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### Health Risks of Firearm Ownership: A Patient Screening and Education Intervention

Aaron Kahn

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Health Risks of Firearm Ownership: A Patient Screening and Education Intervention

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Date of submission: November 27, 2019

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## **Abstract**

### **BACKGROUND**

There is significant health risk associated with firearm ownership. To address this risk a primary care-based intervention was designed and implemented to screen for firearm ownership, educate patients on the risks of gun ownership, and provide patients with resources for reducing associated health risks.

### **METHODS**

A mixed methods study design was employed. Four primary care providers (PCP) practicing in family health volunteered to participate in this intervention. Focus groups with participating PCPs were conducted prior to the intervention to solicit recommendations for intervention protocol and assess participating PCPs current understanding of the health risks of firearm ownership, and after the intervention to obtain feedback regarding intervention impact, barriers encountered, and recommendations for intervention improvement.

### **INTERVENTION**

Based on participating PCPs' feedback from the preintervention focus group a handout containing a firearm ownership screening questionnaire and firearm risk patient education was created. Patients presenting to an outpatient family health clinic for annual preventative health care visits between July 29, 2019 and August 30, 2019 were screened for firearm ownership and educated on health risks of firearm ownership.

### **RESULTS**

Over a period of one month a total of 126 patients were screened for firearm ownership and educated on the risks of firearm ownership. The majority of patients who owned firearms (93.8%) and those who did not (82.0%) reported being aware of the risks of firearm ownership.

In addition, the majority of patients who owned firearms (90.8%) and those who did not (96.7%) responded “No” when asked if they wanted additional information on the health risks of firearm ownership and ways to reduce this risk. Significant intervention barriers identified during the postintervention focus group were knowledge adequacy, right to privacy, right to bear arms, and fear of the government / authorities. Factors identified as perpetuating firearm ownership include pride in firearm ownership and firearms as a symbol of one’s heritage.

## CONCLUSIONS

Despite the barriers encountered in the course of conducting this study in Rochester, New Hampshire, the intervention was generally well received by patients in a State which produced approximately 1/7th of all firearms manufactured in the United States in 2017. We have demonstrated that this intervention can be performed at negligible cost in terms of time and money. This intervention could be readily adapted to suit different communities, providing health care professionals across the country with a favorable cost/benefit means to address a public health crisis.

*Keywords:* firearms or guns, firearms ownership, risk reduction, quality improvement.

## Health Risks of Firearm Ownership: A Patient Screening and Education Intervention

**Introduction****Problem Description**

Primary care providers (PCP) have a responsibility to promote the health of those they serve. To this end, PCPs routinely screen for and educate patients on health risks, with the primary aims of health promotion and reducing morbidity and mortality. The United States Preventive Services Task Force (USPSTF) recommends PCPs routinely screen for multiple health risks, including tobacco use, sexually transmitted infections, obesity, depression and diabetes (US Preventive Services Task Force, n.d.). Firearms, by design, are instruments capable of inflicting life-threatening injury on targets. It follows that firearm ownership is associated with significant health risk. However, screening for firearm ownership and educating patients on the associated health risks is absent from USPSTF recommendations. The intent of this intervention was threefold: 1). introduce a protocol for screening for firearm ownership in the primary care setting, 2). educate patients on the health risks of firearm ownership, and 3). provide patients with resources to mitigate the health risks of firearm ownership.

**Available Knowledge**

Interventions to educate patients on the health risks of firearm ownership have been limited by a relative paucity of research in this domain. Nonetheless, the available evidence consistently documents the health risks posed by firearm ownership. In 2017 an estimated 764 people died each week in the United States due to a firearm-related injury (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2017). This represents a trend of gun-related deaths in the United States, which increased by approximately 19% between 2012 and 2017 (Gramlich, 2018). Approximately 67,000 persons in the United

States suffer non-fatal firearm-related injuries each year, resulting in health care expenditures and lost wages in excess of \$48 billion annually (Fowler, Dahlberg, Haileyesus, & Annett, 2015).

Despite the health risk associated with firearm possession, the number of guns in the United States continues to rise at an estimated 4.16% per year (Karp, 2018). As of 2017 there are more firearms than people in the United States, with an estimated 120.5 guns per 100 residents (Karp, 2018). The United States currently leads the world in the number of privately owned firearms (Richmond & Foman, 2019). In 2017 8,327,792 firearms were manufactured in the United States, but only 488,300, or approximately 5.86%, were exported (Bureau of Alcohol, Tobacco, Firearms and Explosives, 2019). In the State of this intervention, New Hampshire, a total of 1,189,839 firearms, including 544,233 pistols, 172,058 revolvers, 473,101 rifles, 16 shotguns, and 431 miscellaneous firearms, were manufactured in 2017 (Bureau of Alcohol, Tobacco, Firearms and Explosives, 2019). This accounts for approximately 14.3%, or 1/7th, of all firearms manufactured in the United States. These data support the relevance of the intervention in the State it was performed.

In order to develop an effective screening and education intervention, it is essential to understand the factors motivating gun owners to possess a firearm in light of the health risks. Per a Pew Research Center survey in 2017, 67% of gun owners in the United States cite protection as the primary reason for owning a firearm (Gramlich, 2018). Protection far exceeds any other reason, including hunting (38%), sport (30%), collecting (13%) and occupational use (8%) (Parker, Menasce Horowitz, Igielnik, Oliphant, & Brown, 2017b). However, the available data do not support the notion that firearm ownership reduces health risk. The majority of gun-related deaths in the United States do not occur in the course of a home invasion or self-defense.



In 2015 an estimated 60.7% of gun deaths were due to suicide, with over 90% of gun-related suicide attempts being lethal (Bauchner, Rivara, Bonow, & Bressler, 2017).

Protection of family members, particularly children, is also frequently cited as a reason for firearm ownership. Ironically, parents' well-intentioned decision to keep firearms ultimately exposes their children to significant health risk. In the United States, firearm related injuries are the third leading cause of death among children ages one to 17 (Fowler, Dahlberg, Haileyesus, Gutierrez, & Bacon, 2017). Recent estimates of firearm ownership in the United States indicate that guns are present in approximately one in three homes with children (Tseng et al., 2018). Of these households, studies have also found that 36% of children have handled their parents' firearm, despite their parents' belief to the contrary (Tseng et al., 2018). This may be explained in part by the research finding that in households with children where parents cite protection as the primary reason for gun ownership, firearms are stored unloaded and locked away only 52% of the time (Baxley & Miller, 2006).

### **Rationale**

Despite compelling evidence supporting the associated health risks, many gun owners are strongly opposed to surrendering their firearms. According to a Pew Research Center survey in 2017, approximately 74% of gun owners in the United States believe that owning a firearm is essential to their personal sense of freedom (Parker, Menasce Horowitz, Igielnik, Oliphant, & Brown, 2017a). There are a few possible explanations why a behavior posing risk to the health of the person and the public would be perpetuated. These scenarios are all predicated on the assumption that firearm owners would be averse to firearm-related injury. However, given that most gun-related deaths are due to suicide as previously discussed, this assumption cannot be made.

The first scenario is that firearm owners may underestimate the likelihood of adverse firearm-related health events, or may not be fully aware of the health risks associated with gun ownership. In this case, cognizance of the health risks of firearm ownership would ideally result in behaviors to mitigate these risks.

