

Correlation of Population Factors, Compliance with Masking and Social Distance, Vaccination, and COVID-19 Infection in Central Appalachia

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Objectives: Compliance with coronavirus disease 2019 (COVID-19) guidelines, including the use of masks and social distancing and vaccinations, has been poor. Our study examined what factors may identify those who will be more or less compliant, especially in regard to those with identified higher risk.

Methods: A telephone survey of 200 adult patients from two practices, one general internal medicine and the other rheumatology, was performed in May and June 2021. Questions included age, sex, perception of immunocompetence, smoking history, mask and social distancing compliance, COVID-19 symptoms and/or test-proven infection, and immunization status for COVID-19. Those agreeing to participate also underwent chart review for body mass index, physician-assessed immunocompetence, and diabetes mellitus.

Results: No clinical factors approached statistical significance for the prediction of compliance or noncompliance. Compliance with mask and social distancing highly correlated with vaccination and avoidance of infection, however.

Conclusions: Attempts to improve compliance cannot be focused on any of the particular groups examined in this study.

Key Words: compliance, COVID-19, immunocompromise, vaccination

The recommended responses to the coronavirus disease 2019 (COVID-19) pandemic are not always followed. In our east Tennessee/mid-Appalachia region, we have seen significant resistance to wearing masks, social distancing, and, more recently, vaccination. As of this writing, only 37% of those eligible for the vaccination have received it here.¹

Our study endeavored to define what factors affect patient compliance. Our first question was whether patients who are

immunocompromised would be more compliant. A related question was whether immunocompromised patients realize they are immunocompromised. We then looked at a number of other factors; for example, we expected that smokers would be less likely to be compliant. Finally, we assessed whether patients compliant with masks and social distancing were then more likely to be vaccinated, and whether noncompliant patients were more likely to have had symptomatic COVID-19 infections.

Methods

We performed a telephone survey on a randomized selection of 200 patients in our academic general internal medicine and rheumatology practices. After obtaining informed consent, the patients were asked a series of questions relating to COVID-19 symptoms, proven infection, and compliance with mask wearing and social distancing. They were asked whether they had received the COVID-19 vaccine, and if not, whether they intended to be vaccinated in the future. They also were asked whether they were immunocompromised and for their smoking history, age, and sex. We then conducted a chart review to obtain the most recent body mass index, whether they were immunocompromised by physician assessment, and the presence of diabetes mellitus.

The results of the survey were then analyzed for any clinical characteristic or combination of characteristics that correlated with compliance defined as mask wearing in public and social distancing recommendations. A deep neural network was created to evaluate whether the combination of the factors would uncover a pattern that would be predictive of compliance. Finally, we analyzed whether compliance with masks and social distancing was predictive of compliance with vaccination recommendations and with having symptoms of and/or proven infection with the severe acute respiratory syndrome-coronavirus-2.

Key Points

- Immunocompromised patients were no more likely than others to comply with mask and distancing directives.
- Compliant patients were more likely to avoid coronavirus disease 2019 infection and were more likely to be vaccinated.
- Age, sex, body mass index, smoking status, and diabetes mellitus did not correlate with mask and distancing directive compliance.

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Results

Our population characteristics are shown in Table 1. The initial analysis of a number of factors (age, sex, body mass index, diabetes mellitus, perceived immunocompromise, physician assessment of immunocompromise, current smoker, former smoker) showed that none were predictive of the composite of mask and distancing compliance (Table 2). Combining all of the factors was only 62.5% accurate in predicting compliance—again, not statistically significant; however, not complying was correlated with both contracting proven COVID-19 or having probable COVID-19 (combined positive test, having had typical symptoms, or anosmia; $P < 0.031$ and $P < 0.025$, respectively).

Similarly, compliance with mask and distancing strongly correlated with vaccination. Of the compliant patients, 72% were either vaccinated or intending vaccination, compared with 29% of those who were not compliant ($P < 0.000004$, correlation coefficient 0.374, $P < 0.0000005$).

Discussion

As of August 27, 2021, the Centers for Disease Control and Prevention reported that 52% of the total US population has been fully vaccinated against COVID-19. Our home state of Tennessee was only 41.3% fully vaccinated, with even lower numbers in our region.^{1,2} Vaccine hesitancy even before the pandemic has been reported to be higher in the United States than in low-income countries.³ As such, the role of predictive models for social distancing/masking and vaccine behaviors is essential in ending the COVID-19 pandemic.

Our survey of 200 patients from the Appalachian Highlands region sought to prove that immunocompromised patients in our academic practice would social distance and mask more than the general internal medicine patients surveyed, although this assumption was disproved. Of the factors we examined, we found that patients who were either positive for COVID-19, had COVID-19–related symptoms, or anosmia were less likely to be vaccinated or practice social distancing/masking.

A common thread of reviewed studies was an effort to build a model for predicting compliance with mask and distancing

Table 2. Comparisons

Factor	Mask/distance compliance		P
	With factor, %	Without factor, %	
Perceived compromise	65.8	60.3	0.5
Physician opinion compromised	65.1	60.7	0.63
Current smokers	66.7	61.6	0.7
Current or former smokers	61.3	63.6	0.855
Female sex	61.9	64.2	0.9
Diabetes mellitus	69.2	60.9	0.43
COVID-19 tested positive	45.2	65.9	0.049
COVID-19 composite	47.9	68.2	0.036
Vaccine composite	72.3	28.9	<0.0000004

COVID composite is any positive test, appropriate symptoms, anosmia. Vaccine composite is having received ≥ 1 doses of a COVID vaccine or intending to receive the COVID vaccine. COVID-19, coronavirus disease 2019.

behaviors.⁴⁻⁶ Although our study may have been limited by small sample size, regional bias, and including our patients of record, the larger, anonymous surveys reviewed did not produce a consensus on demographic factors to predict social distancing or compliance. Addressing general vaccine hesitancy may lead to a cost-effective and generalizable public health model to increase compliance with the COVID-19 vaccine and preventable illness.

Conclusions

Our study sought to identify clinical characteristics that would point to better compliance with recommendations during the COVID-19 pandemic. Because no such clinical characteristics were identified, attempts to influence public behavior cannot be directed to subgroups, rather must be directed at the population as a whole. Also notable is that those who were compliant with some items (eg, mask wearing/social distancing) were more likely to be compliant in other areas (vaccination) and more likely not to become ill with COVID-19.

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Table 1. Population features

Factor ^a	
Age, y	59.7 (18–86)
BMI	33.1 (18.4–66.8)
Perceived immunocompromise, %	39.50
Physician opinion of immunocompromise, %	41.50
Diabetes mellitus, %	19.50
Smoker, %	18
Current or former smoker, %	46.50
Female sex, %	73.50

BMI, body mass index.

^aIncludes range where applicable.