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RESEARCH

Older adults' strategies for obtaining medication refills in hypothetical scenarios in the face of COVID-19 risk

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ABSTRACT

Objective: To determine whether older adults would avoid going to the pharmacy (e.g., by restricting medications or requesting delivery) due to the risk of coronavirus disease (COVID-19). Our secondary objectives were to determine the types of medications that the older adults are more likely to restrict and to determine the factors that influence these decisions.

Design: Cross-sectional survey experiment in which participants read 6 scenarios, each stating that they had a 3-day supply of a particular medication remaining.

Setting and participants: National Web-based survey distributed to 1457 U.S. adults aged 65 years and older by Dynata from March 25, 2020, to April 1, 2020.

Outcome measures: Participants reported whether they would go to a pharmacy, have a medication delivered, or restrict the use of each medication. They reported their perceptions and experiences with COVID-19, health risk factors, preferences for more or less care (medical maximizer-minimizer), medication attitudes (beliefs about medicines questionnaire), health literacy, prescription insurance status, and demographics.

Results: Most participants (84%) were told to shelter in place, but only 12% reported attempting to obtain extra medications. Participants most often reported that they would go to the pharmacy to obtain each medication (ranging from tramadol 48.9% to insulin 64.9%) except for zolpidem, which they were most likely to restrict (45.4%). Participants who reported comorbidities that increased their risk of COVID-19 were just as likely to go to the pharmacy as those without. In multinomial logistic regression analyses, women and the oldest participants were more likely to seek delivery of medications. Restricting medications was most common for 2 symptom-focused medications (tramadol and zolpidem), and both demographic factors (e.g., gender) and beliefs (e.g., medical maximizing-minimizing preferences) were associated with such decisions.

Conclusion: Many older adults intend to continue to go to the pharmacy to obtain their medications during a pandemic, even those who have health conditions that further increase their risk for COVID-19.

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Background

In 2020, coronavirus disease (COVID-19) is a national emergency and pandemic.[1,2] Within a few months' time, the United States went from identifying its first infection from the novel severe acute respiratory syndrome coronavirus 2 to having over 100,000 deaths. The disease has proved to be particularly challenging to control because it spreads relatively easily through expelled droplets and because substantial numbers of infected patients are asymptomatic. A vast majority of COVID-19 related deaths in the United States have been among adults aged 65 years and older, especially those with health conditions such as cardiovascular disease, diabetes, and lung disease.[3] The Centers for Disease Control and Prevention recommended that the best way to prevent the illness is to avoid being exposed to the virus, such as by staying home as much as possible,[4] which led to stay-at-home public health orders across most of the United States.

Given how quickly this situation evolved and the presence of prescription insurance limits on prospective medication refills, many older adults may not have extra medications at home. If so, they face a difficult tradeoff in the era of prevalent

Key Points

Background:

- Adults aged 65 years and older are at higher risk for severe illness and injury from coronavirus disease (COVID-19), and the risk is even higher if they have chronic health conditions such as cardiovascular disease or diabetes.
- The Centers for Disease Control and Prevention recommends that older adults have several weeks of medication at home as part of emergency preparedness.
- Older adults who do not have extra medications face a difficult tradeoff: Go to the pharmacy and risk exposure to COVID-19, ration or forgo their medications and risk worsening health, or have medications delivered and increase the risk of illness for both themselves and the person who delivers the medications.

Findings:

- Over one-half of the older adults reported that they would continue to go to the pharmacy. Participants who reported risk factors for COVID-19 were just as likely to intend to go to the pharmacy as those who reported no risk factors.
- Women and the oldest participants (within our older adult sample) were more likely to seek delivery of medications.
- Restricting medications was most common for 2 symptom-focused medications (tramadol and zolpidem), and both demographic factors (e.g., gender) and beliefs (e.g., medical maximizing-minimizing preferences) were associated with such decisions.

COVID-19 disease: Older adults who go to the pharmacy risk exposure to COVID-19, particularly as sick patients may be obtaining medications from the pharmacy. In contrast, older adults who forgo their medications are at increased risk of worsening health conditions.[5-11] This could result in patients being hospitalized for a health condition not directly related to COVID-19. Such preventable hospitalizations represent a substantial systemic problem, given that the patient may become infected with COVID-19 and that their hospitalization also diverts resources from other patients with critical needs at a moment when the health system is likely to be critically overburdened. Alternatively, patients may have their medications delivered, either through a program at the pharmacy or by a family member or friend. However, person-to-person contact when the medication is delivered still represents increased risk for the older adult, and some may have ethical concerns about putting others at risk on their behalf.

Objectives

We sought to identify how older adults, who may have chronic medical conditions, make decisions about their maintenance of medications during a pandemic. The primary objective of this study was to determine the proportion of older adults who intended to address an imminent need for a medication refill by going to the pharmacy, requesting delivery, or by restricting medication use. Our secondary objectives were to determine the types of medications (e.g., based on their indication for use) that the older adults are more likely to forgo or ration and to determine the factors that influence how each person makes these types of decisions.

Methods

Participants

We recruited a sample of U.S. adults, aged 65 years and older, using Dynata (Plano, Texas), which maintains a demographically diverse Internet panel of people who opt-in to taking selected surveys.[12] Panel members who log on to Dynata's site are routed (in a randomized fashion) to available surveys on the basis of their demographic characteristics and needs of open surveys. Although Dynata's panel members are not a perfectly representative sample, we used quotas for gender (50% male and 50% female), age (50% 65-70 years, 50% 70 years, and older), and race and ethnicity (18% Latinx, 15% black and African American, 5% Asian and Asian American, and rest general sample) to ensure gender and racial and ethnic diversity among participants.

Participants filled out the anonymous, Web-based survey using Qualtrics software (Provo, Utah and Seattle, Washington) between March 25, 2020, and April 1, 2020.[13] Everyone who finished the survey received modest participation awards per Dynata's incentive system.[12] The University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board (IRB) determined that this study was exempt from IRB review.

