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Revelations from the Clinic: Protective Behaviors and Perceptions among People at High Risk for Severe Illness from COVID-19

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Abstract

Objectives: The CDC has warned of increased risk for severe COVID-19 illness among those with certain preexisting conditions. Protective behaviors such as social distancing and mask-wearing have been shown effective at curbing infection rates. These practices are subject to individual perceptions of risk and responsibility. This study aimed to characterize the risk perceptions and protective behaviors of residents in a rural central Michigan region. Specifically, we examined whether individual risk status predicted protective behaviors and concern about the pandemic. **Methods:** Participants were identified via medical records at participating clinics. The high-risk group was those with conditions that put them at increased risk of severe illness from COVID-19, and was compared to healthy controls. Data were collected via phone survey. Participants were asked about their protective behaviors and level of concern about the ongoing pandemic. **Results:** A total of 150 patients participated in the survey; 73 were high-risk acknowledgers, 29 were high-risk deniers, and 48 were healthy controls. There was no significant difference between the groups on level of concern regarding the pandemic or protective behaviors ($P > .05$). Compared to other comorbidities, obese people were significantly more likely to deny their risk ($P < .05$). **Conclusions:** In this study, high risk, whether acknowledged or denied, did not appear to significantly impact behaviors or concern. The high percentage of those at high risk who did not acknowledge this suggests many factors including a potential lack of patient education regarding their comorbidities, specifically, how their illness increases their risk of severe illness from COVID-19.

Keywords

COVID-19, social distancing, protective behaviors, comorbidities, patient education

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Introduction

In December 2019, the government in Wuhan, China identified a new virus that was causing severe respiratory illness among the population. By January 11th, 2020, the first person to die from the virus was reported in China. The virus quickly spread throughout Wuhan and on January 30th, the World Health Organization (WHO) declared a global health emergency. By February 11th, the new deadly virus was named COVID-19. The virus quickly spread from China to the rest of the world and by March 2020 COVID-19 was declared a pandemic.[1,2]

To better understand this new virus and why it causes such a wide range of illness, from asymptomatic to severe acute respiratory disease and death, several studies have explored the factors associated with poor outcomes. Meta-analyses of these studies have consistently identified

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underlying conditions that place patients at increased risk of a severe disease course. In 1 meta-analysis, the strongest predictors of severe disease were found to be pre-existing respiratory disease, hypertension, cardiovascular disease, chronic kidney disease, cerebrovascular disease, malignancy, diabetes, and obesity, consistent with comorbidity effects noted from other severe acute respiratory outbreaks.[3] Malignancy, in particular, was shown to be associated both with increased risk of contracting COVID-19 and increased risk of severe COVID-19 illness.[4] Another meta-analysis found that cardiovascular conditions were present in many patients who experienced poor outcomes from COVID-19, but the association with these conditions in isolation was less clear as they also often had other comorbidities as well.[5] Patients with type 2 diabetes were more likely to require advanced interventions during hospital stays than those without type 2 diabetes, and those with poor blood glucose control had significantly increased risk of complications and death.[4] The presence of COPD has also been shown to impart a 4-fold increase in mortality in COVID-19 patients, though there does not seem to be a strong association between smoking status and COVID-19 severity.[4] Finally, while a direct link between obesity and severe COVID-19 has not yet been identified, obesity is a main risk factor for several other comorbidities which are associated with severe disease such as hypertension, diabetes, and cardiovascular disease.[6] Taking into account these and other research findings, the Centers for Disease Control and Prevention (CDC) has warned of increased risk for severe COVID-19 illness among those with cancer, chronic kidney disease, COPD, heart conditions (such as heart failure, coronary artery disease, or cardiomyopathies), obesity (BMI $>30\,kg/m^2$), sickle cell disease, immunocompromised from solid organ transplant, and type 2 diabetes mellitus.[7]

Public health measures encouraging or mandating protective behaviors, particularly social distancing and mask wearing, to prevent infection of those who are most likely to experience severe disease could have a large impact on the management of healthcare resources. Studies demonstrating the effectiveness of such measures in the real world have found that certain communities are more adherent to related public health guidelines than others.[8,9] Other studies have characterized the protective behaviors and attitudes of different populations globally with the hope that an understanding of local mindsets will allow more targeted public health action.[8,10-16] Results from these studies indicate heterogeneity in the practices of different populations based on factors such as geography, age, sex, socioeconomic status, and political affiliation. One survey of US respondents found that having risk factors for severe disease did not predict social distancing practices, but those with higher risk perceptions around the negative health consequences of not social distancing were more likely to social distance.[17] Therefore, adequately assessing local risk perceptions and effectively communicating risk could aid in public health measure implementation.

