Patients' Compliance With Quarantine Requirements for Exposure or Potential Symptoms of COVID-19

Chien-Wen Tseng MD, MS, MPH; Yoonhwan Roh MD; Colette DeJong MD; Leimomi N. Kanagusuku MD; and Komal S. Soin MD, MPH

Abstract

Reducing Coronavirus disease 2019 (COVID-19) transmission relies on people quarantining after exposure to COVID-19 or if they experience COVID-19 symptoms, and isolating from others if COVID-19 positive. Quarantine and isolation last 10 to 14 days and can be state-mandated; however, the level of compliance is unknown. The University of Hawai'i Department of Family Medicine clinic called patients instructed by our physicians to quarantine for exposure risk or symptoms of potential COVID-19 infection between March 15, 2020, and April 15, 2020. None of the patients tested positive for COVID-19. Sixty-nine of 90 (77%) patients completed follow-up calls and self-reported whether they had stayed home. Of these 69 patients, 32 (46%) broke quarantine to buy groceries (36%), work (9%), visit others (6%), or for other reasons (12%). For patients living alone, 8 of 11 (73%) left home to buy groceries. For employed patients, 6 of 39 (15%) returned to work during their quarantine period.

Nearly half of our patients did not quarantine for the entire period. Many persons left home to buy food or to work. Strong public health messaging is needed to educate communities about the requirement to quarantine. Clinicians can help by asking patients about social and financial ability to quarantine, schedule follow-up appointments to remind patients to stay home, and link patients to food programs, financial assistance, and other community resources to successfully quarantine and prevent COVID-19 transmission.

Keywords

Quarantine, COVID-19, Coronavirus, SARS-CoV-2

Abbreviations and Acronyms

COVID-19 = Coronavirus disease 2019
CDC = Centers for Disease Control and Prevention
HER = Electronic Health Record
PCR = Polymerase Chain Reaction

Introduction

As of May 6, 2021, over 156 million cases of Coronavirus disease 2019 (COVID-19), caused by the virus SARS-CoV-2, and 3.2 million deaths have occurred globally.[1] COVID-19 cases continue to increase in part because people can infect others even when symptoms are mild or absent, and symptoms can take weeks to develop after exposure.[2] A critical aspect of stopping the COVID-19 pandemic depends on whether individuals with exposure to COVID-19 or who have potential symptoms of COVID-19 infection adhere to quarantine and whether individuals who are positive for COVID-19 adhere to self-isolation. The Centers for Disease Control and Prevention (CDC) advises unvaccinated persons with exposure to COVID-19 to quarantine for 14 days and unvaccinated persons with potential symptoms of COVID-19 to quarantine for 10 days regardless of test results because results can be falsely negative.[2-4] Persons with COVID-19 should isolate for 10 days.[3] Despite the importance of these guidelines and government mandates to quarantine or isolate, little is known about patient compliance.[5] What is known is that other CDC guidelines to prevent COVID-19 transmission, such as face mask use in public, have not been observed optimally.[6] Since patients commonly seek medical care from their clinicians for exposure, symptoms, and COVID-19 testing, we examined whether patients told by clinicians to quarantine for exposure or potential symptoms did so for the entire period.

In Hawai'i, the first case of COVID-19 was reported on March 6, 2020. As of May 6, 2021, Hawai'i has documented 33 036 cases and 486 deaths related to COVID-19.[7] At the University of Hawai'i Department of Family Medicine and Community Health Clinic, we followed up with patients who sought care for concerns about potential COVID-19 symptoms or exposure risk and had been asked to quarantine at home for 10–14 days by our clinicians (none tested positive). In our follow-up, we asked patients to self-report if they had successfully quarantined. Our study describes whether our patients followed quarantine instructions, what barriers they faced to do so, and what support is needed by patients in quarantine to decrease COVID-19 transmission.

Methods

The study was conducted at the primary care clinic affiliated with the University of Hawai'i John A. Burns School of Medicine Department of Family Medicine and Community Health. Our clinic patients are diversely insured by Medicaid (50%), commercial plans (30%), Medicare (12%), and other sources (8%). Clinicians consist of 11 attending physicians, 21 family medicine resident physicians, a pharmacist, behavior health counselors, and a social worker.