Survey instrument

In the survey, we first provided background information about COVID-19 to ensure a common framing of the problem and potential risks. Participants were then asked to imagine that they had been instructed to shelter in place because of COVID-19 and were provided a description of this term (Appendix A). We specified that pharmacies were currently open and that people were allowed to leave their home to obtain essential services, such as going to the pharmacy.

We then asked participants to imagine that they take a specific medication and were given a brief description of why the medication is used. We selected medications that are commonly used in clinical practice by older adults for a variety of health conditions (Table 1). We aimed to choose medications that we anticipated the older adults would perceive as posing various amounts of risk for substantially worsening health if they went without the medication (e.g., albuterol for shortness of breath compared with zolpidem for difficulty sleeping). We asked participants to imagine having only 3 days of medication remaining but a sufficient amount of all of their other medications. Immediately after each medication, participants reported what they would do in that situation: go to the pharmacy to obtain the medication, decrease the amount of medication that they are using to make it last longer, ask someone else to deliver the medication, or stop the

Table 1
Medications in the hypothetical scenarios

Medication	Description of use in the survey	Classification
Albuterol	Used by people with asthma or other lung conditions to treat shortness of breath	Inhaler
Atorvastatin	Used by people with high cholesterol to prevent a heart attack or stroke in the future	Statin
Escitalopram	Used to treat symptoms of depression	Antidepressant
Insulin	Used by people with diabetes to lower high blood sugar	Insulin
Tramadol	Used by people with long-term pain to treat moderate amount of pain	Prescription pain medication
Zolpidem	Used at bedtime for difficulty in falling asleep	Sleep medication

medication. Participants could only choose 1 outcome for each medication. This was repeated so that each participant responded to a total of 6 medications. We presented both the medications and the response options in random order, and participants were instructed to treat each scenario (i.e., medication) separately.

Subsequently, participants reported their perceived level of seriousness of COVID-19 using a sliding scale (not serious at all to extremely serious) that was converted to a 100-point scale during data analysis. We also inquired whether there had been reports of COVID-19 in their local community, if participants had been told to shelter in place, whether participants believed they had personally been infected with COVID-19, and whether participants personally knew anyone who they believed to have been infected with COVID-19. Given the limited testing, we specified that the last 2 items were their beliefs, regardless of whether testing had occurred. We also asked if participants had attempted to obtain extra prescription medications and their experience with each type of medication used in the hypothetical scenarios. (Table 1)

Participants then answered 1 question about their self-reported health (1 = poor, 5 = excellent) which is inversely associated with mortality.[14] We asked participants if they currently had any of the following health conditions that could increase their risk of serious complications from COVID-19: cancer, diabetes, heart disease, human immunodeficiency virus, hypertension, lung disease. We also asked if they were immunocompromised, if they ever had a cardiovascular event, and about their current and previous tobacco use. For our statistical analysis, we collapsed this to either having no or 1 or more risk factors. We obtained self-reported health literacy using a 1 item statement related to confidence filling out medical forms (1 = not at all, 5 = extremely), which was collapsed for analysis purposes into 2 groups (1–3 vs. 4–5).[15,16]

Participants completed 2 validated scales plausibly related to their attitudes about medications. First, participants completed the medical maximizer-minimizer single-question measure (MM1), which measures people's overall preferences for receiving more versus less health care.[17-21] Second, the participants completed the Beliefs about Medicines Questionnaire (BMQ) with subscales focused on necessity of medications (BMQ-Specific necessity), concerns about medications (BMQ-Specific concern), and medication harms (BMQ-General).[22-25] Higher scores on BMQ-Specific necessity indicated more positive beliefs about medications, whereas higher scores on the other 2 subscales indicated more negative beliefs about medications. Finally, we collected demographic characteristics and whether or not they had prescription drug insurance.

Outcome measure

Immediately after reading about each medication, participants reported whether they would go to the pharmacy, decrease the amount of medication they were taking, ask someone else to deliver the medication, or stop the medication. This response served as the primary outcome of the study.

Statistical analysis

We describe the reported action that participants would take for each medication. Given the small number of people who selected decreasing or stopping each medication, we combined these 2 outcomes to create a restrict medications variable. We used multinomial logistic regression to examine characteristics associated with choosing delivery or restricting medications (vs. going to the pharmacy) for each medication scenario. Regressions included whether or not the person reported health risk factors, self-reported health, prescription drug insurance, MM1, BMQ, health literacy, and demographics. On the basis of the findings of other studies focused on medication decision making among older adults, we analyzed separately the BMQ-General subscale as well as both BMQ-Specific subscales: BMQ-Specific necessity and BMQ-Specific concern.[26,27] Participants who completed the survey in less than 3 minutes, did not complete the survey, or reported an age less than 65 years were excluded. We used a statistical significance level of $P < 0.05$. All analyses were conducted with Stata, version Stata SE 15.0 (StataCorp).

Results

A total of 1652 individuals started the survey. We excluded participants who did not complete the survey (n = 40), were less than 65 years of age (n = 154), or who completed the survey in less than 3 minutes (n = 1), leaving a final analytical sample of 1457 respondents.

Table 2 reports demographic characteristics, health conditions, and current experience with the medication discussed. Participants had relatively high levels of education when compared to older adults in the United States, with over one-half of the participants having a Bachelor's degree or higher when compared to one-third of adults aged 65 years and older in the United States.[28,29] Approximately 75% of participants reported good or very good health. The most common risk factors that were reported were hypertension (n = 786, 54.5%), current or previous tobacco use (n = 500, 34.4%), and diabetes (n = 268, 18.6%). Risk factors were reported by 77.3% of

Table 2
Demographic, health condition, and medication experience information (n = 1457)

