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Factors Influencing Influenza and COVID-19 Vaccine Decision-Making in the Post-ICU Period:

A Secondary Analysis

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Abstract

BACKGROUND: The introduction of COVID-19 vaccines exposed volatility and hesitancy around vaccines. Some health care models, including ICU recovery clinics (ICU-RCs), are

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structured to provide vaccine counseling. However, information regarding provider and patient vaccine conversations is limited in this postacute setting.

RESEARCH QUESTION: What factors influence the decision-making process of patients who have survived an ICU stay surrounding influenza and COVID-19 vaccination?

STUDY DESIGN AND METHODS: To understand further vaccine perceptions after critical illness, a secondary qualitative thematic analysis was performed using transcripts from a randomized controlled trial designed to develop and refine a telemedicine approach to ICU recovery. Thirty-three ICU-RC visits with 19 adult patients and 13 caregivers were conducted within 12 weeks of hospital discharge. The analysis was guided by the theory of planned behavior (TPB).

RESULTS: Five themes were elicited from the data. The first four themes arose from the TPB: (1) behavioral and attitudinal beliefs (not being susceptible to the flu, concerns about the COVID-19 vaccine causing fertility issues, and not being tested enough), (2) normative beliefs (everyone they know is getting the influenza vaccine so they are, too), (3) control vaccine beliefs (patients are more likely to get the COVID-19 vaccine if it is easy to obtain), and (4) intention to vaccinate. Another theme not related to the TPB arose and could contribute to vaccine intent and behavior: (5) health team engagement with patients and caregivers (allowing for ICU clinicians to correct vaccine misinformation in real time).

INTERPRETATION: Using the information learned in our study, the period after critical illness or other acute illness events may be an especially fruitful target for designing an action plan for improving public trust in vaccines and improving overall completion rates; however, further research is needed.

TRIAL REGISTRY: ClinicalTrials.gov; No.: NCT03926533; URL: www.clinicaltrials.gov

Keywords

COVID-19; critical care; follow-up clinic; influenza; vaccination; vaccine hesitancy

Vaccine hesitancy plays an important role in low vaccination intentions and uptake.[1] Before the COVID-19 pandemic, the World Health Organization named vaccine hesitancy—the reluctance or refusal to vaccinate despite the availability of vaccines—as one of the top 10 threats to global health.[1] Since its introduction in late 2020, the COVID-19 vaccine has exposed new levels of misinformation and hesitance around vaccines (eg, concerns about safety, mistrust of the government), leading to undervaccination and vulnerability to other vaccine-ameliorated infections such as influenza.[1,2]

From January 2020 through July 2021, overall adult vaccine rates decreased by 32%.[3] In 2023, adult influenza vaccination rates in the United States are at 47%,[4] falling far below the Healthy People 2030 goal of 70%.[5] According to the Centers for Disease Control and Prevention, 32% of adults in the United States do not intend to become vaccinated for influenza.[4] Should low vaccination rates persist, the combined burden of these infectious diseases will strain the health care system further, leading to preventable illness and death. To mitigate this potential strain on the health care system, the US Department of Health and

Human Services' Healthy People 2030 goal is to increase the share of adults who receive recommended age-appropriate vaccines.[5]

The mutable nature of vaccine hesitancy calls for new modes of analysis to characterize not only the temporal features of hesitancy, but also its behavioral manifestations and their effects on vaccine uptake. Many care models, such as routine preventative care, are structured to provide vaccination discussions at touch points within the health care system. ICU recovery clinics (ICU-RCs) provide transitional care designed to assess and treat the unique needs of patients recovering from critical illness.[6] Provision of timely preventative care, including vaccine counseling, smoking cessation, and other methods of promoting healthy behaviors, have been proposed as key features of these clinics.[7] Since ICU-RC clinicians often are the main point of contact between patients and the medical system in this period after acute illness, information regarding vaccine hesitancy may help them to anticipate and support these important conversations. However, information regarding vaccine conversations in this setting is limited. Thus, we explored the influenza and COVID-19 vaccine beliefs and behaviors of patients who have survived an ICU hospitalization as discussed during an ICU-RC visit.

