing public awareness of several of these unfounded claims and hypotheses about how medications may impact risk of COVID-19. There has been growing concern among the medical community related to

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changes in patient medication taking behaviors including inherent risks of stopping or starting medications. These concerns could be considered particularly high among older adults who greatly depend on medications and who are at much higher risk of infection and poor outcomes related to medication mismanagement and COVID-19. Understanding these dynamics can be informative in practice settings to influence how patient concerns are addressed. In order to understand the scope of changes in medication use during the pandemic, a community-based online survey was developed and distributed. The survey aimed to understand the prevalence of changes in medication use and to associate the changes with demographic, social, and clinical characteristics among survey respondents ≥ 50 years of age.

Methods

The survey was developed by researchers at the University of Florida and was posted on the National Institutes of Health Repository of COVID-19 Research Tools (<https://dr2.nlm.nih.gov/>) that gives access to access to COVID-19 related data collection tools. The full survey is also included in Supplementary Material. Questions were either populated in their exact form from existing questionnaires (e.g. from the Patient-Reported Outcomes Measurement Information System) or modified to appropriately fit the COVID-19 pandemic. The purpose of the survey was to understand changes in behaviors, social activities, health care and medication use, food security, depression, technology/telehealth utilization, and mobility patterns during the COVID-19 pandemic.

The online survey was self-administered and taken on a voluntary basis. It was distributed via the University of Florida Research Electronic Data Capture (REDCap) secure system. The survey was advertised through social media, email lists, websites, and in health articles released by UFHealth. Additionally, a marketing list was purchased with addresses of adults 60+ years of age to increase responses from older adults. Direct mail post-cards (70,000) that advertised the online survey were sent the second week of May 2020. The first response was on 5/21/2020 and the last response was on 6/24/2020. The University of Florida Institutional Review Board approved the study as exempt.

This report specifically focuses on medication changes. Questions related to medication changes included: “Have you started any medication due to COVID-19”, “Have you stopped any medication due to COVID-19” and “Have you had issues getting your prescription medications.” These three questions were coded as binary responses and combined into an overall stratified group for those who had changes in their medications and those that did not. Free text answers were collected after the “started/stopped” questions and these responses were described. Individual medications names were not collected for the “issues getting” medications as the aim was to identify any issues, not specific medications.

Included variables were those related to demographic characteristics such as age, sex, race, marital status, education, employment, income, and community type. Health related questions included self-rated health and presence of selected comorbid conditions associated with COVID-19. Specific COVID-19 related questions included if the respondent had tested positive for the novel coronavirus or if they knew someone who had tested positive. Additional questions also asked about consumption of media coverage and use of social media during the pandemic. Each characteristic was stratified by medication change groups described above and chi-squared or Fisher’s exact tests evaluated the distributions of these variables between these two groups. All analyses were conducted in SAS Enterprise Guide v7.1.

Results

There were $N = 1397$ responses of which 1169 were older adults ≥ 50 years-old. Nearly 50% (576) of respondents were from the Alachua County, FL and surrounding areas and 33% (380) from the Daytona

Beach, FL and surrounding areas. Only 51 (4.4%) of respondents were outside the state of Florida. Due to the multiple means of survey distribution, a response rate was not calculated.

Of these, 1141 responded to the medication changes survey questions and 28 had missing responses and were excluded from the survey sample for this analysis. Among these, 31 (2.7%) reported a medication change included 5 (0.4%) reported stopping a medication, 18 (1.6%) reported starting a medication, and 8 (0.7%) reported trouble obtaining medications (Table 1). These respondents were mutually exclusive. Among medications reported to be stopped, four respondents implicated ibuprofen and one fluticasone nasal spray. Medications started included mostly vitamins or other supplements including zinc ($n = 9$), vitamin C (6), and other supplements (3). Among prescription medications, antidepressants and anti-anxiety medications (4) were reported as well as aspirin (1), losartan (1), and low dose naltrexone (1). One respondent reported unidentified homeopathy.

Those with changes to their medications were overall similar to those without any changes and no variables were significantly different between these groups (Table 2). The mean age was 73 in both groups with most White (93–94%) and 77–78% of the sample reported “good, very good, or excellent” overall health. The sample was characteristic of the local community including a majority of respondents having post-graduate education, high income, and residing in a small city or suburb. There were no clear associations between those with medication changes and comorbid conditions, media consumption, or social media use (Table 2).

Discussion

In this community-based survey sample of over one thousand older adults, only a small percentage (2.7%; $n = 31$) reported any changes to medications during the pandemic. There were no clear associations between these changes and demographic, clinical, or social characteristics. The majority of reported changes to medications involved starting new medications which included mostly use of new vitamins and supplements like zinc and vitamin C. The reported changes to prescription or over-the-counter medications included increased use of antidepressant or anti-anxiety medications and decreased use of ibuprofen. Eight of the 31 respondents reported trouble obtaining one or more of their medications since the pandemic.