Variable	No of people (n,%)[a]
Gender	
Female	733 (50.3)
Male	722 (49.6)
Transgender or other	1 (0.1)
Age (mean, SD)	70.5 (4.7)
Race (All that apply)[b]	
White	1149 (78.9)
Black	205 (14.1)
Asian	73 (5.0)
Other	47 (3.2)
Hispanic	169 (11.7)
Education	
High school diploma or less	174 (12.0)
Trade school, some college or associate degree	476 (32.7)
Bachelor's degree	452 (31.0)
Master's or doctorate degree	354 (24.3)
Health status	
Excellent	146 (10.0)
Very good	538 (36.9)
Good	554 (38.0)
Fair	194 (13.3)
Poor	25 (1.7)
Health conditions	
Hypertension	786 (54.4)
Tobacco use, current or past	500 (34.4)
Diabetes	268 (18.6)
Heart disease	194 (13.4)
Lung disease	162 (11.2)
History of cardiovascular event	118 (8.2)
Cancer	69 (4.8)
Immunocompromised	59 (4.2)
Human immunodeficiency virus	12 (0.8)
Current or prior use of medications in vignettes	
Statins	889 (61.3)
Prescription pain medications	449 (30.9)
Inhalers	374 (25.8)
Antidepressants	278 (19.1)
Sleep medications	234 (16.1)
Insulin	89 (6.2)
Health literacy	
Adequate	1247 (85.6)
Less than adequate	207 (14.2)
Prescription drug insurance	1339 (92.2)

[a] Total may not sum to column total because of missing data
[b] Total may exceed 100%

participants (n = 1058) with most participants reporting either 1 (n = 449, 32.8%) or 2 (n = 348, 25.4%) risk factors.

Most older adults in our study believed that COVID-19 is very serious as evidenced by 85.2% (n = 1238) reporting a score between 75 to 100. A majority of respondents reported cases in their local community (n = 1026, 70.5%) and had been told to shelter in place (n = 1218, 83.8%). Few participants believed that they personally had COVID-19 (n = 37, 2.5%) or knew someone who was infected (n = 159, 10.9%).

Only 12.3% of participants (n = 155) who reported taking prescription medications attempted to obtain extra medications. As shown in Figure 1, participants most often reported that they would go to the pharmacy to obtain each medication (ranging from tramadol 48.9% to insulin glargine 64.9%), except for zolpidem which they were most likely to restrict (45.4%).

Participants who reported 1 or more risk factors associated with poor outcomes when infected with COVID-19 were just as likely to intend to go to the pharmacy as those who reported no risk factors for each of the 6 medications considered (49.9% for no risk factors and 51.1% for 3 or more risk factors). This pattern was replicated in a follow-up analysis that treated risk factors as a continuous variable (data not shown).

On average, approximately one-quarter of participants (27.5%) reported that they would have the medications delivered, ranging from 18.9% for zolpidem to 34.5% for albuterol (Figure 1). Female gender was the only characteristic that predicted intent to have medication delivered across all 6 medications (Table 3; see Appendix B for full regression details). Participants who were older also tended to have the medications delivered. This pattern was statistically significant for atorvastatin, insulin glargine, tramadol, and zolpidem and trended in the same direction for albuterol ($P = 0.06$) and escitalopram ($P = 0.09$). No other factors were substantial predictors of intent to have medications delivered.

There was a wide variation in the percent of patients who reported that they would restrict their medication. The medications that participants were least likely to decrease or stop were insulin glargine (3.4%) and albuterol (4.7%), while participants were most likely to report restricting tramadol (26.5%) or zolpidem (45.4%), 2 medications used to treat the non–life-threatening symptoms of moderate pain and insomnia. The predictors related to restricting medications were similar for these 2 medications (Table 3; see Appendix B for full regression details). Participants who were older or female gender were more likely to restrict both medications, but these characteristics were not predictors of restricting any other medication. Participants with a stronger preference toward taking action related to their health based on MM1 or who reported better self-reported health were less likely to restrict these medications. MM1 was not correlated with any other medication while self-reported health was also positively correlated with decreased intention to restrict atorvastatin and escitalopram.

Beliefs about medications also substantially predicted intent to restrict several medications. Participants who had more positive beliefs about the necessity of medications based on BMQ-Specific necessity reported a decreased intent to restrict escitalopram or tramadol. Participants with more concerns about medication harms based on BMQ-General were more likely to restrict all of the medications except tramadol and zolpidem.

Discussion

Over one-half of older adults surveyed reported that they would continue to go to the pharmacy to obtain prescription medications during the COVID-19 pandemic. Participants who reported comorbidities that increased their risk of COVID-19 were just as likely to go to the pharmacy as those without. Restricting medications was most common for 2 symptom-focused medications (tramadol and zolpidem), and both demographic factors (e.g., gender) and beliefs (e.g., medical maximizing-minimizing preferences) were associated with such decisions.