Starting March 15, 2020, clinicians developed and used a screening COVID-19 questionnaire for patients who sought care for concerns about possible COVID-19 infection to ask about exposure risk and symptoms (Figure 1). Our clinicians created the screening questionnaire and incorporated it into our electronic health record (EHR) visit template early on in the COVID-19 pandemic to ensure that we provided standardized, high-quality

care according to CDC guidelines. The questionnaire was pilot tested with 5 patients, revised for clarity, and all clinicians were trained to use the EHR template with the questionnaire. Following CDC guidelines, our clinicians asked patients to quarantine if they had any exposure to someone who tested positive for SARS-CoV-2. Patients were asked to quarantine even if they had not yet been officially notified through contact tracing by the Hawai‘i State Department of Health since contact tracing was not conducted for all positive cases at that time. Patients with exposure risk or possible symptoms of COVID-19 were counseled on the potential false-negative test results and asked to quarantine between 10 days (symptoms) to 14 days (exposure) even if a test was negative or testing was not done.[8] At the time of the study (March and April 2020), COVID-19 testing was not readily accessible to all. Hence, clinicians used their clinical judgment as to whether to ask patients with concerning symptoms to quarantine.

COVID-19 Screening Questionnaire

1. Does the patient have new shortness of breath or difficulty breathing?

a. Unstable? If yes, ask them to call 911 immediately

2. Have other symptoms? Fever, cough, headache, nasal congestion/runny nose, new loss of taste or smell, sore throat, muscle or body aches, chills, nausea, vomiting, or diarrhea.

3. At risk for exposure or at risk for poorer outcomes? Yes - consider test.

a. High priority testing – extensive, close contact with vulnerable persons?
   - Works in nursing home, long-term care
   - Health provider, first responder (EMS, police, firefighter)
   - Works or lives in community congregate settings (shelters, correctional facility, schools, churches, mass gatherings, production plants etc.)
   - Member of large household in close quarters
   - Lives with or provides care to higher risk individuals

b. Higher risk for exposure due to occupation?
   - Travel industry (flight attendant, TSA, cruise ship, etc), tourist or hospitality worker (hotel, restaurant, bar), transportation (bus/taxi/uber/lyft), mail carrier, gym, education, etc.

c. Higher risk due to travel in last 14 days?

d. Direct close contact to known or presumed COVID+ person?
   - Close contact (≥ 15 mins total over 24 hours, ≤ 6 feet without proper PPE)
   - Exposure to infectious secretions

e. Risk for poor outcomes due to co-morbidities? Chronic lung disease - COPD (higher risk) or moderate/severe asthma (possibly higher risk), serious heart conditions – congestive heart failure, coronary artery diseaes, chronic kidney disease (higher risk) or liver disease (possible higher risk), diabetes (especially uncontrolled) Obesity/overweight - BMI > 30, immune suppressed, pregnancy

f. Risk for poor outcomes due to age ≥ 65

Figure 1. COVID-19 Screening Questionnaire

On April 15, 2020, investigators began calling patients seen since March 15, 2020, who our clinicians asked to quarantine for exposure or potential symptoms of COVID-19. Our clinicians developed and used a second questionnaire EHR template for these follow-up calls to ask if symptoms had improved, whether patients knew test results, and if patients followed quarantine successfully (Figure 2). For this study, investigators reviewed patients' EHR charts for symptoms associated with COVID-19 (eg, cough, fever, shortness of breath, sore throat, myalgias, chills, loss of smell or taste, nausea, vomiting, diarrhea, headache, runny nose, or congestion),[8] potential exposure to COVID-19 (from work, travel, or friends/family), tests ordered, medications prescribed, age, sex, current smoking status, and 3 health conditions (respiratory disease, heart disease, and diabetes) associated at the time with increased risk for poorer COVID-19 outcomes. A de-identified database was constructed without patient names, medical record numbers, or contact information. Data were presented using simple descriptive analyses. The University of Hawai'i Office of Research Compliance deemed the study not to be human subject research (IRB 2020-00457).