Study Design and Methods

Design and Setting

We performed a secondary qualitative thematic analysis using transcripts from a randomized controlled trial (RCT) that was designed to develop and refine a telemedicine approach to ICU-RC delivery.[8] The original RCT was conducted in a tertiary academic medical center in the southeastern United States. The ICU-RC offers an interdisciplinary evaluation of physical, cognitive, and mental health weeks to months after an ICU hospitalization. The study was approved by the Vanderbilt University Institutional Review Board (Identifier: 190790) and is reported according to the Consolidated Criteria for Reporting Qualitative Research.

This thematic analysis was performed using a qualitative descriptive approach and was guided by the theory of planned behavior (TPB) to investigate the salient factors that patients who have survived an ICU stay expressed during inquiry and counseling about influenza and COVID-19 vaccine recommendations.[9] The TPB is a well-known framework for understanding, predicting, and characterizing overt choices to perform a behavior.[9] The TPB may be used to theorize the impacts of behavioral attitudes (ie, inclination toward a behavior), subjective norms (ie, social influence), and perceived control (ie, capacity to perform) regarding vaccine intentions and behaviors. Figure 1 displays the relationship of these three beliefs and their role in influencing intention to vaccinate and actual vaccine behaviors.[10] It should be noted that during early parts of the study, the COVID-19 vaccine was not available for certain age groups, so some of the responses are related to hypothetical acceptance of the vaccine.

Sampling and Recruitment

Because this was a secondary analysis, we did not recruit participants for this study. Sample recruitment and data collection procedures were all carried out during the parent RCT. The parent RCT included convenience sampling of adults (aged ≥ 18 years) with septic shock or ARDS hospitalized in a 35-bed medical or 23-bed surgical ICU and projected to be discharged alive. Participants were excluded if they did not have access to a computer, electronic device (eg, tablet or smartphone), internet connection, or a combination thereof for telemedicine visits. Additional exclusions in the parent RCT included out-of-state residence, discharge to hospice, inability to live independently because of a psychiatric or substance misuse disorder, severe dementia, blindness, deafness, or inability to speak English. Patients declining to participate in the RCT were still offered referral to the ICU-RC, if clinically indicated.

Patients meeting RCT eligibility criteria were approached for face-to-face recruitment after transferring out of the ICU. Before March 2020, consent was obtained during hospitalization. After March 2020, because of COVID-19 restrictions, eligible patients were phoned after hospital discharge to discuss participation. Those who agreed to participate voluntarily consented to the study via Research Electronic Data Capture e-consent procedures.[11] On enrollment, patients were randomized 1:1 to undergo telemedicine ICU-RC (intervention) or usual care determined by the discharging clinical team (eg, primary care).

Procedures

Telemedicine ICU-RC visits were performed via a secure webconferencing platform. Participants met with the ICU pharmacist, ICU physician, and a psychologist, all of whom have worked in the ICU-RC since it was established in 2012. During the participant's ICU stay, the pharmacist and physician may have provided direct patient care. If the patients did not know the clinicians, they introduced themselves at the beginning of the visit. No prior communication occurred between the participants and psychologist.

Before the COVID-19 pandemic (December 2019 through March 2020), telemedicine ICU-RC visits were carried out in a physical examination room where clinicians entered one at a time to complete their portion of the evaluation. At the onset of the COVID-19 pandemic, clinicians concurrently joined visits from individual remote locations, permitting concurrent telemedicine evaluation and dialogue. Secure patient portals allowed participants to access the video conferencing platform from a location of their choice (provided the ICU clinicians had a license in the state), usually at home.

Data Collection

Research personnel collected baseline demographic and clinical data for all 19 participants. During the study, 33 telemedicine ICU-RC visits were audio recorded by a trained research assistant attending the visit from a private remote location. No participants declined audio recording of the visit or dropped out. Although not recruited for the study, patient caregivers were present during some of the recordings and participated in the dialogue. Recordings were stored in a secure web-based file repository and were transcribed verbatim by an

approved commercial transcription service (https://rev.com). No field notes were created during or after the telemedicine visits. Transcripts were compared with audio recordings for verification, but were not given to participants for member checking. Intentions to vaccinate, as identified by patient statements during the ICU-RC visit, were recorded in a Microsoft Excel file. An audit trail was maintained throughout the study. Influenza vaccines were considered completed if they were carried out during the current season. COVID-19 vaccines were marked completed if the patient received two doses of Pfizer or Moderna vaccines.