Many pharmacies are exploring strategies to encourage patients to continue to obtain their medications, but to do
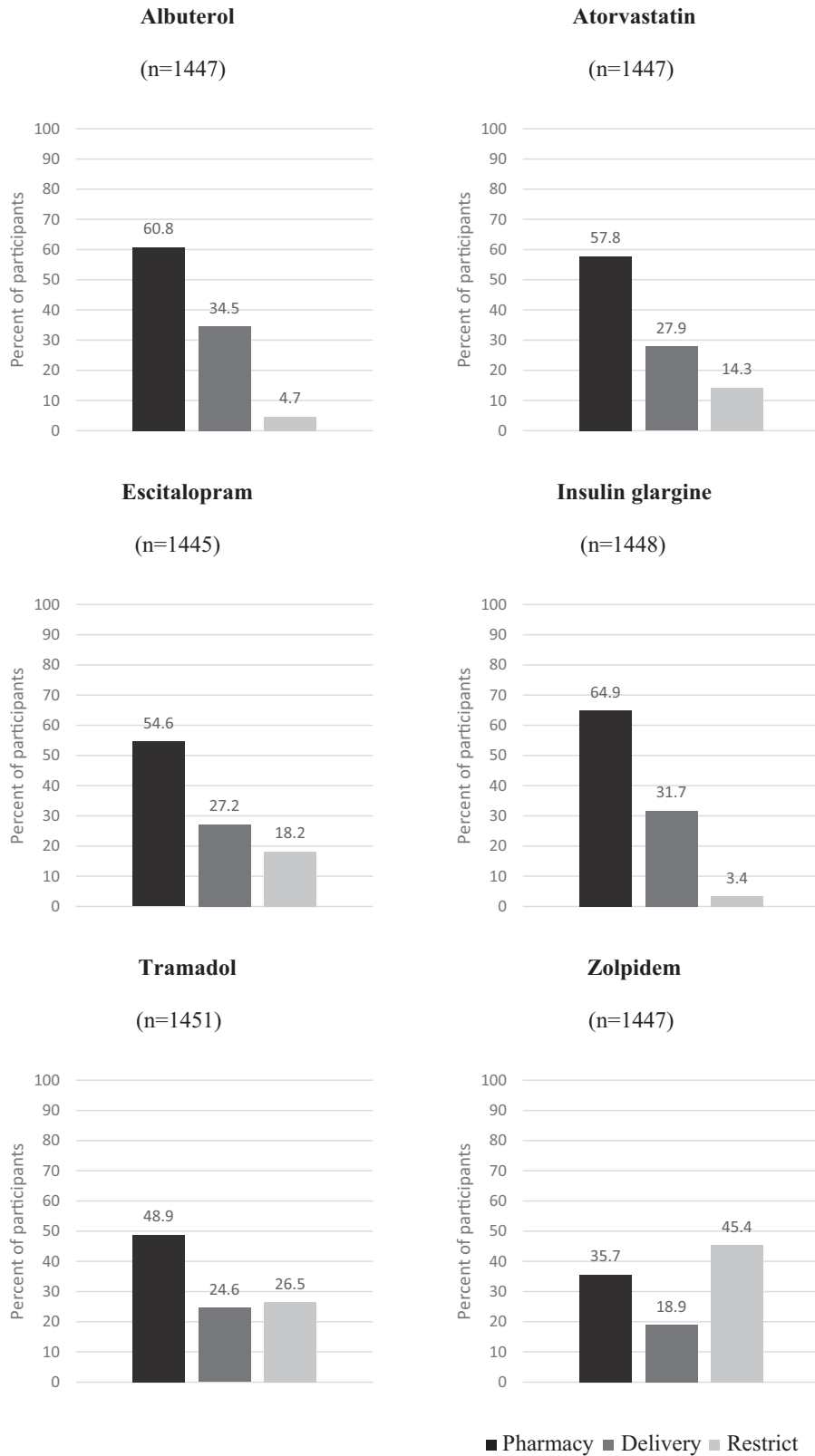
Older adults refilling medications during COVID-19

Figure 1. Older adults' medication related decisions by medication

Table 3
Demographic, personal health, and psychological factors that substantially predict older adult's intention to restrict medications or have medications delivered compared to going to the pharmacy[a]

Medication	Delivery			Restrict		
	Variable	Relative risk reduction (95% C.I.)	P-value	Variable	Relative risk reduction (95% C.I.)	P-value
Albuterol	Female	1.75 (1.38–2.22)	< 0.01	Health literacy	2.09 (1.09–4.00)	0.03
				BMQ-General	2.04 (1.36–3.04)	<0.01
Atorvastatin	Age	1.04 (1.02–1.07)	< 0.01	Hispanic	0.51 (0.28–0.94)	0.03
	Female	1.53 (1.18–1.98)	< 0.01	Self-reported health	0.75 (0.61–0.93)	0.01
				Prescription insurance	0.57 (0.33–0.96)	0.03
				BMQ-General	1.49 (1.15–1.94)	< 0.01
Escitalopram	Female	1.43 (1.10–1.86)	0.01	Self-reported health	0.69 (0.57–0.83)	< 0.01
				BMQ-General	1.36 (1.06–1.73)	0.01
				BMQ-Specific necessity	0.84 (0.72–0.99)	0.04
Insulin	Age	1.04 (1.01–1.06)	0.01	Asian and Asian American	3.76 (1.51–9.36)	< 0.01
	Female	1.78 (1.39–2.27)	< 0.01	BMQ-General	1.72 (1.10–2.70)	0.02
Tramadol	Age	1.04 (1.01–1.07)	0.01	Age	1.05 (1.02–1.08)	< 0.01
	Female	1.92 (1.46–2.53)	< 0.01	Female	1.72 (1.30–2.26)	< 0.01
				Self-reported health	0.70 (0.59–0.84)	< 0.01
				MM1	0.88 (0.79–0.98)	0.02
				BMQ-Specific necessity	0.85 (0.74–0.98)	0.03
Zolpidem	Age	1.06 (1.02–1.10)	< 0.01	Age	1.04 (1.01–1.07)	0.01
	Female	1.61 (1.17–2.22)	< 0.01	Female	1.47 (1.14–1.89)	< 0.01
				Education	1.15 (1.01–1.32)	0.04
				Self-reported health	0.81 (0.69–0.95)	0.01
				MM1	0.88 (0.80–0.97)	0.01

Abbreviations used: MM1, Medical Maximizer-Minimizer single-question measure; BMQ, Beliefs about Medicines Questionnaire
[a] Variables that substantially predict outcomes are reported. The multinomial logistic regression included age, gender, education (1–4–4 = Master's degree or higher), health literacy (1–5–5 = adequate), Hispanic, black, Asian and Asian American, self-reported health (1–5–5 = excellent), number of risk factors, prescription insurance, Medical Maximizer Scale-1 (1–1–6 = watch and wait, 6 = take action), and BMQ (1–5–5 = strongly agree) divided into General, Specific necessity, and Specific concern.

so without going into the store, such as having medications dropped off at the patient's home, sent via mail, or even delivered by drone.[30,31] Other strategies older adults may consider using to decrease the frequency of going to the pharmacy include obtaining early refills of medications in light of the pandemic, obtaining a 90 day supply of medication, and enrolling in medication synchronization programs. However, our works suggests that older adults may be reluctant to use some of these services. Although we did not explore why participants preferred to go to the pharmacy, 1 barrier that older adults may face is that some programs require or encourage the use of technology to sign up or manage participation. Nearly one-half of adults aged 65 years and older do not have a smartphone and one-third have never used the Internet.[32,33] Although it can be challenging to fit in with the pharmacy workflow, pharmacy staff may consider providing support so that older adults can enroll in these programs. Given that the participants in this study used the Internet to complete this survey, technology may not be a substantial barrier to utilizing these programs. A more challenging issue to address is that physical distancing may lead to social isolation and loneliness among older adults.[34-37] It is possible that older adults are seeking to continue their usual activities that have been deemed essential, such as going to the pharmacy, in order to increase their social interactions. Although pharmacists may not be in a position to directly address social isolation and loneliness, they should consider becoming familiar with national and local resources that are available to their patients.[38-41]