COVID-19 Follow-up Questionnaire

1. Current symptoms?

2. Feeling better, same, or worse?
- a. Completely better
- b. Better, with minor symptoms
- c. Better, with baseline symptoms
- d. Slightly better
- e. No change

3. If sent for testing: Aware of results (how)?
- a. Call from our clinic
- b. Testing site called
- c. Looked up results on MyChart
- d. Patient called us

4. Household – lives with other people or lives alone?

5. Work - employer and type of work?

6. Stopped working or teleworked during quarantine or isolation?

7. Left quarantine or isolation?
- a. Shopping for groceries
- b. Work
- c. Visit family or friends
- d. Other reasons_____

8. Others became ill in household or at work?
- a. Household _____
- b. Work _____

Figure 2. COVID-19 Follow-up Questionnaire

Results

Ninety patients were advised to quarantine between March 15, 2020, and April 15, 2020, for exposure risk or symptoms (none tested positive). Of these, 69 patients were contacted in follow-up calls (77% follow-up) and included in the analyses. The 69 patients ranged in age from 8 months to 82 years (mean age, 43 years), 68% were female, 57% were employed, and 84% lived in multi-person households (Table 1). Over half had at least 1 risk factor for poor COVID-19 outcomes: 13% were aged 65 years and older, 19% currently smoking, and 55% with chronic respiratory disease, heart disease, or diabetes (Table 1).[9]

Sixty-six of 69 patients (96%) had symptoms, and 31 (45%) also reported exposure risk such as recent travel, friends or family visiting from out-of-state, or working in settings, such as health care and tourism industries (Table 1 and Table 2). The most prevalent symptoms included cough (80%), fever (32%), and shortness of breath (35%) (Table 2).[8] Thirty-five patients (51%) were prescribed treatments, including cough medications (28%), asthma inhalers (25%), decongestants (19%), antibiotics (12%), and oseltamivir, also known as Tamiflu® (1%).

Twenty-nine patients (42%) were sent for nasopharyngeal Polymerase Chain Reaction (PCR) testing (Table 2). All 29 had negative PCR results, although one patient subsequently tested positive later on for the COVID-19 IgM antibody. Most knew their test results primarily because testing sites called (48%), our clinicians called (31%), or patients looked up results through their online personal health portal (14%) (Table 3).

Table 1. Demographics of Patients Advised to Quarantine for Exposure or Isolate for Potential COVID-19 Infection (N=69)

Mean age (range)	**43 years (8 months–82 years)**	
	n	%
Age		
0 to 19 years	5	7
20 to 39 years	28	41
40 to 64 years	27	39
65 years and older	9	13
Sex		
Woman	47	68
Man	22	32
Employed	39	57
Household		
Lives alone	11	16
2 or more persons	58	84
Chronic Conditions		
Respiratory	15	22
Diabetes	19	28
Heart disease	8	12
Any of the 3 conditions	38	55
Smoking Status		
Never	40	58
Current	13	19
Former	16	23
Exposure Risk		
Work	23	33
Family visiting	4	6
Friend visiting	3	4
Travel	6	9
At least 1 exposure risk	31	45

Table 2. Initial Visit Assessment of Symptoms, Treatment, and COVID-19 Testing

	n	%
All Persons (N=69)		
Had exposure risk only (no symptoms)	3	4
Had symptoms	66	96
Received treatment	35	51
Sent for COVID-19 PCR testing	29	42
Type of Symptom (N=69)		
Cough	55	80
Fever	22	32
Shortness of breath	24	35
Sore throat	20	29
Myalgias	7	10
Chills	4	6
Loss of smell or taste	3	4
Nausea, vomiting, or diarrhea	7	10
Headache	0	0
Runny nose or congestion	20	29
Other (eg, wheezing)	7	10
Type of Treatment (N=69)		
Cough medication	19	28
Asthma inhaler	17	25
Decongestants	13	19
Antibiotics	8	12
Oseltamivir (Tamiflu®)	1	1
COVID-19 Testing (N=29)		
Nasopharyngeal PCR (0 of 29 positive)	29	42
IgM antibody (1 of 1 positive)[a]	1	1

Abbreviations: COVID-19, Coronavirus disease 2019; PCR, polymerase chain reaction
[a] One person had an initial negative PCR test but a subsequent positive IgM antibody test.