Data Analysis and Rigor

A nurse PhD student (S. J. C.) with qualitative research knowledge and a PhD nurse scientist (L. M. B.) with extensive qualitative research and analysis experience conducted a thematic analysis of the previously transcribed ICU-RC visits. The primary investigators (S. J. C., L. M. B.) autonomously acquainted themselves with the data using a cross-case approach.[12] Like-data clustering and note-taking occurred during this first step. In the next step, the research team (S. J. C., L. M. B.) manually conducted transcript analysis and developed a codebook, which included the constructs of the TPB for a deductive analytic process. Each researcher independently examined the transcripts line by line to identify relevant codes. Responses and codes were evaluated and deliberated among the investigators to ensure clarity and consistency. Inconsistencies then were discussed and amended in the coding method. Further examination revealed the need to relabel select codes, based on like descriptor or repeat-pattern responses, capturing the core idea from each code grouping. Finally, the codes were pooled, integrated, and relabeled to create categories via axial coding. Similar codes were organized into subthemes within the predetermined TPB constructs. Because intentions and behaviors might vary according to other variables unrelated to the TPB, we also allowed for the discovery of other possible moderators. Through this inductive analysis, we identified one new category not fitting into TPB contructs.[12] This relabeling to capture the core ideas expressed by participants yielded the final five major themes. Both primary investigators independently identified and used all available data, resulting in code saturation.

The criteria for qualitative rigor (ie, credibility, transferability, dependability, and confirmability) were evaluated.[13] Credibility was established through the descriptive design and research focus alignment with the TPB.[13] It was fortified by the application of self-reflection and collaboration, because data were reviewed and discussed between researchers representing different settings and specialties, being open-minded regarding new findings.[13] Data collection procedures were evaluated routinely by the clinicians who participated in the vaccine discussions and reviewed the findings for accuracy and reflection of practice.[13] Transferability was achieved by the participant findings being supported with findings in the literature.[13] Dependability was demonstrated by keeping an audit trail to maintain documentation of our analysis as well as data such as direct quotes from transcripts, drafts of subthemes created during analysis, a codebook, and a code sheet created during the analysis process.[13] Confirmability was attained through debriefing with the ICU clinician and pharmacist who delivered the telemedicine ICU-RC visit to minimize potential bias.[13]

Results

Participants (N = 19) requiring ICU admission for septic shock, ARDS, or both completed 33 ICU-RC visits at either 3 weeks after hospital discharge (16%), 3 months after hospital discharge (16%), or both (68%) (Table 1). On average, 12-week visits were 15 min shorter (3-week visit median, 52 min; 12-week visit median, 37 min). Family caregivers participated in two ICU-RC visits. Influenza vaccines were discussed with 17 participants and COVID-19 vaccines were discussed with seven participants. Vaccines were not discussed with two participants, one completing a single visit and the other completing both visits, leaving us with 30 transcripts and 17 patients left to analyze. At the time of the first telemedicine visit, 10 and four patients had received the influenza and COVID-19 vaccine, respectively. During the telemedicine visit, of the seven influenza vaccine-eligible patients and three COVID-19 vaccine-eligible patients, three patients and one patient expressed an intention to vaccinate against influenza and COVID-19, respectively. The COVID-19 vaccine was not available for one eligible participant at the time. Within 6 months after the telemedicine visit, and of those who had not been vaccinated before the telemedicine visits, three and zero eligible patients received the influenza and COVID-19 vaccines, respectively. One patient with a history of Guillain-Barré syndrome was ineligible for the influenza vaccine. Another patient was excluded from receiving the COVID-19 vaccine because they did not meet age criteria to receive the vaccine at that time.

Five themes were elicited from the data. The first four themes arose from the TPB: (1) behavioral and attitudinal beliefs, (2) normative beliefs, (3) control salient vaccine beliefs, and (4) intention to vaccinate. One theme not related to the TPB also arose and could contribute to vaccine intent and behavior: (5) health team engagement with patients and caregivers. These new findings were used to adapt the current TPB framework of possible factors influencing patient decisions regarding influenza and COVID-19 vaccination (Fig 2). Hereafter, we describe each theme paired with salient quotations (Table 2).