While we are concerned about the rate at which older adults report that they would go to the pharmacy to obtain their medications, there are 2 positive findings in our study. First, older adults intend to continue to take their medications as prescribed. Medication adherence is important to prevent hospitalizations, particularly as there are limited hospital resources available in many communities.[42,43] Second, older adults were generally able to differentiate medications that are critical to continue (e.g., insulin) from those that can be used as needed to manage symptoms (e.g., zolpidem). Importantly, we provided the indication for each medication. Unfortunately, a substantial number of older adults may not be familiar with the reason for each of their medications, which may limit their ability to make informed decisions about the risks of restricting their medications.[44-46] As shown in our data, patients who have negative beliefs about their medications or a preference for less care may be at higher risk for decreasing or stopping their medications. Without knowledge of their medications, it is possible that these patients might discontinue critical medications and suffer harm as a result. Additional research is needed to determine if patients who historically have been reported to have a lack of knowledge about the specific indication for their medication have a gist understanding of the risk of stopping these medications.

The primary limitation of our study was that participants were asked to imagine hypothetical scenarios, in most cases about medications that they were not currently taking. The approach that respondent's selected to manage running out of each medication may not align with their real-world actions. We also acknowledge that we limited our exploration to 6

medications and this does not capture the diversity of medications or health conditions for which older adults receive treatments. Furthermore, we did not specify if going to the pharmacy involved physically going into the store as some stores offer alternatives such as drive-through or curbside pickup which would decrease risk of exposure. In addition, we chose to combine delivery by friends or family with delivery by professional services which prevents us from making conclusions about whether participants would be open to 1 approach over another. Although our sample included substantial demographic diversity and was drawn from a panel that includes members from across the United States, we make no claims that it is representative of the U.S. population, only because our participants shared the common characteristic of being willing to participate in survey research. As a result, we acknowledge that the specific estimates and associations we identified may not fully generalize to all real-world medication discussions. The higher health literacy and better health of our sample compared to the general older adult population makes some of our findings even more surprising as an educated sample is likely to be more aware of the risks of COVID-19 exposure, yet were often still willing to go to the pharmacy and did not seem to be sensitive to the presence of risk factors in their decision making. Finally, we gathered this information near the beginning of the COVID-19 pandemic. Further research is needed to determine if older adults change their preferences for obtaining medications as the pandemic persists and impacts local communities to varying degrees.

Conclusion

Early in the COVID-19 pandemic, many older adults were instructed to shelter in place, but only 12% had attempted to obtain extra medications. Over one-half of older adults reported that they would continue to go to the pharmacy to obtain their medications, even if they had additional health risk factors for serious illness from COVID-19. Women and the oldest participants were more likely to seek delivery of medications. Restricting medications was most common for 2 symptom-focused medications (tramadol and zolpidem), and both demographic factors (e.g., gender) and beliefs (e.g., medical maximizing-minimizing preferences) were associated with such decisions. Research is needed to identify strategies to encourage older adults to maintain a continuous supply of their medications while minimizing risk of exposure to COVID-19.

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Appendix A. Questions for survey used in data analysis

Introduction

This study is being conducted by the Center for Bioethics and Social Sciences in Medicine at the University of Michigan. By taking this survey, you can help us understand how people think and feel about making decisions about medications given the COVID-19 pandemic.

This survey will take about 10 minutes. Your name will not be recorded anywhere in this survey. All of your answers will be completely anonymous. You may choose not to answer any questions you don't want to answer. If for some reason you cannot complete the survey, you may restart the survey at a later time by clicking on the survey link you were provided by Dynata. You will have to restart the survey from the beginning.

It is important that you not make any changes to your personal medication regimen based on the information provided in this survey. Please contact your doctor, pharmacist, or a licensed health care professional if you have any questions or concerns about your medications.

Your help means a lot to us. We thank you again for taking the time to complete this survey!

COVID-19 background information

We would first like to share some information with you about COVID-19, which is a new disease. While our understanding of this disease is constantly changing, the following points are all generally agreed upon:

Spread

- COVID-19 is spread between people who are in close contact with one another (less than 6 feet away from each other).
- COVID-19 is likely spreads when an infected person coughs or sneezes. These droplets land in the mouths or noses of people who are nearby and possibly can be inhaled into the lungs.
- COVID-19 may also be spread to a person if they touch a surface or object that has the virus on it and then touch their own mouth, nose, or possibly their eyes. This is not thought to be the main way the virus spreads.
- People are thought to be most contagious when they have symptoms (are the sickest), but it does appear that people can spread the disease even before they have symptoms.

Outcomes

- About 80 out of every 100 people who get COVID-19 have only mild or moderate symptoms.
- About 20 out of every 100 people get severe cases requiring hospitalization.
- While estimates vary, about 1 to 5 people out of every 100 who get COVID-19 die from the disease.
- Older adults and people with serious chronic medical conditions like heart disease, diabetes, and lung disease are at much higher risk for serious illness and death from COVID-19.

Hypothetical scenario − Directions

We would now like you to **imagine a scenario related to COVID-19**. We recognize that you may or may not be in this situation right now. However, please imagine the scenario and what you would do to the best of your ability.

We would like you to imagine that there have been reports of COVID-19 in your local community. In other words, in your city, town, or county.

Now imagine that government authorities have asked the public in your local community to **shelter in place**. This means that you should stay home and not leave unless necessary. However, trips to a grocery store are still allowed, as food is a necessity.

Imagine also that pharmacies continue to be open in your community. Going to the pharmacy to get your medications is one of the approved reasons to leave your home.