The goal of the current study was to characterize the risk perceptions and protective behaviors among residents of a rural central Michigan region. Specifically, we examined whether individual risk status predicted social distancing practices and concern about the pandemic.

Methods

Participants

This cross-sectional correlational study was reviewed and approved by Blinded IRB, and included a waiver of written consent. The study population included patients from 2 primary care clinics in rural central Michigan. The Electronic Medical Records (EMR) system at each clinic was used to construct 2 lists of patients: patients with high-risk conditions and patients without high-risk conditions. The inclusion criteria for the high-risk group were based on the CDC's designated comorbidities that put patients at high risk for contracting severe COVID-19 illness. These conditions included cancer, chronic kidney disease, COPD, heart conditions (such as heart failure, coronary artery disease, or cardiomyopathies), obesity (BMI $>30\,kg/m^2$), sickle cell disease, immunocompromised from solid organ transplant, and type 2 diabetes mellitus. The high-risk patient list was formed by selecting universal International Classification of Disease (ICD) codes in the EMR that represented these conditions. The list of patients without high-risk conditions, which became the potential control group, was selected by running the inverse report of the high-risk group in the EMR. These lists excluded vulnerable populations including patients under 18 years of age, non-English speakers, and decisionally-impaired persons.

Data Collection

Data were collected by a team of 3 medical students who called patients from the high-risk patient and non-high-risk patient lists. Following informed consent, patients were asked if they had any of the conditions recognized by the CDC as high risk for contracting severe COVID-19 (cancer, CKD, COPD, TIIDM, immunocompromised due to organ transplant, obesity, serious heart conditions, and sickle cell disease). Next, as seen in Table 1, patients were asked structured questions and given options from which they could choose their responses. For question 2, when asking about the patients' protective behaviors, standardized examples were provided for the patient in order to determine how often they practice protective behaviors. For example, the

Table 1. Questions Asked During Phone Call.

Question asked	Answer options given
Q1: What is your level of concern or uncertainty regarding the ongoing pandemic?	1—Not concerned at all 2—Slightly concerned 3—Somewhat concerned 4—Moderately concerned 5—Extremely concerned
Q2: What is your current level of social distancing, including: wearing a mask while in public, limiting travel, standing 6 ft apart from others?	1—Never 2—Rarely 3—Sometimes 4—Often 5—Always
Q3: Would/does falling into a high-risk category change your social distancing practices?	Yes No
Q4: Would/does falling into a high-risk category change your perception of the ongoing pandemic?	Yes No

answer "rarely" would indicate that the patient wears mask only when required, travels outside of hometown, and has in no way limited interaction with others.

Statistical Analysis

Data were initially entered into an Excel spreadsheet, and converted to an SPSS database for analysis. Descriptive analyses included frequency counts, means, and standard deviations. Comparisons of study groups included bivariate *t*-tests, 1-way ANOVA *F* tests, and chi-square analysis. All analyses were pre-specified and hypothesis driven, with the exception of analyses that subdivided the at-risk group based on unanticipated denial of risk by some participants (see Results section).