The alternative scenario in which gun owners decide to possess firearms despite knowledge of the health risks suggests that firearm ownership has a subjective utility for gun owners which exceeds the health risks. The findings of Stroebe, Leander and Kruglanski in their study on motivations of gun ownership support this explanation. The study found a mismatch between subjective and objective risk of victimization among firearm owners (Stroebe, Leander, & Kruglanski, 2017). Specifically, gun owners were found to overestimate their risk of victimization (Stroebe et al., 2017). It is plausible that inflation of the risk of victimization increases the perceived utility of firearms for gun owners. However, even were the actual risk of victimization greater, the utility of firearms in such situations is questionable. Studies of violent crime have found that potential victims used a firearm for self-defense in less than 1% of reported cases (Hemenway & Solnick, 2015; Planty & Truman, 2013). In addition, the National Crime Victimization Surveys found that firearms used in self-defense did not reduce victims' risk of injury more than other protective actions, such as running away, screaming or struggling (Hemenway & Solnick, 2015). These findings suggest a mismatch between gun owners' perceptions of the protective value of firearms and objective utility in episodes of violent crime.

Addressing patient behaviors which are maintained despite awareness of associated health risks can be a clinical challenge. The transtheoretical model of behavior change is a useful framework for understanding patients' readiness to adopt health change (Prochaska, 2008). This model suggests that the process of behavior change occurs sequentially in a series of

stages: precontemplation, contemplation, action, maintenance and termination (Prochaska, 2008). Advancing to the next stage of change is predicated on completion of the preceding stage. Persons in the precontemplation stage of change have no plans or intent to adopt a behavior change, and the notion of changing a given behavior may be novel. This model suggests that it is unreasonable to expect a person to move directly to the action stage of change if they are still in the precontemplation stage. As a practical example, advising a smoker to quit (action) is not likely to be successful if the patient is not considering quitting (precontemplation).

Awareness of the consequences of a health behavior is essential in moving patients into the contemplation stage. “The individual may be at this stage because he or she is uninformed or underinformed about the consequences of a given behavior.” (Prochaska, 2008, p. 845) For this reason, the intervention was planned with specific consideration for persons in the precontemplation stage of change.

### **Specific aims**

The purpose of this intervention was to develop and implement a protocol for screening for gun ownership in the primary care setting, to educate patients on the health risks of possessing a firearm, and to provide patients with resources to reduce the health risks of firearm ownership. As previously discussed, it is possible that gun owners are not fully aware of the health risks of firearm ownership. This intervention aims to eliminate lack of knowledge of associated health risks as a possible factor contributing to gun owners’ decision to possess firearms.

## Methods

### Context

The intervention was conducted in a hospital-affiliated outpatient family health practice in Rochester, New Hampshire, between July 30, 2019 and August 30, 2019. While the majority of patients served are adults, the practice provides care to patients across the lifespan. At the time of the intervention the practice was staffed with seven providers, including five physicians and two nurse practitioners. Two physicians and two nurse practitioners participated in the intervention on a voluntary basis. No providers were compensated financially for participating in the intervention.

As previously discussed, New Hampshire produces approximately 1/7<sup>th</sup> of all firearms manufactured in the United States annually. Firearm registration data published by the United States Department of Justice, New Hampshire ranks third in firearms per capita in the United States. (United States Department of Justice, Bureau of Alcohol, Tobacco, Firearms and Explosives, 2017) However, it should be acknowledged that estimating the actual number of firearms in communities across the United States has been limited by inconsistent licensing and registration laws between states. Nonetheless, these data support the salience of the intervention in New Hampshire.

The monetary costs of this intervention were covered by the project leader. The two largest expenditures were \$99 for a student license of Atlas.ti 8 qualitative analysis software, and approximately \$80 for production of carbonless 2-set patient screening and education handouts. Non-monetary costs included additional work required for participating PCPs. In addition, because issues relating to firearms have become very politicized in the United States, there was

concern that some patients may object to this screening and patient education intervention, potentially damaging the therapeutic relationship between patient and PCP.

There were no immediate direct financial benefits anticipated with this intervention. As previously discussed, gun ownership is associated with an increased risk for firearm-related injuries. The costs of firearm-related injuries in terms of health care expenditures and lost wages are significant. These costs could hypothetically be reduced should the intervention result in fewer firearm-related injuries. Estimating the possible cost savings resulting from this intervention is not possible.

While not a specific aim, any reduction in morbidity and mortality due to firearm injuries resulting from this intervention would be considered the greatest possible benefit. Estimating the magnitude of this reduction is not possible at this time.

### **Intervention**

Four PCPs, including one osteopathic family medicine physician, two family nurse practitioners, and one allopathic family medicine physician, practicing in a hospital-affiliated outpatient family practice in Rochester, New Hampshire volunteered to participate in this intervention. The intervention was divided into three phases: preintervention, intervention, and postintervention. Provider feedback was essential in formulating an intervention approach appropriate for this setting. Focus groups of PCPs participating in the intervention were conducted during the preintervention and postintervention phases. Questions posed by the moderator during preintervention and postintervention focus groups are detailed in Appendix A and Appendix C, respectively. One of the nurse practitioners participating in the intervention was the project leader and was excluded from the focus groups to prevent the introduction of

bias. Focus groups were moderated by the project leader with assistance from a member of the project team.

The purpose of the preintervention focus group was to assess PCPs current understanding of health risks of gun ownership, current firearm screening and education practices, solicit PCPs' recommendations for the intervention protocol as well as opinions regarding possible barriers to intervention implementation. The focus group recording was transcribed, and qualitative analysis performed using Atlas.ti software. Based on PCPs' input from the first focus group it was decided that printed handouts containing screening questions as well as key points about the health risks of firearms would be appropriate to distribute to patients for this intervention. Participating PCPs suggested that this format could enhance the efficiency of the intervention, as patients desiring more information on the health risks of firearm ownership could review materials after the office visit. Key patient education points to guide the provider during the intervention were printed clearly in a distinct, simple table labeled, "Firearm Facts." Resources to reduce the risk of firearm ownership were similarly printed clearly in separate area labeled, "What You Can Do." A sample of this handout is available in appendix B.

The handout was printed on 2-part carbonless paper, with one copy given to the patient and the other given to the project leader. To facilitate an accurate count of each encounter during the intervention, each handout was printed with a unique, sequential number. No identifying information was captured from patients. Handouts were bound in booklets containing 50 sets of handouts and carbonless copies each. Booklets were perforated at the top for easy tear off. Each participating PCP was provided with two bound booklets, for a total of 100 handouts per participating PCP.

The intervention was conducted for a period of one month, between July 29, 2019 to August 30, 2019, after which completed handouts were collected by the project leader. During the intervention phase participating PCPs performed screening and patient education using the handout developed during preintervention phase.

In the postintervention phase of the intervention, a second focus group of participating PCPs was conducted. The purpose of this focus group was to obtain PCPs' feedback on the intervention, as well as any "lessons learned" from the experience and recommendations for future implementations. Again, audio recording of this focus group was be transcribed and qualitative analysis performed using Atlas.ti software.