Hypothetical scenario − Medications part 1

Next, we would like you to imagine that you are taking different types of medications and that you are about to run out of that medication.

For each medication we ask you about, we will provide a description and information about why they are commonly used.

We would like you to imagine that have been taking each medication for a long time but that you only have **three days of medication remaining**.

Please treat each medication **separately**. That means that you should imagine having three days remaining for that one medication while imagining that you continue to have a sufficient amount of all of your other medications.

What we want to know is: If you were running short on this one particular medication, what would you do? Your options will be:

- **Go to the pharmacy** to obtain your medication. This means that you would personally go to the pharmacy in person, potentially exposing yourself to COVID-19.
- **Decrease the amount** of medications that you are taking to make it last longer. This could include taking a smaller amount of the medication or not taking the medication each time you normally take the medication. This would mean getting less of the benefit of the medication, at least until it runs out.
- **Ask someone else** to deliver the medication to you. This means that you would stay at home, but that you might be exposed to COVID-19 by the person delivering the medications. It also means that the other person might become infected with COVID-19 because they did this delivery for you.
- **Stop the medication** for now. This would mean no longer getting the benefit of the medication. You could decide to restart the medication when it is safer to go get the medicine from the pharmacy.

Once again, we realize you may not be in this actual situation. Please imagine being in this situation to the best of your ability.

Hypothetical scenario — Medications part 2 [randomized order of questions and choices]

What would you do if you only had three days remaining of **atorvastatin** (Lipitor) which is used by people with high cholesterol to **prevent a heart attack or stroke in the future**?

What would you do if you only had three days remaining of **albuterol** (ProAir HFA) which is used by people with asthma or other lung conditions to **treat shortness of breath**?

What would you do if you only had three days remaining of **escitalopram** (Lexapro) which is used to **treat symptoms of depression?**

What would you do if you only had three days remaining of **insulin glargine** (Lantus) which is used by people with diabetes to **lower high blood sugar?**

What would you do if you only had three days remaining of **tramadol** (Ultram) which is used by people with long-term pain to **treat moderate amounts of pain?**

What would you do if you only had three days remaining of **zolpidem** (Ambien) which is used at bedtime for **difficulty falling asleep?**

Perception of COVID-19

Next, we will ask about your thoughts about COVID-19. For each question, move the slider bar to indicate your response.

In your opinion, how serious is COVID-19?

Experience with COVID-19

We would like to find out more about your personal experiences with COVID-19. [yes/no]

Have there been reports of COVID-19 in your local community?

Have you been told to shelter in place? Shelter in place means that you should stay home and not leave unless necessary for an approved reason.

Do you believe that you have had COVID-19, whether or not you were tested?

Do you personally know anyone who you believe has had COVID-19, whether or not they were tested?

Personal medications — Part 1

We would like to find out more about your medications.

How many different kinds of medications do you take in a typical week?

Prescription medications

Over-the-counter medications or herbal/natural supplements

Have you attempted to obtain extra prescription medications due to COVID-19? [yes/no]

Personal medications — Part 2

Earlier in the survey, you answered questions about several medications. We would like to learn whether you currently or have ever taken these types of medications.

For each type of medication, please indicate if you currently, in the past, or never have taken the medication.

Antidepressants such as bupropion (Wellbutrin), citalopram (Celexa), duloxetine (Cymbalta), fluoxetine (Prozac), sertraline (Zoloft), venlafaxine (Effexor)

Inhalers such as albuterol (ProAir, Proventil, Ventolin), albuterol/ipratropium (Combivent), budesonide/formoterol (Symbicort), fluticasone (Flovent), fluticasone/salmeterol (Advair), tiotropium (Spiriva)

Insulin such as Humalog, Novolog, Humulin N or R, Novolin N or R, Lantus or Levemir

Prescription pain medications such as tramadol (Ultram), fentanyl (Abstral, Actiq, Duragesic or Fentora), or morphine (Roxanol)

Sleep medications such as eszopiclone (Lunesta), trazodone (Desyrel), or zolpidem (Ambien)

Statins or cholesterol medications such as atorvastatin (Lipitor), pravastatin (Pravachol), rosuvastatin (Crestor), or simvastatin (Zocor)

Medical conditions

We would like to find out about your current health and your health conditions.

In general, how would you rate your health today? [poor/fair/good/very good/excellent]

Do you currently have any of the following conditions? (randomized order)

- **Lung disease**, such as asthma or chronic obstructive pulmonary disease (COPD)
- **Heart disease**, such as abnormal heart rhythms, blood clots in your legs, an enlarged heart, or hardening or narrowing of your arteries
- **Cancer**
- **Diabetes**
- **High blood pressure**
- **Human immunodeficiency virus (HIV)**

Are you currently **immunocompromised**, such as due to medications or having a transplant?

Have you **ever** had a heart attack, stroke, mini-stroke, or transient ischemic attack (TIA)?

Do you **smoke or use e-cigarettes** (also known as vaping)? [yes, currently/in the past/no, never]

Other Scales — Medical Maximizer-Minimizer (MM1)

We would like to learn more about your approach to health care. Please rate how much you personally agree or disagree with

Not serious at all		Extremely serious

the following statement. There is no right or wrong answer.

Sometimes medical action is clearly necessary, and sometimes it is clearly NOT necessary. Other times, reasonable people differ in their beliefs about whether medical action is needed.

In situation where it's not clear, do you tend to lean towards **taking action** or do you lean towards **waiting and seeing** if action is needed?

Importantly, there is no "right" way to be.

Please answer on the 1-6 scale below:

- I strongly lean toward waiting and seeing
- I lean toward waiting and seeing
- I somewhat lean toward waiting and seeing
- I somewhat lean toward taking action
- I lean toward taking action
- I strongly lean toward taking action

Other Scales − Beliefs about Medicines Questionnaire (BMQ)

We would like to learn more about your beliefs related to medications.

Please rate how much you personally agree or disagree with each statement. There are no right or wrong answers.