Follow-up

At follow-up, 52 patients (75%) said they felt significantly better (49% completely better, 26% better with only minor symptoms) (Table 3). The median time between follow-up and the initial visit was 13 days (data not shown).

Compliance

Thirty-two patients (46%) said they left home despite being asked by our clinicians to quarantine (Table 4). Twenty-five patients (36%) went out to shop for groceries, while others went to work (9%), visited family or friends (6%), or for other reasons such as exercising and going to the bank (12%). Of the 11 patients who lived alone, 8 (73%) broke quarantine to buy groceries. Of the 39 employed patients, 6 (15%) went to work during the quarantine period (data not shown). Of the 58 patients who lived in multi-person households, 14 (24%) reported that their family or roommates were also sick or later became ill (Table 4). We did not confirm whether any family or household contacts later tested negative or positive for SARS-CoV-2.

Table 3. Follow-Up Assessment of Improvement In Symptoms and Knowledge of Test Results

	n	%
Follow-up (N=69)		
Had a scheduled follow-up visit	37	54
Knowledge of Test Results (N=29)		
Our clinic called	9	31
Testing site called	14	48
Patient looked up result in MyChart	4	14
Patient called us	2	7
Symptoms at Follow-up (N=69)		
Completely better	34	49
Better, minor symptoms	18	26
Better, baseline symptoms	9	13
Better, slightly	2	3
No change	3	4
No symptoms at initial visit	3	4

Table 4. Compliance With Quarantine Guidelines and Report of Ill Contacts

	Lives Alone (N=11)		Lives With Others (N=58)		All Quarantined (N=69)	
	n	%	n	%	n	%
Compliance with Quarantine						
Observed quarantine	3	27	34	59	37	54
Left home for any reason	8	73	24	41	32	46
Reasons for Noncompliance[a]						
To buy groceries	8	73	17	29	25	36
To go to work	1	9	5	9	6	9
Visit family/friends	4	36	2	3	4	6
Other reasons	4	36	4	7	8	12
Number of patients who reported ill contacts[b]						
Any ill contacts	1	9	15	26	17	25
Co-worker sick	0	0	1	2	1	1
Household member sick	0	0	14	24	14	20
Other (eg, friends)	1	9	1	2	2	3

[a] Percentages might add to over 100% since patients can report multiple reasons for noncompliance.
[b] Patients reported if their co-workers, household members, or friends were also sick (ie, ill contacts). Percentages might add to over 100% since patients can report ill contacts at more than 1 place.

Discussion

Along with vaccination, a necessary part of preventing the spread of COVID-19 is for people with exposure or potential symptoms to stay at home.[10] However, in our study, only approximately half of patients observed full quarantine when asked to do so by their clinician, and this fell to less than one-third among patients who lived alone. None of our patients with exposure or symptoms sent for PCR testing had a positive result, although this did not guarantee that all persons were COVID-19 free.

Most patients said they broke quarantine to address an essential need to buy food. Among individuals who lived alone, all who left their homes cited shopping for groceries as a reason for doing so. For patients who were employed, 1 in 7 returned to work before being cleared. Anecdotally, patients told us their job could not be done via telework, and they needed to earn income. Patients also reported breaking quarantine for non-essential reasons; however, these results highlight the importance of food and economic support for people who must quarantine for up to 2 weeks. States now fund low or no-cost grocery delivery programs to help increase compliance with quarantine or isolation (Hawai‘i has such programs), and employers can provide paid sick leave or options for people to work from home when possible.[11] In some states, contact tracing personnel asks people who have been exposed to COVID-19 and must quarantine whether they anticipate difficulties doing so and assign case managers to those who need food or financial assistance.[12] Our clinic now routinely asks all patients about their social and financial ability to quarantine or isolate and links them to community services for groceries, supplies, and economic assistance.[12-14] Such support services have become increasingly available and funded by states and the federal government to address the COVID-19 pandemic.[15]