### **Study of Intervention**

Given the scope of this intervention directly assessing its impact on firearm-related mortality was not possible. However, given the previously described gap in research in this domain, information gleaned from this study could aid future implementations and investigations. A mixed methods approach was therefore used, with qualitative data obtained from focus groups and quantitative data from patient responses to intervention questions.

### **Measures**

One of the principal concerns raised by PCPs during the first focus group was the potential time required to perform the intervention. Participating PCPs felt that it would be most appropriate to perform the intervention during an annual preventative care visit. At the practice where the intervention was performed, annual preventative visits are typically allotted more time than visits for acute issues or specific problems. Although PCPs have more time with patients during annual preventative visits, time is still at a premium. To minimize the time required to perform the intervention, participating PCPs suggested a brief, focused list of screening

questions. Specifically, a questionnaire similar to the PHQ-2 screening tool for depression was requested by PCPs during the preintervention focus group (Kroenke, Spitzer, & Williams, 2003). The PHQ-2 is a brief, two-item questionnaire used for depression screening. A positive screening result on the PHQ-2 is considered suspect for depression and prompts the provider to administer the more detailed nine-item PHQ-9 questionnaire. Patients who screen negative on the PHQ-2 questionnaire are considered to have lower suspicion for depression and are not administered the PHQ-9 during the encounter. Based on this approach, the initial screening question, “Do you have firearms in your home?” was suggested to participating PCPs, with positive responses leading to further screening questions as well as patient education on the health risks of firearm ownership, and negative responses requiring no further intervention. However, concern was raised during the preintervention focus group that this approach may not capture all persons who might benefit from screening and firearm risk education, including patients who did not currently have a firearm in the home but were considering purchasing one. As detailed below, it was also pointed out that the proposed protocol would not capture patients who possess firearms kept outside the home:

Participant 1: Or, no, my gun’s not in my house, it’s in my car.

Participant 3: <Laughs> Right, it’s in my pocket right now.

Participant 2: It’s under the car seat.

Participant 1: Hey, it’s a carry at will state. You’re free to carry it in the State of New Hampshire.

While the screening questionnaire could have been expanded to account for these instances, it was felt that doing so would require additional PCP time, thus conflicting with the



previously discussed requirement of brevity. With consideration of these issues it was decided that all patients would be asked the following three dichotomous “yes/no” screening questions:

1. Do you have firearms in your home?
2. Are you aware that firearms pose a health risk to you and others in the home?
3. Would you like more information on the health risks of firearm ownership and how you can reduce these risks?

Patients who answered “yes” to the first question were asked the follow-up question, “If so, are they stored in a safe, with a trigger lock, or other safety device?”

Quantitative measures of this intervention include number of patients who received firearm ownership screening and firearm ownership health risk education, as well as patient responses to screening questions.

### **Analysis**

Feedback obtained from participating PCPs during the postintervention focus group was used as a proxy measure of intervention efficacy. Focus group recordings were transcribed and qualitative analysis performed using Atlas.Ti 8 software. Major themes were identified, and coding performed using a sequential three step approach of open coding, then axial coding, and finally restricted coding. The intent of this analysis was to better explore the experience of the intervention, and to provide a possible starting point for further investigation using grounded theory. As previously described, qualitative analysis of the preintervention focus group was necessary to develop the patient screening and education. Number of patients who received firearm ownership screening and firearm ownership health risk education was counted from carbon copies of patient handouts used during intervention. In addition, patient responses to screening questions were collected from intervention handouts.

## **Ethical Considerations**

Patients were not actively recruited to participate in this intervention. Patients selected for this screening and education intervention had presented to the office for an annual preventative health care visit. While the intervention was designed to minimize time required to perform, concern nonetheless exists that the intervention left less time for PCPs to address patient concerns. For this reason, the screening and education protocol was designed to require no more than one minute to complete. It was also made explicitly clear to participating PCPs that the decision to defer or abandon the intervention for any given patient was completely at the participating PCP's discretion.

In addition, there was concern that patients may be uncomfortable answering questions regarding firearm usage. According to a survey by the Pew Research Center, "Eight-in-ten gun owners say they don't mind if other people know they own a gun, but they don't set out to tell them; 14% say they'd rather other people not know that they have a firearm, and 6% actively do want others to know." (Parker et al., 2017a) Patients were advised prior to screening for firearm ownership that they could decline to answer, and neither participation or abstention would affect the care they received. In addition, patients were advised that responses were being collected as part of a quality improvement project and that no identifying information was collected. Finally, patients were advised that their responses would not be included in their medical records.

## **Results**

### **Quantitative Data**

A total of 126 patients presenting to the clinic for annual preventative health care visits during the intervention period were screened for firearm ownership and received firearm risk

education. A summary of patient responses to screening questions is detailed in table 1. These responses are further subdivided by firearm ownership in table 2 and figure 1.

| Table 1.  |                |               |
|---|----------------|---------------|
| <i>Summary of Firearm Screening Questionnaire Responses</i> |                |               |
|   | <u>Yes (%)</u> | <u>No (%)</u> |
| Firearm(s) in Home?   | 65 (51.6)      | 61 (48.4)     |
| Aware of Firearm Risks?                                     | 111 (88.1)     | 15 (11.9)     |
| Patient Wants More Info?                                    | 8 (11.0)       | 65 (89.0)     |
| <i>Note: n=126</i>  |                |               |

| Table 2.   |                               |           |                                  |           |
|--|-------------------------------|-----------|----------------------------------|-----------|
| <i>Summary of Firearm Screening Questionnaire Responses By Firearm Ownership</i> |                               |           |                                  |           |
|  | <u>Firearm(s) in Home (%)</u> |           | <u>No Firearm(s) in Home (%)</u> |           |
|  | 65 (51.6)                     |           | 61 (48.4)                        |           |
|  | <u>Yes</u>                    | <u>No</u> | <u>Yes</u>                       | <u>No</u> |
| Firearms Locked Up?  | 49 (75.4)                     | 16 (24.6) | N/A                              | N/A       |
| Aware of Firearm Risks?  | 61 (93.8)                     | 4 (6.2)   | 50 (82.0)                        | 11 (18.0) |
| Patient Wants More Info?   | 6 (9.2)                       | 59 (90.8) | 2 (3.3)                          | 59 (96.7) |
| <i>Note: n=126.</i>  |                               |           |                                  |           |