Presented as matrix table where 1 = strongly disagree and 5 = strongly agree

BMQ Specific necessity

- My life would be impossible without my medicines.
- Without my medicines, I would be very sick.
- My health, at present, depends on my medications.
- My medicines protect me from being worse.
- My health in the future will depend on my medicines.

BMQ Specific concern

- I sometimes worry about the long-term effects of my medicines.
- Having to take medicines worries me.
- I sometimes worry about becoming too dependent on my medicines.
- My medicines disrupt my life.
- My medicines are a mystery to me.

BMQ General

1. If my doctors had more time with patients, they would prescribe fewer medicines.
2. Doctors use too many medicines.
3. Doctors place too much trust in medicines.

4. Natural remedies are safer than medicines.
5. Medicines do more harm than good.
6. People who take medicines should stop their treatment for a while every now and then.
7. Most medicines are addictive.
8. All medicines are poisons.

Finally, we have some questions that we will use to describe who responded to our survey.

Demographics

What is your gender? [male/female/transgender/other]
How many years old are you? _____
What is your race? Select all that apply.

- American Indian or Alaska Native
- Asian or Asian American
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White or Caucasian
- Other (please specify): _____

Are you Hispanic or Latino/a? [yes/no]
What is the highest level of education you have completed?

- None
- Elementary school
- Some high school, but no diploma
- High school (Diploma or GED)
- Trade school
- Some college, but no degree
- Associate's degree (AA, AS, etc.)
- Bachelor's degree (BS, BA, etc.)
- Master's degree (MA, MPH, etc.)
- Doctoral/Professional degree (PhD, MD, etc.)

Do you have prescription drug insurance? [yes/no]
How confident do you feel filling out medical forms by yourself?

- Not at all
- A little bit
- Somewhat
- Quite a bit
- Extremely

Closing

We thank you for taking the time to complete our survey. Your participation is greatly appreciated!

Appendix B

Demographic, personal health, and psychological factors that predict older adult's intention to restrict medications or have medications delivered compared to going to the pharmacy[a]