Theme 1: Patient Vaccine Behavioral and Attitudinal Beliefs

During clinic visits, participants discussed influenza and COVID-19 vaccine beliefs and attitudes, including assumptions based on past experiences. One patient believed they were unlikely to contract influenza. “The last time I had the flu I was 5 years old … I don’t ever get the influenza … I am not worried” (patient 044). Another participant outlined a public health advantage of vaccinating against influenza believing it would “help resolve the workload of people in the ER with breathing difficulties” (patient 027).

COVID-19 vaccine concerns included issues with fertility (quotation 1.3), not being tested enough (quotation 1.4), not covering future mutations (quotation 1.5), and not enough research (1.6). Other beliefs included being potentially allergic to the vaccine (quotation 1.7), vaccines being linked to autism (quotation 1.8), and unknown long-term effects (quotations 1.9 and 1.10). “Well, [my fears are] more the long-term effects of it. Like 10 years, 20 years, will it cause cancer or will it not? There’s just so much unknown that I don’t like to think about” (patient 044).

Theme 2: Patient Normative Beliefs

Normative beliefs favoring vaccination included social pressure (everyone they know getting the influenza vaccine) (quotation 2.1) and realizing vaccine misinformation exists (quotation 2.2): “It’s that bloody British doctor as well who started all this crud” (patient 027).

Theme 3: Patient Control Beliefs

A barrier identified to receiving the influenza vaccine included lack of availability (quotations 3.1 and 3.2), whereas a barrier to receiving the COVID-19 vaccine was ineligibility (quotation 3.3). Another patient reported the COVID-19 vaccine was easy to obtain (quotation 3.4).

Theme 4: Intention to Vaccinate

Intentions to vaccinate against influenza were reported alongside health concerns after an ICU admission and with a patient’s history of vaccination (quotations 4.1 and 4.2): “Obviously, given the relative instability in my health, I feel like maybe this year is the year I should start [getting the flu vaccine]” (patient 027).

Theme 5: Health Team Engagement With Patients and Caregivers

The engaging and multidisciplinary nature of telemedicine visits provided ICU clinicians with unique opportunities promptly to address and provide expert advice on vaccine-related concerns. Within this context, engagement included offering comprehensive education about vaccines to enhance awareness and knowledge among patients and facilitating convenient access to necessary vaccinations through referrals. ICU clinicians actively involved caregivers (family members providing support, assistance, and care to the patient who has survived an ICU stay) in meaningful vaccine discussions.

When one patient described believing that influenza was not a risk for them, the pharmacist encouraged vaccination: “[I] really [want] to encourage [you] to [get the influenza vaccine], especially with COVID … If you have had the influenza shot, you would do a lot better” (ICU pharmacist discussion with patient 044).

In response to a fear of the unknown long-term COVID-19 vaccine effects, both the ICU pharmacist and physician provided reassurance and education about mRNA vaccine technology, describing is as “like Snapchat … it’s there and then it’s gone,” with the ICU physician explaining that “the mRNA platform for making the vaccine … is really not that new … [the mRNA] is unstable, which is why we don’t have more vaccines from this platform yet. [Vaccine Brand] came up with a lipid particle to keep it stable enough to get into the body, but then it just disappears. So, there’s really no biologic plausibility for causing cancer or anything like that. It just makes this little strip of protein and then your body sees the protein and says, ’Oh, no,’ and it makes the antibodies that you would develop with a natural infection” (ICU physician and pharmacist discussion with patient 045). Finally, although the COVID-19 vaccine was not immediately available during the visit for certain patients, the ICU physician provided valuable information regarding the availability of the vaccine (quotation 5.7).

Although 13 caregivers were present in the entire study, only two caregivers actively participated in discussions surrounding vaccines. Having caregivers present during the telemedicine visits allowed for the ICU team to converse with them and to learn about their role in the patient's care. During one such visit, a caregiver spoke against the patient receiving the COVID-19 vaccine (quotation 5.8), but it was discovered that the patient generally was not hesitant about vaccines because they already had received a flu shot. This highlighted the potential for further education and counseling regarding COVID-19 vaccination.

Discussion

The acceptance of vaccines is influenced heavily by psychological behaviors, societal issues, and perceived control of access to vaccines.[14] This qualitative study applied a theoretical approach to identify factors perceived to influence vaccine behaviors for the influenza and COVID-19 vaccines in patients recovering from critical illness. Open dialogue allowed patients and caregivers to express concerns and for the care team to provide real-time education and evidence-based recommendations. We identified misunderstandings about how vaccines work and the evidence behind them. Intentions to vaccinate were associated with health concerns after ICU admission, suggesting that the period after hospitalization may be a good time to discuss vaccines.