In our study, 75% of patients with symptoms improved significantly over time. As patients feel better, they may drop their guard about infecting others and break quarantine early to return to work or run errands. From our experience, patients were often initially unaware that they needed to quarantine for a full 14 days after exposure because it can take that many days to develop symptoms.[4] Patients also mistakenly believed that a negative test cleared them from quarantine without realizing that COVID-19 tests could be falsely negative.[2] Our clinicians provided extensive education for our patients that transmission can occur without symptoms, and tests can be falsely negative. We now arrange follow-up appointments with all patients asked to quarantine or isolate. This scheduled follow-up visit (by phone or video) allows our clinicians to evaluate whether patients' symptoms are improving and remind patients to quarantine or isolate for the entire period even if they feel better.

Although clinicians can educate individual patients, our findings point out the importance of a clear and strong message to the public about the need to quarantine for exposure or symptoms. In the initial months of the COVID-19 pandemic, the vast majority of our patients sought care appropriately for exposure risk and symptoms. This finding highlights the role of consistent and accurate public health education about COVID-19. The same public message about the importance of quarantine or isolation should be widely disseminated in the community through various outlets and in different languages.[16]

Nearly 1 in 4 of our patients who lived in multi-person households said that someone in their household was sick or later became ill. For quarantine or isolation to truly work in preventing transmission, persons must also separate from household members. Transmission rates between household members of COVID-19 positive persons are high and have exceeded 50% in some studies.[17,18] Large families or multi-generational households can find it particularly difficult to prevent household transmission if there are not enough rooms to allow for adequate separation. Hawai'i and other states have set up free hotels for people who cannot quarantine or isolate within the same household, and clinicians can help reduce transmission by referring patients to these resources.[19-21]

Our study is limited by a small sample size and was conducted for patients seen from March to April 2020. Therefore our findings reflect the knowledge and behavior of patients at the beginning of the COVID-19 pandemic. As we proceed further into the pandemic, patients may be more aware of the need to quarantine and isolate for exposure or symptoms. Our study patients tested negative for COVID-19, and compliance with staying home may be higher among those with a positive COVID-19 test. We relied on patients' self-report regarding whether they broke quarantine. Actual rates may be lower or even higher if people are reluctant to say they left quarantine when advised not to. Given how important quarantine and isolation are to reducing transmission, an ongoing effort to track noncompliance and barriers to quarantine or isolation is needed on a larger scale.

As the pandemic evolves and continues to be a part of our daily lives, we now take the time to switch from reaction to planning. Our study found high rates of noncompliance with quarantine due in part to a need for food and economic support. A robust public health system is needed to educate the public about the importance of quarantine or isolation, provide the necessary resources, and help clinicians connect patients to these resources to prevent COVID-19 transmission.

Conflict of Interest

None of the authors identify any conflict of interest.

Disclosure Statement

Dr. Tseng serves on the US Preventive Services Task Force (USPSTF) and is the Hawai‘i Medical Services Association Chair of Health Services and Quality Research at the University of Hawai‘i.

Authors' Affiliations:
- Department of Family Medicine and Community Health, John A. Burns School of Medicine, University of Hawai'i, Honolulu, HI (CT, YR, LK, KS)
- Department of Medicine, San Francisco School of Medicine, University of California, San Francisco, CA (CD)

Correspondence to:
Chien-Wen Tseng MD, MS, MPH;651 Ilalo St, MEB,Honolulu, HI 96813;
Email:cwtseng@hawaii.edu