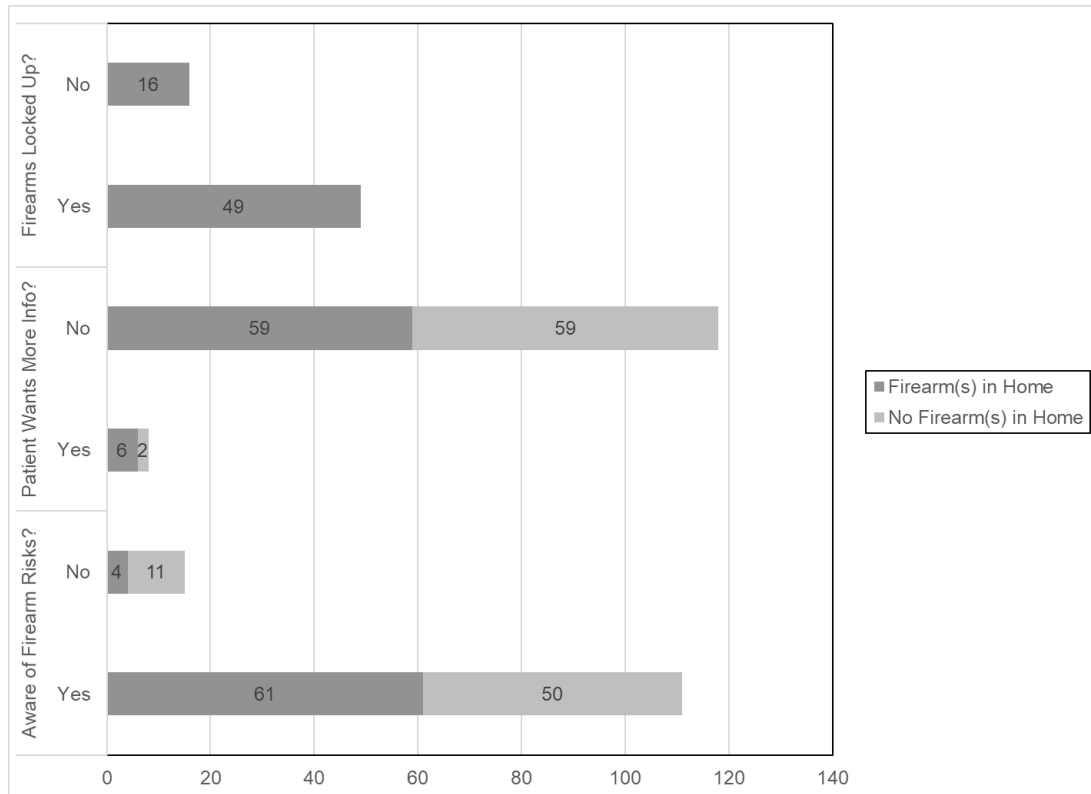


Figure 1. Firearm screening questionnaire responses by presence of firearm(s) in the home.

## Qualitative Data

Qualitative analysis was performed from preintervention and postintervention focus group transcripts. Network diagrams detailing significant themes and relationships are in appendices D and F. As previously discussed, a principal aim of the preintervention focus group was to solicit participating PCPs' recommendations for the intervention protocol and supplemental materials. Specific themes which emerged during the preintervention and postintervention focus groups are detailed in appendices E and G, respectively.

### Preintervention Focus Group.

A number of significant themes emerged from the preintervention focus group. All participating PCPs acknowledged the health risk associated with firearm ownership. Groups

identified as vulnerable to firearm-related injury were children, those with psychiatric disorders, and those who lacked training on safe handling and storage of firearms. All participating PCPs agreed that limiting access to firearms was the most effective firearm risk reduction strategy, although, as the following excerpt highlights, there was some disagreement on what constitutes limited access.

Participant 3: Access. I'm going to say that if you're going to have a gun in the home it needs to be locked at all times, and once that child is an appropriate age they need to be educated on how to use a firearm, if that's something that you're choosing for your family. You need to make sure they know how to use it safely.

Moderator: OK.

Participant 1: I'm gonna be probably an outlier, and this may reflect my political beliefs, but I think guns should be abolished. Except for military and municipal police, guns should be abolished.

Moderator: OK. And what makes you think that?

Participant 1: Because even with the education classes that we have available there are people that circumvent the laws and they still do harm to self and harm to others. I know it's a societal question, and we have to agree democratically what's acceptable for everybody, but I think as a whole, as a population, we have shown that we are not responsible with arming ourselves.

Multiple potential barriers to the intervention were identified during the preintervention focus group. Participating PCPs expressed concern that, because firearm ownership has become a very polarizing issue in the United States, firearm owners may be resistant to the intervention,

and potentially erode the existing therapeutic relationship. To illustrate this concern, one participating PCP recalled a patient's reaction to firearm ownership screening in the past, "it's my right, it's my responsibility, stay out of my family's business." Therefore, simply asking about firearm ownership may be perceived by gun owners as intrusive and outside the purview of the PCP.

An individual's right to possess firearms was intimately linked with other potential barriers to firearm screening identified during the preintervention focus group, including fear of the government or authorities and one's right to privacy. Per the preintervention focus group excerpt below, participating PCPs noted that overcoming these barriers would require the PCP to reassure patients that responses to the screening questions were confidential, and that the PCP's sole interest is the health and wellbeing of the patient.

Moderator: So that's, OK, that's definitely one of the barriers. I mean, and has that created any, you know, tension between you, or issues with you between, as far providing them care?

Participant 1: Except for that brief moment, and I'm like, "I hear what you're saying. I'm more concerned about your child's health and safety. That's the only reason I brought it up. I'm not the police, I'm not going to report you, I'm not trying to tell you to sell your guns or you have to get the guns out of the house, but the education is important. Let's move on. Next topic."

Participating PCPs' past experiences screening for firearm ownership was varied in terms of setting, frequency and protocol. When practicing in an emergency department in the past, one participating PCP reported having screened every patient for firearm ownership as part of the

intake process. However, the participating PCP noted that this screening did not go beyond collecting responses, and no intervention based on the screening responses, such as firearm risk education, was included in the protocol.

Participant 3: Well, we always screened ER. Always. Always, always a screening tool at the ED in Baltimore. Do you have a gun in the home? Do you have access to the, to a gun?

Moderator: And was that everyone?

Participant 3: Yeah. Including pediatrics, we would ask whoever they came in with.

Moderator: And what would you do with that information?

Participant 3: I don't know, it went in to ...

Participant 2: A box.

Moderator: They just collected it.

Participant 3: Yeah, it went in to the ... I mean, in the same thing, it was a drop-down box, like you would click yes, there's a gun in the home, is the gun locked, that it would be like one of things, that I don't know if it was just filing for them for like a something like what you're doing, for safety.

Moderator: But it's not as though that triggered a discussion necessarily or ...

Participant 3: Not necessarily. Not in the emergency room setting unless there was some concern as to why they were there. If somebody was coming in for an asthma attack I'm not going to address the gun in the house.

Despite the limitations of this protocol, participating PCPs did suggest that screening for firearm ownership might occur more frequently if a prompt was integrated into their electronic health record,

Participant 1: In the old system we actually had a separate questionnaire, query, that we had to

Participant 3: That you could click?

Participant 1: Click.

Participant 3: Huh.

Participant 1: It's not there right

Participant 2: Another box.

### **Postintervention Focus Group.**

Themes which emerged from the postintervention focus group are detailed in appendix G. Perhaps the most significant theme reported by participating PCPs during the postintervention focus group was also the intervention's largest barrier: knowledge adequacy. In the context of this intervention we will define knowledge adequacy as the belief one has sufficient understanding of the risks of firearm ownership. As highlighted in the following excerpt, participating PCPs found that, in general, most gun owners screened during this intervention reported having adequate knowledge of the risks of firearm ownership.

Participant 1: The people that did own guns did not want any additional information on the safety of guns. They felt that they knew as much they needed to know. Um. And, uh, there was some hesitation ambivalence about reporting because they thought it was intrusion upon their privacy.



Moderator: How so?

Participant 1: They just felt it wasn't my right to know. They were afraid that I was reporting them to a federal agency.