Safety, Side Effects, and Effectiveness

Consistent with factors identified in the literature associated with hesitancy toward the influenza and COVID-19 vaccines, perceptions about safety, side effects, and effectiveness were identified as the most common reasons for vaccine hesitancy in our study.[14-16] A comprehensive review of 2,791 studies conducted between 1990 and 2019 revealed that, although vaccine hesitancy largely depends on culture and local context, concerns about safety are the main cause of vaccine refusal.[15] Another review of 1,187 studies primarily about influenza vaccines concluded that perceived side effects and safety concerns were the leading causes of vaccine refusal by the general public.[16] These factors have been observed in previous vaccine programs and have been reported in studies focusing on reasons for COVID-19 vaccine hesitancy.[14] These findings indicate a need for a set of talking points and motivational interviews to understand vaccine hesitancy further among ICU-RC patients.

Role of the Caregiver

During telemedicine visits, caregivers were encouraged to express their opinions on the influenza and COVID-19 vaccines, and it was found that their opinions can affect the patient's intent and follow-through for vaccines. Consistent with the literature, social influence is a core determinant of individual decisions to vaccinate against influenza and COVID-19.[14,17-20] Caregiver hesitation, including perceptions the COVID-19 vaccine was not tested enough, also aligned with existing literature.[19,20] This suggests that a supportive caregiver can be a strong influencing factor for a patient to vaccinate. However, the literature on the effect of caregivers' hesitancy on adults immunizing against influenza and COVID-19 is limited, and more investigation is needed to understand the role of caregivers in adult vaccine hesitancy.[19,20]

Use of Telemedicine

Telemedicine introduces a distinct dynamic compared with traditional in-person visits. In a qualitative study sampling the same participants, the telemedicine ICU-RC visits were reported to be acceptable, time-saving, and comprehensive.[21] They highlighted the strengths of the team dynamic such as thoroughness of each clinician, not having to answer questions more than once, and the convenience of telemedicine visits for saving travel time.[21] Caregivers also noted the convenience and reported emotional benefits from interacting with ICU-RC clinicians.[21] One patient in particular perceived that the ICU-RC clinicians went overboard trying to talk them into the flu vaccine, suggesting a power imbalance of the multiple participating clinicians and potentially influencing vaccination intention.[21] Thus, it is important for providers to let patients share their concerns openly and feel free to ask questions about vaccines to build trust and be able to provide them with accurate information tailored to their individual health needs.[21]

Strengths and Limitations

The strengths of this study include fuller insights into vaccine decision-making using dialogues among multidisciplinary clinicians, patients, and caregivers after critical illness. Telemedicine ICU-RC delivery allowed for care teams to reach patients who have survived an ICU stay who may not have been able to attend an in-person visit or otherwise participate in research during a global respiratory pandemic.

This study has limitations. First, the sample is small and participant diversity was limited, thus limiting the transferability of our findings. Patients were recruited from a single academic medical center, and participants who did not have access to technology and did not speak English were excluded. For these reasons, findings are transferable only to like populations in like settings. Second, because many visits were conducted with the entire team present, answers to clinician questions could have influenced the disclosure of problems during the visit. Third, although we looked at vaccine adherence, the COVID-19 vaccine was discussed with only 37% of participants, and some patients did not have access to the COVID-19 vaccine at the stage of the pandemic when the visits were conducted. It is uncertain whether, given access, they would have accepted or declined the vaccine. Fourth, because we did not collect information on socioeconomic status, we cannot account for that as a contributing factor in the beliefs and barriers regarding vaccine update. Finally, only two caregivers actively participated in vaccine discussions, and we did not assess variations in visits based on the presence or absence of caregivers. A larger sample size is necessary to gain a more comprehensive understanding of the impact and involvement of caregivers in vaccine hesitancy.