Increased vitamin and supplement use were not a surprising finding as these “natural remedies” or nutraceuticals have been promoted for

Table 1
Prevalence of medication changes and specific medications mentioned in a community-based survey of older adults (≥ 50 years-old).

Reported change in medications since pandemic	N (%)	Medications mentioned (n)
Stopped taking medications	5 (0.4%)	Ibuprofen (4); fluticasone nasal spray (1)
Started additional medications	18 (1.6%)	Zinc (9); vitamin C (6); antidepressants or anti-anxiety medications (4); losartan (1); other vitamins (3); aspirin (1); homeopathic medicines (1); other supplements (3); low dose naltrexone (1 ^a).
Had trouble obtaining medications and stopped some or all	8 (0.7%)	N/A
Total (N = 1141)	31 (2.7%)	

Note: Missing data and excluded from survey sample, $n = 28$. There was no overlap in individuals reporting medication changes.

Medications started: Other supplements included elderberry, curcumin, and “Noxylane 4.” Other vitamins included vitamins D3, B complex, and vitamin A.

^a One participant reported “LDN.” Text search by the authors in reference to COVID-19 found reports on use of “low dose naltrexone.”

Table 2
 Characteristics among those reporting any changes in medications during the pandemic versus those that did not report changes.

Variables	Any medication changes during pandemic	
	Yes	No
	N = 31 (2.7%)	1110 (97.3%)
Age, mean (SD)	73 (7)	73 (7)
Sex, Female	10 (33.3%)	483 (43.9%)
Race, White	29 (93.6%)	1050 (94.6%)
Married	19 (61.3%)	693 (62.7%)
Education	4 (12.9%)	141 (12.8%)
High school	9 (29.0%)	447 (40.5%)
College	16 (51.6%)	468 (42.4%)
Post-graduate	2 (6.5%)	49 (4.4%)
Other		
Currently employed	12 (40.0%)	409 (37.2%)
Household income	1 (3.2%)	66 (6.0%)
\$0–24,999	2 (6.5%)	69 (6.3%)
\$25,000–34,999	5 (16.1%)	105 (9.6%)
\$35,000–49,999	5 (16.1%)	215 (19.6%)
\$50,000–\$74,999	16 (51.6%)	494 (45.0%)
\$75,000+	2 (6.5%)	149 (13.6%)
Not reported		
Community	2 (6.5%)	91 (8.3%)
Large city/Urban	14 (45.2%)	607 (55.2%)
Small city	9 (29.0%)	245 (22.3%)
Suburb	6 (19.4%)	156 (14.2%)
Rural		
Positive SARS-CoV-2 Test, “Yes”	0 (0%)	5 (0.5%)
Know someone with Positive SARS-CoV-2 Test, “Yes”	0 (0%)	2 (0.2%)
Self-rated overall health		
Good, Very Good, or excellent	24 (77.4%)	872 (78.6%)
Fair or poor	2 (6.4%)	101 (9.1%)
Comorbid conditions		
Hypertension	18 (58.1%)	542 (48.8%)
High cholesterol	11 (35.5%)	530 (47.8%)
Cardiovascular disease	1 (3.2%)	160 (14.4%)
Stroke	0 (0%)	58 (5.2%)
Pulmonary disease	1 (3.2%)	92 (8.3%)
Depression	4 (12.9%)	116 (10.5%)
Diabetes	2 (6.5%)	132 (11.9%)
Cancer	4 (12.9%)	134 (12.1%)
Time watching media coverage of pandemic		
None	2 (6.5%)	33 (3%)
<1 h per day	12 (38.7%)	437 (39.4%)
1–3 h per day	10 (32.3%)	482 (43.4%)
3+ hours per day	7 (22.6%)	158 (14.2%)
Use social media, Yes	19 (65.5%)	720 (67.4%)

Missing data by variable: Age (0); sex (39); race (28); marital status (33); education (33); employed (38); income (40); community (39); positive test (52); know someone with positive test (1164); self-reported health (170); comorbidities (28); media coverage (28); social media (72).

Abbreviations: SD = standard deviation; SARS-CoV-2=Severe acute respiratory syndrome coronavirus 2.

Note: All data is self-reported by survey participants. Distribution between groups was evaluated for all variables using chi-squared or Fisher’s exact tests and no significant values were found.

many decades to prevent or treat illnesses.^{4–6} Zinc in particular has been a focus as a sole regimen as well as a combination with hydroxychloroquine and azithromycin.⁷ Zinc is postulated by many to have its own anti-viral properties but has also been implicated as a modulator of viral entry by interrupting the link between viral spike proteins and the angiotensin-converting enzyme 2 (ACE2) on host cells.⁸ Curcumin and other nutraceutical preparations are also experiencing increased attention based on Ayurveda and Traditional Chinese Medicine concepts as are preparations of cannabidiol for prevention of COVID-19.^{7,31}