References

1. World Health Organization. COVID-19 Dashboard. Available from: https://covid19.who.int/?gclid=EAIaIQobChMIuvSltrnL6gIVQD6tBh3hHAoTEAAYASAAEgL8F_D_BwE. Accessed May 7, 2021.
2. Wiersinga WJ, Rhodes A, Cheng AC, Peacock SJ, Prescott HC. Pathophysiology, transmission, diagnosis, and treatment of Coronavirus disease 2019 (COVID-19). *JAMA*. 2020;324(8):782–793.
3. Centers for Disease Control and Prevention. Duration of Isolation and Precautions for Adults. Available from: https://www.cdc.gov/coronavirus/2019-ncov/hcp/duration-isolation.html. Published March 16, 2021. Accessed May 7, 2021.
4. Centers for Disease Control and Prevention. When to Quarantine. Available from: https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/quarantine.html. Published March 12, 2021. Accessed May 7, 2021.
5. Bodas M, Peleg K. Self-isolation compliance in the COVID-19 era influenced by compensation: findings from a recent survey in Israel. *Health Aff*. 2020;39(6):936–941.
6. Tamamoto TA, Rousslang ND, Ahn HJ, Better HE, Hong RA. Public compliance with face mask use in Honolulu and regional variation. *Hawaii J Health Soc Welf*. 2020;79(9):268–271.
7. Hawai'i Data Collaborative. Tracking COVID-19 in Hawai'i. Available from: https://www.hawaiidata.org/covid19. Published May 7, 2021. Accessed May 7, 2021.
8. Center for Disease Control and Prevention. Symptoms of Coronavirus. Available from: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html. Published February 22, 2021. Accessed May 7, 2021.
9. Centers for Disease Control and Prevention. People Who Are At Increased Risk for Severe Illness. Available from: https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/index.html. Published April 20, 2021. Accessed May 7, 2021.
10. Sachdeve DD, Brosnan HK, Reid MJA. Outcomes of contact tracing in San Francisco, California – test and trace during shelter-in-place. *JAMA Intern Med*. 2021;181(3):381–383.
11. Sommers BD, Coburn BE. Prescribing paid sick leave – an important tool for primary care during the pandemic. *JAMA Health Forum*. 2020;1(5):e200659–e200659.
12. National Public Radio. Groceries and Rent Money: Why Support for COVID Isolation Is More Important Than Ever. Available from: https://www.hawaiidata.org/covid19. Published March 19, 2021. Accessed May 7, 2021.
13. OneOahu. Available from: https://www.oneoahu.org/resources. Accessed May 7, 2021.
14. American Association of Retired Persons. Hawai'i Information, Health, and Food Help During COVID-19 Outbreak. Available from: https://states.aarp.org/hawaii/health-food-help-coronavirus-covid-19-hawaii. May 7, 2021.
15. KHON2. City Launches New Partnership To Help Oahu's COVID-19 Patients and Their Families. Available from: https://www.khon2.com/coronavirus/watch-live-city-launches-new-partnership-to-help-oahus-covid-19-patients-and-their-families/. Published November 12, 2020. Accessed May 7, 2021.
16. Centers for Disease Control and Prevention. Communication Toolkit – For Migrants, Refugees, and Other Limited-English-Proficient Populations. Available from: https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/communication-toolkit.html. Published February 5, 2021. Accessed May 7, 2021.
17. Grijalva CG, Rolfes MA, Zhu Y, et al. Transmission of SARS-CoV-2 infections in households – Tennessee and Wisconsin, April-September 2020. *MMWR*. 2020; 69(44):1631–1634.
18. Jing QL, Liu M, Zhang Z, et al. Household secondary attack rate of COVID-19 and associated determinants in Guangzhou, China: a retrospective cohort study. *Lancet*. 2020;20(10):1141–1150.
19. State of Hawai'i. State and County Partnership Builds Capacity for Isolation and Quarantine Rooms. Available from: https://health.hawaii.gov/news/newsroom/state-and-county-partnership-builds-capacity-for-isolation-and-quarantine-rooms/. Published August 25, 2020. Accessed May 7, 2021.
20. County of Los Angeles, California. Medical Sheltering Sites. Available from: https://covid19.lacounty.gov/medical-sheltering/#. Accessed May 7, 2021.
21. New York City Government. Help Now NYC: COVID-19 Hotel Program for Those With COVID-19. Available from: https://www1.nyc.gov/site/helpnownyc/get-help/covid-19-hotel-program.page. Accessed May 7, 2021.