Variable	Albuterol (n = 1316)		Atorvastatin (n = 1315)		Escitalopram (n = 1,314)		Insulin glargine (n = 1,316)		Tramadol (n = 1,319)		Zolpidem (n = 1,315)	
	Relative risk reduction (95% C.I.)	P-value	Relative risk reduction (95% C.I.)	P-value	Relative risk reduction (95% C.I.)	P-value	Relative risk reduction (95% C.I.)	P-value	Relative risk reduction (95% C.I.)	P-value	Relative risk reduction (95% C.I.)	P-value
Restrict medication compared to go to pharmacy												
Age	1.02 (0.97–1.09)	0.42	1.03 (0.99–1.07)	0.11	1.03 (1.00–1.06)	0.10	1.02 (0.96–1.09)	0.52	1.05 (1.02–1.08)	< 0.01	1.04 (1.01–1.07)	0.01
Female Gender	0.98 (0.57–1.70)	0.95	1.18 (0.84–1.64)	0.35	1.19 (0.87–1.62)	0.27	0.93 (0.50–1.75)	0.83	1.72 (1.30–2.26)	< 0.01	1.47 (1.14–1.89)	< 0.01
Education (1–4, 4 = Master's degree or higher)	1.08 (0.81–1.44)	0.60	1.19 (1.00–1.42)	0.05	1.05 (0.89–1.23)	0.59	0.96 (0.69–1.33)	0.80	1.01 (0.87–1.16)	0.91	1.15 (1.01–1.32)	0.04
Low (1–3) vs. adequate (4–5) health literacy	2.09 (1.09–4.00)	0.03	0.75 (0.45–1.24)	0.26	0.96 (0.62–1.48)	0.85	1.20 (0.54–2.66)	0.65	0.93 (0.63–1.37)	0.70	0.88 (0.61–1.27)	0.48
Hispanic	0.95 (0.40–2.24)	0.90	0.51 (0.28–0.94)	0.03	0.79 (0.48–1.29)	0.35	0.64 (0.21–1.95)	0.44	0.79 (0.50–1.24)	0.30	0.75 (0.50–1.11)	0.15
Black/African American	1.55 (0.78–3.10)	0.21	0.87 (0.53–1.41)	0.56	1.19 (0.77–1.84)	0.43	1.66 (0.75–3.65)	0.21	0.99 (0.67–1.47)	0.95	0.79 (0.55–1.13)	0.20
Asian/Asian American	1.11 (0.36–3.43)	0.86	0.87 (0.41–1.85)	0.72	1.29 (0.67–2.48)	0.45	3.76 (1.51–9.36)	< 0.01	0.96 (0.51–1.80)	0.90	0.69 (0.38–1.23)	0.21
Self-reported health (1–5, 5 = excellent)	0.89 (0.63–1.25)	0.51	0.75 (0.61–0.93)	0.01	0.69 (0.57–0.83)	< 0.01	0.82 (0.55–1.20)	0.30	0.70 (0.59–0.84)	< 0.01	0.81 (0.69–0.95)	0.01
Risk factors	0.66 (0.34–1.28)	0.22	0.96 (0.61–1.50)	0.84	1.02 (0.68–1.55)	0.91	0.82 (0.38–1.77)	0.62	0.92 (0.63–1.33)	0.65	0.85 (0.61–1.20)	0.36
Prescription insurance	0.54 (0.26–1.15)	0.11	0.57 (0.33–0.96)	0.03	0.75 (0.45–1.26)	0.28	0.48 (0.21–1.10)	0.08	0.80 (0.49–1.28)	0.35	1.13 (0.72–1.78)	0.59
MM1 (1–6, 1 = watch and wait, 6 = take action)	1.00 (0.82–1.22)	0.97	0.93 (0.82–1.05)	0.25	0.93 (0.83–1.05)	0.23	1.09 (0.87–1.37)	0.44	0.88 (0.79–0.98)	0.02	0.88 (0.80–0.97)	0.01
BMQ-General (1–5, 5 = strongly agree)	2.04 (1.36–3.04)	< 0.01	1.49 (1.15–1.94)	< 0.01	1.36 (1.06–1.73)	0.01	1.72 (1.10–2.70)	0.02	1.05 (0.84–1.30)	0.69	1.14 (0.93–1.40)	0.20
BMQ-Specific necessity (1–5, 5 = strongly agree)	0.95 (0.71–1.26)	0.72	0.92 (0.78–1.10)	0.38	0.84 (0.72–0.99)	0.04	0.77 (0.56–1.07)	0.12	0.85 (0.74–0.98)	0.03	0.88 (0.77–1.00)	0.05
BMQ-Specific concern (1–5, 5 = strongly agree)	0.75 (0.52–1.09)	0.13	1.02 (0.80–1.29)	0.88	1.04 (0.84–1.30)	0.69	1.35 (0.98–2.04)	0.16	1.06 (0.87–1.29)	0.57	0.97 (0.81–1.17)	0.77
Constant	0.01 (0.00–1.37)	0.07	0.06 (0.00–1.01)	0.05	0.16 (0.01–2.21)	0.17	0.01 (0.00–1.90)	0.09	0.16 (0.02–1.61)	0.12	0.21 (0.02–1.96)	0.17
Medication delivered compared to go to pharmacy												
Age	1.02 (1.00–1.05)	0.06	1.04 (1.02–1.07)	< 0.01	1.02 (1.00–1.05)	0.09	1.04 (1.01–1.06)	0.01	1.04 (1.01–1.07)	0.01	1.06 (1.02–1.10)	< 0.01
Female Gender	1.75 (1.38 – 2.22)	< 0.01	1.53 (1.18 – 1.98)	< 0.01	1.43 (1.10–1.86)	0.01	1.78 (1.39 – 2.27)	< 0.01	1.92 (1.46 – 2.53)	< 0.01	1.61 (1.17 – 2.22)	< 0.01
Education (1-4, 4=Master's degree or higher)	0.94 (0.83–1.06)	0.33	0.94 (0.82–1.08)	0.38	0.92 (0.80–1.06)	0.24	0.90 (0.80–1.03)	0.12	0.94 (0.81–1.08)	0.39	0.97 (0.82–1.15)	0.72
Low (1–3) vs. adequate (4–5) health literacy	1.26 (0.90–1.78)	0.18	1.28 (0.90–1.83)	0.17	1.12 (0.77–1.62)	0.56	1.32 (0.93–1.86)	0.12	0.94 (0.63–1.41)	0.77	1.26 (0.81–1.95)	0.30
Hispanic	1.00 (0.69–1.44)	0.99	0.93 (0.63–1.38)	0.73	0.93 (0.62–1.39)	0.72	0.90 (0.62–1.32)	0.60	1.17 (0.78–1.77)	0.44	1.07 (0.67–1.70)	0.79
Black/African American	0.78 (0.54–1.13)	0.19	0.91 (0.62–1.34)	0.64	0.97 (0.65–1.43)	0.86	0.83 (0.57–1.20)	0.32	0.74 (0.48–1.14)	0.18	0.62 (0.38–1.03)	0.07
Asian/Asian American	1.04 (0.61–1.77)	0.90	1.04 (0.59–1.84)	0.89	1.04 (0.57–1.87)	0.90	1.19 (0.68–2.07)	0.54	0.98 (0.53–1.80)	0.94	1.02 (0.53–2.00)	0.94
Self-reported health (1–5, 5 = excellent)	0.89 (0.77–1.04)	0.14	0.93 (0.79–1.09)	0.37	0.94 (0.80–1.11)	0.46	0.98 (0.84–1.14)	0.81	1.00 (0.84–1.19)	0.98	0.92 (0.75–1.12)	0.42
Risk factors	0.78 (0.57–1.07)	0.12	0.73 (0.52–1.03)	0.07	0.83 (0.59–1.17)	0.28	0.74 (0.54–1.02)	0.07	0.79 (0.55–1.13)	0.20	0.69 (0.45–1.05)	0.08
Prescription insurance	0.98 (0.63–1.53)	0.93	1.27 (0.76–2.11)	0.36	1.20 (0.72–2.00)	0.48	1.17 (0.73–1.85)	0.52	1.10 (0.64–1.88)	0.73	1.47 (0.78–2.77)	0.23
MM1 (1–6, 1 = watch and wait, 6 = take action)	1.03 (0.94–1.12)	0.58	1.03 (0.94–1.14)	0.49	1.06 (0.97–1.17)	0.21	0.98 (0.89–1.07)	0.59	1.05 (0.95–1.16)	0.38	1.03 (0.91– 1.16)	0.65
BMQ-General (1–5, 5 = strongly agree)	1.09 (0.90–1.32)	0.39	1.11 (0.90–1.36)	0.32	1.04 (0.85–1.29)	0.69	1.07 (0.88–1.31)	0.47	1.13 (0.91–1.41)	0.28	1.04 (0.80–1.35)	0.76
BMQ-Specific necessity (1–5, 5 = strongly agree)	0.96 (0.85–1.09)	0.56	0.95 (0.83–1.08)	0.42	0.95 (0.83–1.08)	0.43	0.99 (0.87–1.12)	0.81	1.00 (0.87–1.16)	0.95	0.98 (0.84–1.16)	0.83
BMQ-Specific concern (1–5, 5 = strongly agree)	0.94 (0.79–1.11)	0.47	1.04 (0.86–1.25)	0.72	1.02 (0.84–1.23)	0.86	0.99 (0.83–1.18)	0.91	1.01 (0.83–1.23)	0.94	1.07 (0.85 –1.35)	0.58
Constant	0.17 (0.02–1.28)	0.09	0.02 (0.00–0.20)	< 0.01	0.10 (0.01–0.90)	0.04	0.05 (0.01–0.38)	< 0.01	0.02 (0.00–0.23)	< 0.01	0.01 (0.00–0.11)	< 0.01

Abbreviations used: BMQ, Beliefs about Medicines Questionnaire; MM1, Medical Maximizer-Minimizer single-question measure.

[a] Individuals who identified as transgender or other were excluded owing to their small number (n = 1).