Changes in prescription medications and over-the-counter were anticipated but less frequently reported. The emotional impact of the

pandemic – ranging from causes such as loss of employment or income, social isolation, feelings of uncertainty, and so on – has led to increased stress, depression, and anxiety.^{9,10} Respondents reported new use of antidepressants and anti-anxiety medications as well as one reporting increased dosages of an antidepressant. The impact of natural disasters and traumatic events has been documented but the impact of such a global social and economic disaster is unprecedented and will likely be explored in future research.^{11–13}

The viral relationship with ACE2 also led to hypothesis for medications such as ACE inhibitors and angiotensin-receptor blockers (ARBs) to be implicated in hypotheses related to increased risk as well as potential treatments.¹⁴ Developing evidence indicates that these agents likely have no relationship with viral risk or as therapeutic agents. Nonetheless, many have published guidance to maintain treatment continuity or to take caution when halting treatment with these agents due to widespread concern regarding these common treatments.^{15–17} Ibuprofen also gained attention after French authorities warned against its use based on anecdotal reports and a mechanistic link between ibuprofen and ACE2 upregulation.¹⁸ Similarly, this hypothesis has not been confirmed and evidence has since emerged suggesting non-steroidal (and steroidal) anti-inflammatory agents may improve symptoms by decreasing inflammation.¹⁹

It was surprising to not observe use of hydroxychloroquine or azithromycin in this survey. Hydroxychloroquine and azithromycin have been highly publicized, politicized, and subject to randomized and non-randomized clinical studies. Evidence thus far is not confirmatory and is particularly limited by the low quality of evidence of published studies due to poor trial design or biases in observational studies. A recent review suggested only 2 high quality studies out of 32 published on hydroxychloroquine.²⁰ Similarly, azithromycin, usually in combination with hydroxychloroquine, is lacking sufficient evidence for benefit. Additional questions have been raised about the safety of these agents alone or in combination, particularly risk for cardiac outcomes.^{21,22}

While the underlying reasons for interrupted medications in this survey are not known, these may be related to the patient factors or broader influences rather than at the pharmacy level. In addition, the few access issues reported by respondents indicate a robust response by the medical community to ensure access to medications. Pharmacists and pharmacy technicians are essential workers during this pandemic and there have been few reports of interrupted service.^{23–25} There has likely been some shifts in these services during the pandemic including increased focus on drive-thru services as well as delivery, mail order, and virtual pharmaceutical care.^{23,24,26,27} Decreased patient mobility due to desire to remain socially isolated, decreases in use of medical services, or decreased public transportation could also drive these medication interruptions.²⁸ External forces such as reduced medication imports still threaten the medication supply as well.²⁹ Pharmacists should be prepared to offer patients and physicians guidance on availability of alternative regimens and substitutes and to provide services virtually or in other non-traditional paradigms.

In the context of this study, pharmacists have a dual role in providing access to medications and being a source of information to patients regarding safe and effective medications.³¹ Recognizing a social divide with regards to use of medications during the pandemic, separation of these roles from these divisive talking points should be championed. Rather, promoting open communication and dialogue are critical to maintain patient relationships and trust in the pharmacy profession.

Limitations

This survey was primarily community-based in and around the University of Florida geographic area. Approximately 50% of respondents were from the Alachua County, FL and surrounding areas, 30% from the Daytona Beach, FL and surrounding areas, and <5% were from outside of Florida. The sample includes a non-representative demographic mix of both Florida and U.S. residents with a vast majority

being White, high income earners, and highly educated and more representative of a population surrounding a large university. Thus, the results may not be generalizable to other communities. Understanding medication changes and access in underrepresented communities is of the utmost importance as these communities have been harder hit by the pandemic and may be less likely to seek medical advice due to limited access.³⁰

At the time of sampling, Florida was not yet a focus of attention for the pandemic with 1000 average daily cases in May 2020 which increased to highs of 9000 daily cases by the end of June 2020. Alachua County and the surrounding areas, in particular, had been mostly spared from high case burden. The cross-sectional nature of this one-time survey may not capture future changes in medications as the disease epidemiology has changed in these areas. Other limitations of surveys, including recall bias, survey fatigue, and response bias further limit the conclusions from this survey. In particular, due to the survey distribution methods, a response rate could not be calculated and an inherent sampling bias is possible.

Conclusions

In a volunteer-based online survey, few respondents (<3%) reported changes in their medication regimens during the SARS-CoV-2 (COVID-19) pandemic. Reported changes included increased use of vitamins and supplements to protect against the virus as well as antidepressants and anti-anxiety medications. Additional research in higher-risk and more representative samples is needed to understand the dynamics between the pandemic and medication use. The pharmacist's role in remaining an accessible source of care and information during the pandemic is critical and this survey indicates the profession has been part of a robust response to maintain access to and distribute evidence-based knowledge of medications.

Author statement

Joshua Brown: Conceptualization, Methodology, Writing-Original draft preparation.

Scott Vouri: Conceptualization, Methodology, Writing-Reviewing and editing.

Todd Manini: Conceptualization, Methodology, Writing-Reviewing and editing, Supervision.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.sapharm.2020.11.005>.

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