Results

Participant Characteristics

A total of 2,771 high-risk and 7,210 control patients were eligible to participate in the survey. The patients were randomly sorted and called. A total of 150 patients agreed to participate in the study; 102 were considered high risk, and 48 were healthy controls based on information in the EMR. Of the 102 high risk patients, when asked if they were high-risk according to the CDC recommendations, 73 acknowledged they were high risk, while 29 denied they were at high risk. Because acknowledgement of risk may impact feelings and practices, those who denied they were high risk were treated as a separate group for purposes of description and analysis. Therefore, this led to a total of 3 different patient groups: high risk deniers, high risk acknowledgers, and controls which were the non-high-risk group. Of the total 102 high risk individuals, the percentages of their reported risks were: cancer (n = 9)—8.8%, Type 1 diabetes (n = 37)—36.3%, obesity (n = 47)—46.1%, heart disease (n = 21)—46.1%, COPD (n = 27)—26.5%, chronic kidney disease (n = 8)—7.8%, and organ transplant (n = 1)—1.0%. This total exceeds 100% as 34 patients had more than 1 risk factor.

Table 2 shows the differences between the 3 patient groups on background factors. The groups did not differ significantly on gender, but there was a non-significant trend for high-risk patients to be older than controls. Additionally, those at high risk were more likely to have been tested for COVID, and when tested, were more likely to have tested positive ($P < .10$).

Survey Responses

Participant survey responses are detailed in Table 3. There was no significant difference in responses between high-risk deniers, high risk acknowledgers, and control participants However, non-significant trends include that the high-risk acknowledger group, when compared to the control group, was nearly 50% more likely to report never or rarely practicing protective behaviors. The high-risk acknowledger group was also more likely to indicate level of risk would impact their protective behavior practices. In addition, the high-risk denier group was more likely than either the healthy controls (119% more likely) or high-risk acknowledger group (44% more likely) to indicate they rarely or never practiced protective behaviors.

Risk Factors for High-Risk Groups

A final analysis looked at whether certain risk factors predicted whether someone would acknowledge or deny their risk. As shown on Table 3, high risk deniers were more likely to be obese, while high risk acknowledgers were more likely to have cancer, Type 2 diabetes, and COPD.

Discussion

In this study, we aimed to assess the social distancing attitudes and practices of rural primary care patients with high-risk comorbidities compared to the healthy population. We particularly wanted to determine if the high-risk group was more likely to follow the CDC guidelines regarding protective behaviors such as wearing a mask, staying 6 ft apart, and limiting contact with others.

We found that when comparing the high-risk acknowledgers to the control patients, there was no significant difference in level of concern regarding the pandemic, with

Table 2. Participant Characteristics by Study Group.

	Control (n = 48)	High risk, denies (n = 29)	High risk, acknowledges (n = 73)
Age (years)	57.1	60.5	63.8
Gender (% male)	35.4	37.9	38.4
Ever tested for COVID (%)	27.1	48.0	44.3+
Positive COVID test (% of those tested)	0	8.3	16.1+

+$P < .10$.

Table 3. Survey Responses by Study Group.

	Control (n = 48) (%)	High risk, denies (n = 29) (%)	High risk, acknowledges (n = 73) (%)
Level of concern about pandemic			
Not at all/slightly	20.8	31.0	24.7
Somewhat/moderately	47.9	31.0	41.1
Extremely	31.3	37.9	34.2
Level of social distancing practiced			
Never/rarely	6.3	13.8	9.6
Sometimes/often	52.1	44.8	54.8
Always	41.7	41.4	35.6
Would/does being high risk impact your social distancing practices			
No	52.1	44.8	44.4
Yes	47.9	55.2	55.6
Would/does being high risk impact your concern about the pandemic			
No	56.3	41.4	47.2
Yes	43.8	58.6	52.8

No differences were statistically significant at $P < .05$.

Table 4. Comparison of Risk Factors for those who Acknowledge Versus Deny their High-Risk Status.