Interpretation

Restoring public trust in vaccines is crucial to helping resolve vaccine hesitancy and decrease rates of morbidity and mortality resulting from infectious disease.[22] Clinicians play a central role in building this trust because their recommendations have been shown to increase vaccine confidence and compliance.[22] However, it is important to avoid bias in their education efforts, because patients potentially could see this as coercion, thereby

perpetuating their hesitancy to receive vaccines.[21,23] Furthermore, vaccine hesitancy often is informed culturally, and patients base their views on opinions, rather than scientific information.[24] Having insight into the experiences and opinions of patients and caregivers who have participated in vaccination discussions via telemedicine or in person can provide valuable knowledge for developing approaches to address this hesitancy.[21,25]

Using the information learned in our study, exploring further mediators and moderators of vaccine hesitancy, and increasing the diversity of participants and number of investigative sites may be effective steps in designing an action plan for improving public trust in vaccines and improving overall acceptance rates. The period after critical illness or other acute illness events may be an especially fruitful target for discussion of preventative care such as vaccines; however, further research is needed.

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ABBREVIATIONS:

ICU-RC	ICU recovery clinic
RCT	randomized controlled trial
TPB	theory of planned behavior

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Take-home Points

Study Question:

What factors influence the decision-making process of patients who have survived an ICU hospitalization surrounding influenza and COVID-19 vaccination?

Results:

Using the theory of planned behavior as a guide, we elicited five major themes: (1) behavioral and attitudinal beliefs, (2) normative beliefs, (3) control beliefs, (4) intention to vaccinate, and (5) health team engagement with patients and caregivers

Interpretation:

The period after critical illness or other acute illness events may be an especially fruitful target for discussion of preventative care such as vaccines; however, further research is needed.

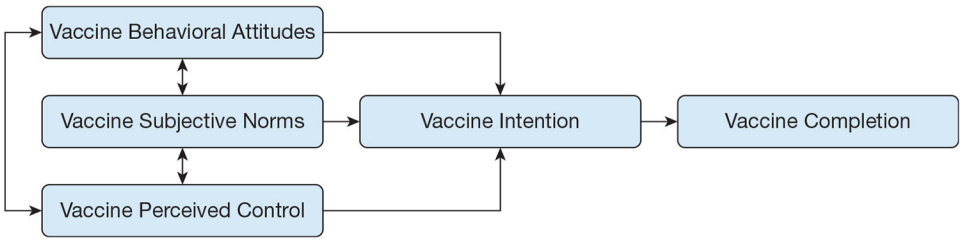

Figure 1 –.

Diagram showing the theory of planned behavior. The theory of planned behavior posits that attitudes, subjective norms, and perceived behavioral control shape an individual's intention to engage in a particular behavior.[10] In the context of vaccine hesitancy, it suggests that an individual's decision to become vaccinated is influenced by their beliefs about the vaccine's effectiveness, societal expectations, and perceived ability to access and obtain the vaccine.

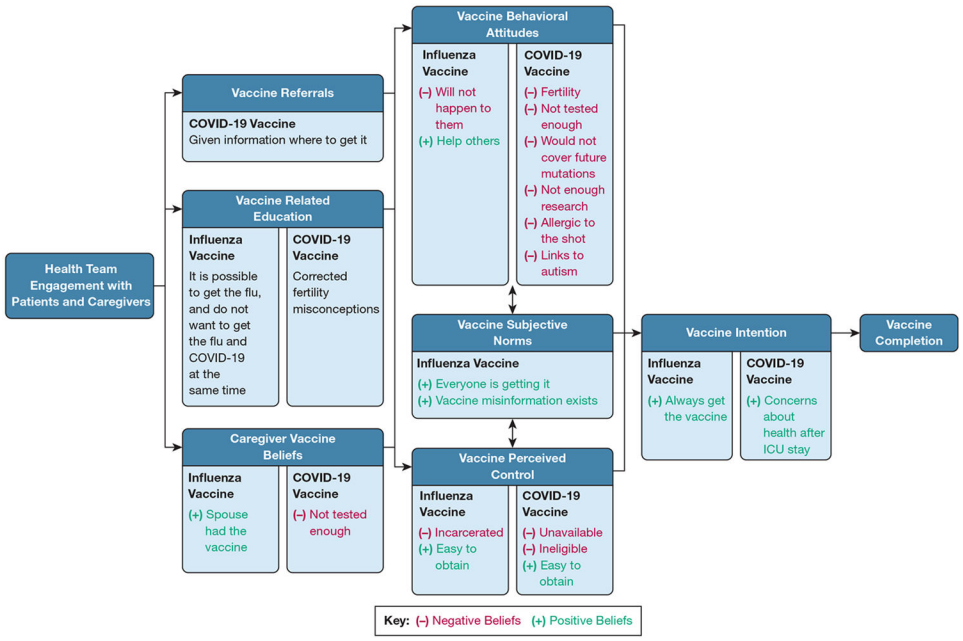

Figure 2 –.