The preceding passage suggests that factors outside of knowledge of firearm risks contribute to knowledge adequacy among gun owners, including the right to privacy and fear of the government and/or authorities. Participating PCPs also reported experiencing resistance from multiple gun owners who saw the intervention as a threat to their right to bear arms. As exemplified by the following two excerpts, these themes recurred throughout the postintervention focus group:

Participant 1: They just felt it wasn't my right to know. They were afraid that I was reporting them to a federal agency.

Moderator: Okay, so there was fear of being reported or . . . OK.

Participant 2: I had to explain that to a couple people as well. So, “no, no, none of that. Nobody will be knocking on your door.”

Participant 1: I think the majority of gun owners during the survey that I did, were very adamant that this is their right, they're fully aware of their rights and their entitlements, and they're going to continue to maximize that and they don't want any outside influence, even if it's for educational purposes or public safety.

Knowledge adequacy was not unique to firearm owners, and participating PCPs reported this behavior among non-gun owners as well.

Moderator: Okay. How about people who didn't own guns? I mean, did you find they were more than receptive to getting more information, or were they about the same?

Participant 1: The information that you provided, it reaffirmed their beliefs not to own guns.

This alignment of intervention content with non-gun owners' existing understanding of firearm risks may partially account for non-gun owners' apparent disinterest in further information on the subject. By lending further evidence to existing opinions on firearm risks the intervention may have bolstered non-gun owners' sense of knowledge adequacy, thereby inadvertently furthering disinterest in additional information on the subject. Therefore, while the factors associated with knowledge adequacy differed greatly between these gun owners and non-gun owners, both groups were unified by their sense of knowledge adequacy with respect to firearm risk.

As anticipated by participating PCPs during the preintervention focus group, polarity of opinions regarding firearm ownership was indeed a significant theme encountered during the intervention. As expressed by one participating PCP, this divide, perhaps mediated by knowledge adequacy, was found to be another intervention barrier, "It was very polarized. There was not a lot of people in the middle that said, 'Well, I don't know, I want to learn more.'"

Knowledge adequacy is a plausible means for firearm owners to justify gun ownership in the face of evidence health risk to the owner and others. However, knowledge adequacy does not provide any insight regarding the utility of firearms to their owners. Participating PCPs

identified several redeeming aspects of firearm ownership verbalized by patients during the intervention. As illustrated in the following two excerpts, perhaps one of the most striking themes was the culture of firearm ownership, in which firearms are a proud symbol of one's heritage.

Participant 2: A lot more guns in New Hampshire than I ever realized. A lot more.

Because a lot of these people that I didn't know that guns, have a lot of guns. <laugh>

When they start going into their collections . . . And it's a pride thing. They don't necessarily, a lot of people don't even have ammo. They don't even shoot them. But they have them, they collect them. You know, they were the grandfather's, or what not.

Moderator: So there's a tradition element of this. And, and pride in ownership. Do you think there's an element of identity in that? This is our family weapon and somehow giving that up?

Participant 2: There were some heirlooms passed down, so.

Participant 1: They're [parents] going to intentionally expose them to [children to firearms] when they think they're physically capable.

Participant 2: Right.

Moderator: Okay.

Participant 2: There was a pride of like, parent teaching his kid the right way to deal with guns.

Moderator: Okay,

Participant 2: Like he was taught.

Moderator: So maybe not necessarily as a means to reduce the risk, just because it was almost a traditional thing.

Participant 1: Correct.

Heritage and pride in gun ownership, therefore, were identified as strong factors in parents' decision not only to possess firearms, but to intentionally expose their children to guns. Regarding the strength of this bond between firearms and one's heritage, a participating PCP commented, "I think it's ingrained in their their heritage, so to speak. I don't think we're going to change it."

A primary aim of the postintervention focus group was to solicit participating PCPs' feedback regarding patient response to the intervention, assessment of intervention impact, and recommendations for improvement. The patient education handout was reported to be useful and generally well received. In particular, "the public law enforcement officials liked it, they said is pretty on target." Despite the previously discussed barriers encountered during the intervention, participating PCPs felt that the intervention was generally well received by patients. Having a strong therapeutic relationship between patient and provider was found to facilitate patient receptiveness to the intervention. However, one participating PCP conceded, "Most people took the paper I was giving him more just to be polite."

Participating PCPs did not have specific recommendations for how the intervention might be improved. One concern voiced by participating PCPs in the preintervention focus group was the potential time required to perform firearm screening and patient education. However, participating PCPs found that the intervention did not add a significant time burden when completed as part of an annual preventative care visit. In addition, participating PCPs felt that

performing firearm screening on an annual basis was an appropriate interval, and, as discussed in the following excerpt, expressed concerns that more frequent screening might result in increased resistance from patients.

Moderator: Do you think that's challenged your relationship at all with the patient or made it somewhat adversarial?

Participant 2: I think if we kept going back every six months with the same questions, I think it eventually would.

Participant 1: Or they would tell us I'm not answering that question.

Participant 2: Right. I think because they knew that this was a one time thing, we're just doing a survey, it was not a big deal, not part of their record, I think they were a lot more comfortable with answering. But if this was going to come up every time I think it would get old for some of the patients.

Participating PCPs' assessments of the net impact of the intervention on patient behavior was mixed. As previously discussed, a great polarity in opinions was observed in patients who were screened for firearm ownership, with the majority of patients on either end of the spectrum. Unfortunately, it was felt that the patients who were most receptive to the intervention were also the patients least likely to benefit from firearm risk education. One participating PCP articulated this observation succinctly:

Participant 2: I think the ones that it'll make the impact the most are the ones I probably would worry the least about. If that make sense.

Moderator: So, you mean the ones that were already conscious . . .

Participant 2: make good decisions about it, conscious about it, they're going to read that data and they're going to say, "OK." But they're probably not the ones that would have loaded guns on the kitchen table.

Consistent with this observation, participating PCPs found that patients believed to benefit the most from the intervention were not likely to change their behavior.

Participant 1: There were some cases I can recall where people would say, you know, I think I will go buy child safety locks, or I will keep my ammo separate from my gun and locked separately. But the majority of the time, "I'm gonna keep doing what I'm doing."

## **Discussion**

### **Summary**

Facilitated by four primary care providers a total of 126 patients presenting to an outpatient family health clinic in Rochester, NH, for annual preventative health care visits between July 29, 2019 to August 30, 2019 were screened for firearm ownership and received firearm risk education. Slightly more than half of the patients who participated in this intervention reported having firearms in the home. Of patients with firearms, approximately 75.4% reported locking firearms up and/or using a trigger lock or other safety device.

As shown in figure 1, when divided by firearm ownership, two notable commonalities are noted in the screening questionnaire responses. First, the overwhelming majority of both patients with and patients without firearms reported being aware of the risks of firearm

ownership (93.8% and 82.0%, respectively). The second common finding is that most patients with firearms (90.8%) and without firearms (96.7%) responded “No” when asked if they would like additional information on the health risks of firearm ownership and ways to reduce this risk. A possible explanation for this disinterest in information on the health risks of firearm ownership among firearm owners and non-owners alike was the near-universal phenomenon of knowledge adequacy. Knowledge adequacy was perhaps the most significant barrier experienced during the intervention. While knowledge adequacy was a common phenomenon, the associated factors differed greatly between patients who owned firearms and those who did not. Knowledge adequacy in firearm owners was associated with privacy concerns, right to bear arms, and fear of the government and/or authorities. Among non-firearm owners, knowledge adequacy was found to reinforce existing beliefs regarding firearm risks, perhaps furthering the view that additional information was not needed.