	High risk, acknowledges (n = 73) (%)	High risk, denies (n = 29) (%)
Has/had cancer	11.0	3.4%+
Has type 2 diabetes	45.2	13.9**
Is obese (BMI ≥30)	38.4	65.5*
Has heart disease	23.3	13.8
Has COPD	30.1	17.2+
Has chronic kidney disease	5.5	13.8

+$P < .10$. *$P < .05$. **$P < .01$.

less than one quarter not at all or only slightly concerned, and about one third extremely concerned. In addition, while the difference was not significant, the high-risk group was nearly 50% more likely than control patients to report never or rarely practicing protective behaviors, with only about a third indicating they always practiced protective behaviors. When asked if being high risk impacts their concern about the pandemic, those at high risk were 20% more likely to be concerned about the pandemic compared to the controls, however this difference was not significant. In addition, the high-risk group was more likely to indicate that being high risk impacts their protective behavior practices, with around 55% admitting this was the case. Interestingly, while they stated that being high risk impacts their protective behaviors, it is not reflected in their actual level of protective behaviors since only one third stated they always practice protective behaviors with no significant difference compared to the controls.

Encountering high risk deniers was unexpected but provided an opportunity to explore the issue in this study. While the results were not statistically significant due to sample size, the denier group was much more likely than either the healthy controls (49% more likely) or the high-risk acknowledgers (26% more likely), to say they were not at all or only slightly concerned about the pandemic. In addition, the high-risk deniers were more likely than either

healthy controls (119% more likely) or the high-risk acknowledgers (44% more likely) to indicate they rarely or never practice protective behaviors. Although this group denied being high-risk, they were more likely to respond similarly to the high-risk acknowledger group than the control group.

We also explored factors that might lead to high-risk denial. We found that obese patients were significantly more likely to deny their risk factor, while patients with type 2 diabetes, COPD, and cancer were significantly more likely to acknowledge their risk factor. These results indicate that patients with obesity have a greater chance of not knowing their elevated COVID risk, which could potentially increase their chances of contracting and having severe illness from not only COVID-19 but potentially other illnesses as well.

The lack of significant difference between the control and high-risk groups in terms of both perceptions and practices related to COVID-19 may be due to inadequate education about their comorbidities and recommended protective behavior practices. It has previously been found that therapeutic patient education improves disease prevention and compliance with treatment.[18] Patients in the high-risk acknowledgers group may not have understood that their comorbidities increase their risk of severe illness from COVID-19, and therefore were unaware that they should be more attentive to protective behavior recommendations. In addition, we had multiple conversations with patients about proper protective behavior practices due to their lack of understanding of the recommendations. For example, some patients were unaware of where COVID-19 is most likely to spread or when it is necessary to wear masks.

It is also interesting that there were 29 patients that denied they were part of the high-risk group, with the majority being obese patients. This suggests that there is a lack of patient education on their comorbidities. A recent study suggested that in order to improve patient education on comorbidities, specifically obesity, there needs to be more training among providers in order to decrease bias and increase patient counseling, which would ideally increase patient awareness.[19] Additionally, a US national survey of primary care physicians showed physicians want additional training to improve their care of obese patients.[20] It is critical that physicians properly educate and counsel their patients on obesity in order to prevent increased overall mortality, and mortality from diabetes, renal disease, liver disease, neoplasms, and respiratory diseases.[20] Educating patients on their comorbidities could help improve their compliance to treatment and awareness of the disease. In addition, it could prevent mortality or severe morbidity from COVID-19.

This study had multiple limitations. One limitation is the sample size which decreased statistical power resulting in potentially clinically meaningful findings not being statistically significant. Secondly, people that were more concerned about COVID-19 or supported protective behavior practices may have been more likely to answer and respond to the survey due to interest in the topic. Thirdly, the younger population was less likely to answer the phone calls than the elderly. Since the younger patients are typically healthy and in the control group, they may have been less likely to participate in protective behaviors. Lastly, some patients stated they were practicing the highest level of protective behaviors which impacted how they answered the last 2 survey questions. Since they already were doing the maximum level of behaviors, they said being high risk does not impact their protective behavior practices or concern regarding the pandemic. Future study should consider modifications to that type of question.

In conclusion, this study found no significant difference in the protective behavior practices and concern about the pandemic between those who are at high risk due to pre-existing medical conditions and those who are not. This study suggests that this could be from a lack of patient understanding of their comorbidities, especially among patients whose primary risk was obesity. In order to decrease mortality from COVID-19, patients need to be educated on their comorbidities, recommendations for protective behaviors, and buy-in for following those recommendations needs to increase.

Declaration of Conflicting Interests

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