Diagram showing theory of planned behavior-derived factors influencing respiratory vaccine decisions after critical illness. This figure illustrates a conceptual framework that explains the relationship between the theory of planned behavior (TPB) and health team engagement with patients and caregivers. Findings suggest that health team engagement and caregiver vaccine beliefs influence patient vaccine behavioral attitudes, subjective norms, and perceived control.

TABLE 1]

Demographic Characteristics of Study Sample

Characteristic	Data
Age, y	49.1 ± 16.3
Sex	
Female	10 (53)
Male	9 (47)
Race	
White	17 (89)
Black	2 (11)
Hispanic ethnicity	1 (5)
Diagnosis	
Septic shock	18 (95)
ARDS	3 (16)
Positive COVID-19 findings during hospitalization	2 (11)
APACHE II score	21.1 ± 9.3
Mechanical ventilation (n = 8), d	3 (2-6.5)
ICU stay, d	3 (2-9)
Hospital stay, d	16 (12-22)
Discharge destination	
Home	15 (79)
Inpatient rehabilitation, skilled nursing facility, or long-term acute care hospital	4 (21)
No. of telehealth visits completed	
Total transcript visits analyzed	33
Total participants	19
Caregiver discussed vaccines in at least one visit	2 (6.3)
Vaccines discussed with participants in at least one visit	
Influenza	17 (89)
COVID-19	7 (37)
No vaccines discussed	2 (11)
Eligible participants with whom vaccines were discussed and who already were vaccinated before the first telemedicine visit	

Characteristic	Data
Influenza (n = 17)	10 (59)
COVID-19 (n = 7)	4 (57)
Eligible participants with whom vaccines were discussed who had not been vaccinated before the telemedicine visits and expressed intentions to become vaccinated	
Influenza (n = 7)	3 (43)
COVID-19 (n = 3)	1 (33)
Eligible participants with whom vaccines were discussed who had not been vaccinated before the telemedicine visits, expressed intentions to become vaccinated, and completed vaccinations in 6 mo after telemedicine visit	
Influenza (n = 3)[a]	1 (33)
COVID-19 (n = 1)[b]	0 (0)
Eligible participants with whom vaccines were discussed who had not been vaccinated before the telemedicine visits and expressed no intention to become vaccinated, but who completed vaccinations in 6 mo after telemedicine visit	
Influenza (n = 4)[a]	2 (50)
COVID-19 (n = 1)[b]	0 (0)

Data are presented as No. (%), mean ± SD, or median (interquartile range), unless otherwise indicated. APACHE = Acute Physiology and Chronic Health Evaluation.

[a]Eligible patients completed the flu vaccine and received a new one or received it this season, but had not received the vaccine the previous season.

[b]Eligible patients received only Pfizer or Moderna, so both vaccines needed to be completed.

TABLE 2]