Other formidable barriers include the culture of firearm ownership, including pride in firearm ownership and the role of firearms as a symbol of one’s heritage. Despite being generally well received by patients, it is unclear if the intervention was able to overcome these barriers and effect behavior change.

Despite these challenges, one success of the intervention was the voluntary commitment by one participating PCP to continue performing firearm ownership screening and firearm risk education after the completion of the intervention. Another participating PCP also expressed interest in continuing firearm screening and education but was unsure they would remember without an automated prompt in the electronic health record.

**Limitations**

Closed-ended, dichotomous-type questions were intentionally chosen for the firearm screening questionnaire to meet the requirement of brevity set forth by participating PCPs in the preintervention focus group. However, this type of question has several limitations, including restriction of patient responses, which may prohibit the capture of more nuanced situations. In addition, options for statistical analysis of categorical data, such as those obtained from the screening questionnaire, are inherently limited.

Demographic information was intentionally not collected from patients screened for firearm ownership in order to preserve anonymity and to simplify the screening process. However, this information would help to understand the characteristics of patients screened.

Other significant limitations include short duration of the intervention, and implementation at a single site. A longer period of study is needed to assess the intervention's impact, if any, on firearm-related morbidity and mortality. The author acknowledges that these limitations limit the generalizability of any findings.

**Conclusions**

Unfortunately, incidents of firearm-related injury have become commonplace in the United States. The scope of this politically-charged problem is daunting, and the barriers to change many and challenging. It is understandable that health care professionals would focus on these obstacles, and in the course of doing so lose sight of the fact that the underlying issue is a public health crisis. Health care professionals have a fundamental obligation to protect public health. Without exception, threats to public health must be addressed swiftly, professionally and dispassionately. Rather than focus on the entirety of the problem, this intervention has demonstrated a means for health care providers to address this public health crisis within their



own practices. Further, we have demonstrated that this intervention can be performed at negligible cost in terms of time and money. Finally, the intervention was generally well received by patients in a State which produced approximately 1/7th of all firearms manufactured in the United States in 2017. This intervention could be readily adapted to suit different communities, providing health care professionals across the country with a favorable cost/benefit means to address a public health crisis.

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**Appendix A**

## Focus Group Questions, Pre-intervention

Moderator: Aaron Kahn, FNP

Assistant: Claire Wennberg, MSN, RN

June 25, 2019, 12:30PM

Diabetes and Endocrine Center, Rochester, NH

Moderator Introduction:

Thank you for participating in today's focus group. We will be discussing your opinions regarding a quality improvement initiative on firearm screening in the primary care setting. Specifically, the initiative will involve screening patients for firearm ownership and educating patients on the associated health risks. As primary care providers at the clinic of the proposed intervention, your feedback is valuable.

Please note that our discussion today is being recorded. As this recording will be transcribed, I ask that, if possible, only one person speak at a time.

1. Which patients do you believe are at risk by owning a firearm or living in a home with a firearm?
  - a. How do you believe this risk can be reduced?

2. Which patients in the primary care setting do you believe should be screened for firearm ownership and how frequently?
  - a. What other settings do you believe screening for firearm ownership would be appropriate?
3. For your patients who own firearms or live in a home with firearms, whom do you educate on the health risk associated with firearm ownership?
  - a. How receptive are the patients who receive this education?
  - b. What barriers have you encountered to screening for firearm ownership and educating patients on the associated health risks?
  - c. What barriers do you anticipate?
4. What factors prevent you from screening for firearm ownership and educating patients on the associated health risks?
5. What recommendations do you have for a firearm screening and patient education protocol?
  - a. How much time should it take to perform firearm screening and education?
  - b. Who should perform firearm screening and education?
  - c. What format do you think would be most effective? For example:
    - i. face-to-face?
    - ii. printed handouts?
    - iii. multimedia?

## Appendix B

## Intervention Handout

0001

**PROTECT  
YOUR  
SELF**



**PROTECT  
YOUR  
FAMILY**

## FACTS ABOUT FIREARMS AND YOUR HEALTH

Our mission is to do all we can to help you and your family live long, healthy lives. To help you stay well, we routinely check for health risks, such as high blood pressure and cigarette smoking. We also educate you on ways to reduce health risk, such as advising persons with high blood pressure to limit sodium intake. We are here to provide you with the facts, and respect that these are your choices to make.

Personal protection is a top priority of many Americans. About 67% of firearm owners in the U.S. say protection is the primary reason for owning a firearm. However, owning a firearm exposes you and your family to serious health risk.

Most firearms are not used for protection. The majority of firearm-related deaths in the U.S. are due to suicide, not self-defense during a

- ◆ *Do you have firearms in your home?*  Y  N
- ◆ *If so, are they stored in a safe, with a trigger lock, or other safety device?*  Y  N
- ◆ *Are you aware that firearms pose a health risk to you and others in the home?*  Y  N
- ◆ *Would you like more information on the health risks of firearm ownership and how you can reduce these risks?*  Y  N

burglary or home invasion. Unfortunately, firearms frequently harm those they are meant to protect.

Firearm injuries are the third leading cause of death of children between ages 1 and 17. In addition, in households with children where parents keep a gun primarily for protection, firearms are stored unloaded and locked away only

52% of the time. Unfortunately, programs which teach children to stay away from firearms have not been shown to be effective. In homes with firearms, over 1/3 of kids have handled a gun without their parents' knowledge.

The following are some ways you can reduce the health risk of firearm ownership.

### FIREARM FACTS

**764** DEATHS

WEEKLY DEATH TOLL IN THE U.S. DUE TO FIREARM INJURIES. <sup>1</sup>

**\$48** BILLION

ANNUAL HEALTHCARE COSTS AND LOST WAGES DUE TO FIREARM INJURIES. <sup>2</sup>

**60.7** PERCENT

PERCENTAGE OF ALL FIREARM DEATHS DUE TO SUICIDE. <sup>3</sup>

**36** PERCENT

KIDS WHO HAVE HELD PARENTS' GUNS CONTRARY TO PARENTS' BELIEF. <sup>4</sup>

**3<sup>rd</sup>** LEADING

GUN INJURIES ARE 3<sup>RD</sup> LEADING CAUSE OF DEATH OF KIDS AGES 1-17. <sup>5</sup>

### WHAT YOU CAN DO

- ◆ Always store firearms unloaded and in locked safe. Double check to make sure guns are unloaded before storing. Parts of disassembled guns should be stored separately.
- ◆ Always use a trigger lock or other safety device. Free gun locks are available at:
  - ◆ Dover Police Dept: (603) 742-4646
  - ◆ Rollinsford Police Dept: (603) 742-8549
  - ◆ Project ChildSafe: [www.projectchildsafe.org](http://www.projectchildsafe.org)
- ◆ Ammunition should be stored in a locked container separately from firearms and away from sources of heat and electricity.

Created by Aaron Kahn, FNP, in partial fulfillment of the requirements of the Doctor of Nursing Practice program at the University of New Hampshire.

**Appendix C**

## Focus Group Questions, Post-intervention

Moderator: Aaron Kahn, FNP

Assistant: Claire Wennberg, MSN, RN

September 3, 2019, 12:30PM

Rochester Hill Family Practice, Rochester, NH

Moderator Introduction:

Thank you for participating in today's focus group. We will be discussing your opinions regarding the recently completed quality improvement initiative on screening for firearm ownership in the primary care setting.

Please note that our discussion today is being recorded. As this recording will be transcribed, I ask that, if possible, only one person speak at a time.

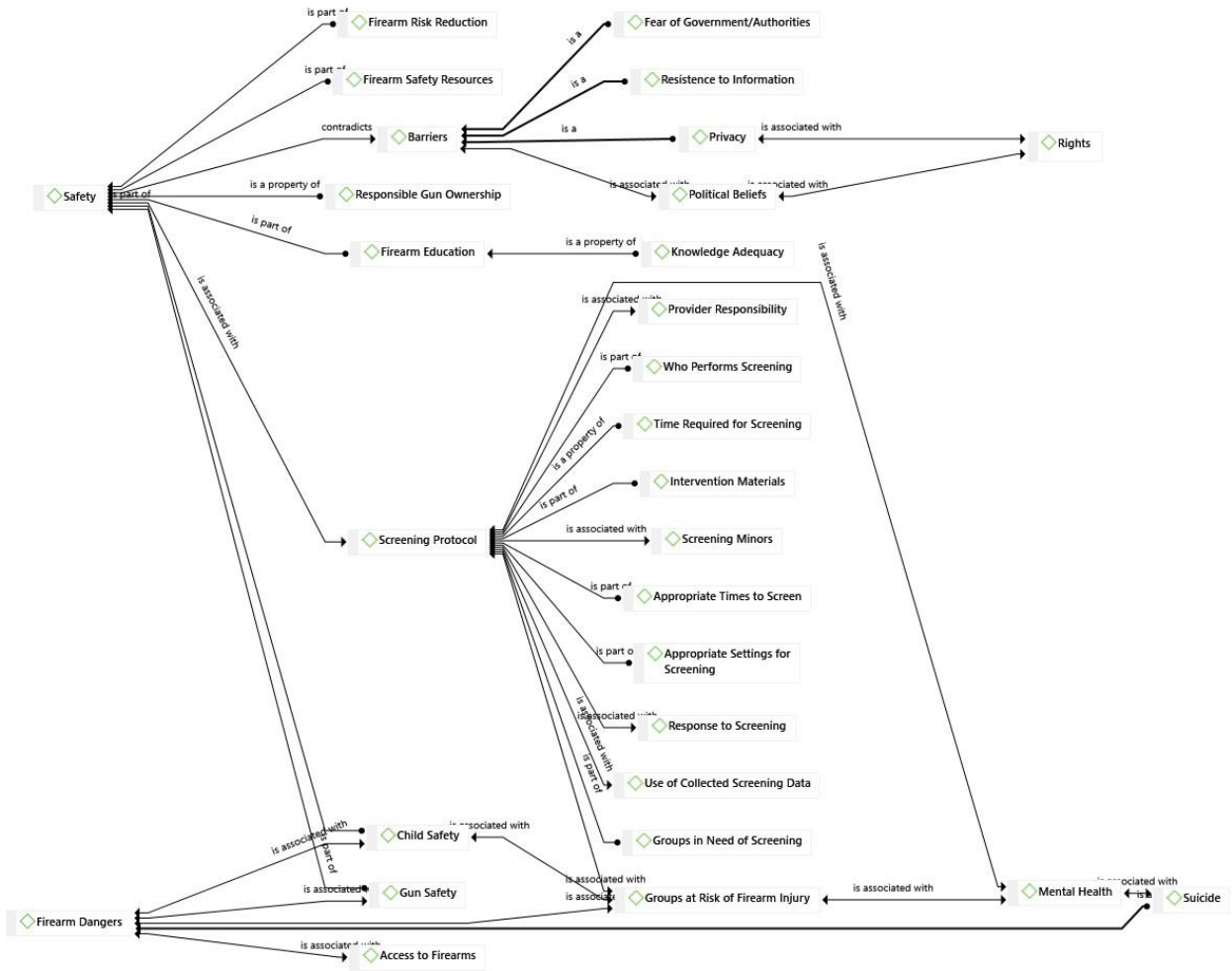
1. What challenges/barriers did you encounter in the course of participating in this intervention?
2. Which patients did you choose to exclude from the intervention?
3. How did patients respond to screening and education? Can you think of a memorable patient encounter during the intervention?
4. How could the intervention be improved?
5. What are your impressions regarding the handout used in the intervention?



- a. With respect to conveying to patients the health risks of firearm ownership how could the handout be improved?
  - b. Think of an encounter in which you performed firearm screening and used the handout. How could the handout be improved to expedite the screening process?
6. What impact do you believe this intervention will have on the health risk associated with firearm ownership?
7. Did you learn anything else in the course of participating in this intervention?
8. Of all the issues we have identified today, which do you believe is most important?