Illustrative Quotations

Theme	Vaccine	Quotation Identification	Belief	Representative Quotation
1	Influenza	1.1	Unlikely to get sick with influenza	“The last time I had the flu I was 5 years old … I don’t ever get the flu … I am not worried.” (patient 044)
		1.2	Public health advantage to vaccinating against influenza	[I am getting vaccinated against the flu] “to help resolve the workload of people in the ER with breathing difficulties. The last thing they need right now is the flu putting a lot more people into the ICU.” (patient 027)
	COVID-19	1.3	Issues with fertility	“Our children are married and they have all opted not to do it because of the fertility potential.” (patient 034)
		1.4	Not tested enough	“I don’t feel like it’s been tested enough to understand all the possibilities down the road.” (patient 034)
		1.5	Does not cover future mutations	“The vaccine is not guaranteed to cover COVID mutations.” (patient 044)
		1.6	There is not enough research	“There is not enough research to even think about getting the vaccine.” (patient 044)
		1.7	Fear of being allergic to the vaccine	“I have high allergies to begin with … when I did allergy shots … my throat swelled so bad.” (patient 044).
		1.8	Links between vaccines and autism	“There are certain things that have been linked to dysfunctions that people have today, like ADD [attention-deficit disorder] and autism.” (patient 045)
		1.9	Fear of unknown side effects	“Well, [my fears are] more the long-term effects of it. Like 10 years, 20 years, will it cause cancer or will it not? There’s just so much unknown that I don’t like to think about.” (patient 044)
		1.10	Fear of unknown side effects	“Are we able to know that there are no long-term side effects, because I’m not so much afraid about me getting the vaccine, but I don’t want my kids to get a vaccine that’s going to affect their kids.” (patient 045)
2	Influenza	2.1	Everyone is getting it	“Everyone I know is getting the flu vaccine.” (patient 027)
		2.2	Misinformation exists	“It’s that bloody British doctor as well who started all this crud.” (patient 027)
3	Influenza	3.1	Lack of availability	“I was incarcerated, and I got out in August. I got out August, and then I got sick in December, and then I know that I’m in the hospital … .” (patient 018)
		3.2	Lack of availability	“Well, [the flu shot] won’t be as easy, because they came to our office, and we’re not in our office. So I’ll have to … go to the clinic or something … .” (patient 019)
	COVID-19	3.3	Ineligible	One patient was “too young” to receive the COVID-19 vaccine at that time (patient 045).
		3.4	Easily attainable	“I want to tell you, I had no problem at all. We just drove up in the health department parking lot and they came out gave me a [COVID-19] shot and that was it.” (patient 042)
4	Influenza	4.1	Correlated with health concerns after an ICU admission and patient history of vaccination	“I always get it” and have been for “45 years in a row.” (patient 024)
		4.2	Correlated with health concerns after an ICU admission and patient history of vaccination	“Obviously, given the relative instability in my health, I feel like maybe this year is the year I should start [getting the flu vaccine].” (patient 027)

Theme	Vaccine	Quotation Identification	Belief	Representative Quotation
5	Influenza	5.1	Not at risk	I "really [want] to encourage [you] to [get the influenza vaccine], especially with COVID." "If you have had the influenza shot, you would do a lot better." (ICU pharmacist discussion with patient 044)
	COVID-19	5.2	Infertility	"So both of our children are married and they have all opted not to do it because of the fertility potential." (patient 034)
		5.3	Infertility	"There's a great video by an [infectious disease] physician at Vanderbilt that you should really look at about the fertility issues … that shows that's really not an issue or a concern. I'm of childbearing age … and I'm not concerned about it." (ICU pharmacist discussion with patient 034)
		5.4	Not tested enough	"[There were] 70,000 people … in the initial trials" and the availability of "6 months of data from those people. That's … more data than … the influenza shot. These vaccines have been tested more than your average vaccine." (ICU pharmacist discussion with patient 044)
		5.5	Link to autism	"That's been shown not to be true." (ICU pharmacist discussion with patient 045)
		5.6	Does not cover mutations	"As soon as [we] have the genetic sequence of one of these mutants … we could have a booster with that specific variant in 6 or 8 months … even if it's not a perfect match, you might still get [COVID-19], but you're less likely to die … go to the hospital … less likely to have severe disease." (ICU physician discussion with patient 044)
		5.7	Fear of long-term vaccine effects	"[mRNA vaccine technology is] like Snapchat … it's there and then it's gone … the mRNA platform for making the vaccine … is really not that new … [the mRNA] is unstable, which is why we don't have more vaccines from this platform yet. [Vaccine brand] came up with a lipid particle to keep it stable enough to get into the body, but then it just disappears. So, there's really no biologic plausibility for causing cancer or anything like that. It just makes this little strip of protein and then your body sees the protein and says, 'Oh, no,' and it makes the antibodies that you would develop with a natural infection." (ICU physician and pharmacist discussion with patient 045)
		5.8	Availability	"You'll see it popping up at [supermarket name] and things like that and pharmacies, but if you have any specific questions about that, please let us know because we get updated information about it all the time." (ICU physician discussion with patient 044)
		5.9	Not tested enough	"We don't feel like it's been tested enough to understand all the possibilities of later down the road. So, we're choosing not to do it." (caregiver of patient 034)