### Appendix D

### Preintervention Network Analysis Diagram



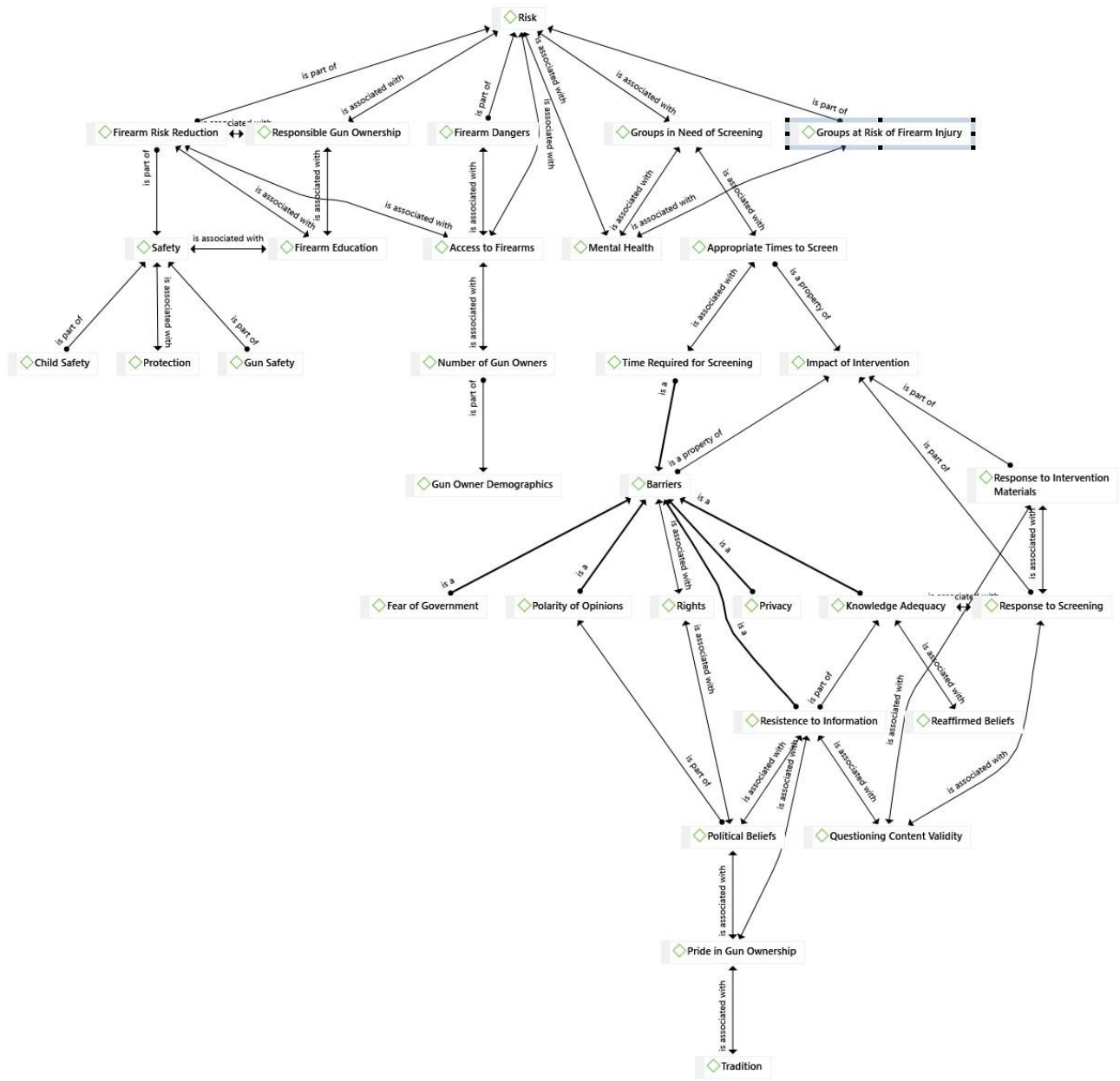
## Appendix E

## Preintervention Focus Group Themes

| <u>Code</u>                        | <u>Comment</u>  | <u>Density</u> |
|------------------------------------|---|----------------|
| Access to Firearms                 | Issues relating to access to firearms.  | 4              |
| Appropriate Settings for Screening |   | 1              |
| Appropriate Times to Screen        | When to screen.   | 1              |
| Barriers                           | Perceived or actual barriers to firearm screening and education.                    | 5              |
| Child Safety                       | Factors which may be protect or endanger children.                                  | 4              |
| Fear of Government/Authorities     | Fear that gov't and/or authorities may limit right to bear arms.                    | 2              |
| Firearm Dangers                    |   | 5              |
| Firearm Education                  | Issues related to educating persons on firearm ownership risks.                     | 2              |
| Firearm Risk Reduction             | Methods to reduce risk of firearm ownership.  | 1              |
| Firearm Safety Resources           | Resources available to reduce risk of firearm ownership.                            | 1              |
| Groups at Risk of Firearm Injury   |   | 4              |
| Groups in Need of Screening        |   | 1              |
| Gun Safety                         |   | 3              |
| Intervention Materials             | Recommendations for intervention materials.   | 1              |
| Knowledge Adequacy                 | Perception that one has sufficient knowledge related to risks of firearm ownership. | 1              |
| Mental Health                      | Relationship between mental health and risk for firearm injury.                     | 3              |
| Occupational Use of Firearms       |   | 1              |
| Political Beliefs                  | Relationship between political beliefs and firearm ownership.                       | 2              |
| Privacy                            | Issues related to right to privacy.   | 2              |
| Provider Responsibility            | When providers are obligated / not obligated to intervene.                          | 1              |
| Resistance to Information          | Actual or perceived resistance to firearm screening and risk education.             | 1              |
| Response to Screening              | Patient responses to screening for firearm ownership.                               | 1              |
| Responsible Gun Ownership          |   | 1              |
| Rights                             | Rights of the individual, including right to own firearms.                          | 3              |
| Safety                             | Issues related to personal and public safety.                                       | 8              |
| Screening Minors                   | Concerns related to screening minors for firearms in the home.                      | 1              |
| Screening Protocol                 | Suggestions for firearm screening protocol.   | 13             |
| Suicide                            | Firearm-related suicide.  | 3              |
| Time Required for Screening        |   | 1              |
| Use of Collected Screening Data    | Concerns related to use of collected screening responses.                           | 1              |
| Who Performs Screening             | Specifically, should screening be performed by provider or delegated to staff.      | 1              |

Appendix F

Postintervention Network Analysis Diagram



## Appendix G

## Postintervention Focus Group Themes

| <u>Code</u>                        | <u>Comment</u>   | <u>Density</u> |
|------------------------------------|--|----------------|
| Access to Firearms                 | Issues relating to access to firearms.   | 4              |
| Appropriate Times to Screen        |  | 3              |
| Barriers                           | Perceived or actual barriers to firearm screening and education.   | 8              |
| Child Safety                       | Factors which may be protect or endanger children.   | 1              |
| Fear of Government                 | Fear that gov't and/or authorities may limit right to bear arms.   | 1              |
| Firearm Dangers                    |  | 2              |
| Firearm Education                  | Issues related to educating persons on firearm ownership risk.   | 3              |
| Firearm Risk Reduction             | Methods to reduce risk of firearm ownership.   | 5              |
| Groups at Risk of Firearm Injury   |  | 2              |
| Groups in Need of Screening        |  | 3              |
| Gun Owner Demographics             |  | 1              |
| Gun Safety                         |  | 1              |
| Impact of Intervention             | Participating PCPs' perceptions of intervention impact.  | 4              |
| Knowledge Adequacy                 | Perception that one has sufficient knowledge related to risks of firearm ownership.                      | 4              |
| Mental Health                      | Relationship between mental health and risk for firearm injury.  | 3              |
| Number of Gun Owners               |  | 2              |
| Polarity of Opinions               | Divide between gun owners and those who do not own guns.   | 2              |
| Political Beliefs                  | Relationship between political beliefs and firearm ownership.  | 4              |
| Pride in Gun Ownership             | Pride in gun ownership as a factor perpetuating firearm ownership.                                       | 3              |
| Privacy                            | Issues related to right to privacy.  | 1              |
| Protection                         | Utility of firearms for protection.  | 1              |
| Questioning Content Validity       | Patient skepticism of facts presented during the intervention.   | 3              |
| Reaffirmed Beliefs                 | Role of intervention in perpetuating existing beliefs with respect to health risks of firearm ownership. | 1              |
| Resistance to Information          | Actual or perceived resistance to firearm screening and risk education.                                  | 5              |
| Response to Intervention Materials |  | 3              |
| Response to Screening              | Patient response to firearm screening and risk education.  | 4              |
| Responsible Gun Ownership          |  | 3              |
| Rights                             | Rights of the individual, including right to own firearms.   | 2              |
| Risk                               | Risk for firearm-related injury.   | 7              |
| Safety                             | Issues related to personal and public safety.  | 5              |
| Time Required for Screening        |  | 2              |
| Tradition                          | Role of family tradition in decision to own a firearm.   | 1              |
| Use of Collected Screening Data    | Concerns related to use of collected screening responses.  | 4              |