

# **EHR-based screening and intervention for intimate partner violence**

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**Organization:** Medical University of South Carolina

**Inclusive Dates of Project:** 9/13/2018 to 07/31/2023

**Federal Project Officer:** Christine Dymek

**Acknowledgment of Agency Support:** This grant was funded by the Agency for Healthcare Research and Policy.

**Grant Award Number:** 1R18HS025654-01A1

## Structured Abstract

**Purpose:** Assess the impact of an electronic health record (EHR)-based multifactorial intervention screening for Intimate Partner Violence in primary care practice.

**Scope:** Women aged 18 to 49 years old being seen in fifteen university health system primary care clinics.

**Methods:** We developed an EHR intervention to promote IPV screening and risk management in primary care with three components: (1) a non-interruptive EHR alert; (2) confidential screening using the 3-item Partner Violence Screening (PVS) instrument and (3) confidential assessment and referral of high risk patients using decision-support templates. We evaluated this intervention using a randomized stepped wedge study design deployed across the 15 clinics in blocks of five sites. The trial was conducted in the setting of a control intervention of screening for IPV using nurse interviews and an electronic checklist.

**Results:** Clinics saw 19,695 unique eligible patients over the study period (64.4% white, 4.2% Latino, 85.7% private insurance). The intervention had large effects on the overall rate of screening for IPV, increasing the rate of screening from 45.2% to 65.3% when the non-interruptive alert was active (multi variate odds ratio, 2.35 (2.26-2.44,  $P < 0.001$ )). The confidential PVS process was more effective at identifying patients at risk for IPV (130 patients (1.46% (1.22%-1.73%, 95% CI)) vs. 9 patients (0.05% (0.02%-0.1%, 95% CI))). In 63 visits providers used the decision support tools, diagnosing adult abuse in 26 cases and attempting to refer 42 patients for telecounseling (four accepted referral). Conclusions: The intervention appeared to be largely effective in addressing the various aspects of diagnosis and management of IPV in primary care.

Key words: Intimate Partner violence, primary care, decision support, non-interruptive alert, computer assisted screening, self-reported screening.

## PURPOSE

### Objectives of the study:

The objective of this study was to develop and evaluate an integrated suite of electronic health record (EHR) tools that automates “best practices” from Northern California Kaiser Permanente for screening and intervention for IPV identified within clinical settings. The goal of the intervention goes beyond mere screening of patients for IPV and includes tools for assessment of IPV risk, for documentation of IPV care, and support for a warm hand-off during the primary care visit to a national IPV hotline resource. Importantly, the study includes work to keep notes documenting IPV and billing for IPV care confidential, segmenting this care in a secure segment of the electronic health record.

### Scope:

**Background:** Intimate Partner Violence (IPV) is a frequently occurring condition (25% lifetime prevalence) for which screening in primary care is the United States Preventative Service Task Force recommended service [1] Screening for IPV is conducted much less frequently in primary care than screening for other conditions such as depression [2] IPV is stigmatizing to its victims and concerns about confidentiality are a recognized barrier to disclosure [3]. Self-administered computer questionnaires are an effective but under-utilized, privacy-preserving approach to screen for IPV [4]; alternatively, many healthcare providers often screen for IPV and other issues with oral questions. In IPV, asking questions in an overly routine or uncaring way is a barrier to a forthright response [2]. Further complicating matters, IPV screening also generates electronic health record (EHR) documentation that can compromise privacy, particularly if the perpetrator of the violence has access to

a patient's screening results, EHR summaries, or claims data. An EHR diagnosis may also become widely available to personnel within a health system, creating concerns that may further inhibit disclosures [2,5]. Many women, even in emergency department settings with evidence of injuries, choose not to disclose abuse because of privacy and safety concerns [6]. Therefore, maintaining patients' privacy in screening for IPV in healthcare settings is of paramount importance. We describe our approach to highly private self-reported screening for IPV risk factors herein.

One of the most widely used approaches to change provider behavior is an alert or prompt in an EHR for a specific task. These alerts come in two general flavors: interruptive which presents a popup alert that blocks a user from further actions on the computer screen until resolved and non-interruptive, which has more diverse implementations but often highlights an action on the screen. Blocking popup style alerts are the most common type of decision support alert in EHR systems; however, this approach has been over utilized, and as a result, providers frequently ignore these alerts. A recent review of non-interruptive alerts found these were an effective means to alter provider behavior. However, this method has not been previously applied in IPV screening. We describe our implementation of a non-interruptive alert for annual IPV screening herein, as one of three elements of our intervention.

A lack of expertise of primary care providers in the assessment of risk and difficulty linking patients to needed resources may also pose significant barriers for providers in screening processes. Integrated tools for risk assessment and referral for follow-up of positive IPV screening, including reminders of legal conditions that may mandate disclosure (for example, children witnessing IPV events), may help providers feel more comfortable with screening tasks [3,7], and thus encourage compliance with screening guidelines. While screening and counseling for IPV is a billable activity, the desire to keep discussions private may result in a provider not using IPV-related billing codes and losing potential credit for time spent counseling in provider productivity calculations. An approach to document time spent in confidential activities that a health system might *choose not to bill for* because of privacy concerns may be important positive reinforcement for provider screening behaviors for IPV. We also describe this, the third element of our intervention herein.

**Context:** Implementation of a computerized self-reported screening program in primary care clinics has some logistical issues, especially if the responses need to be kept private and sheltered from potential perpetrators of violence. In this setting, the perpetrator of violence may attend clinical visits with the patient and prevent sharing honest answers to oral or written or computerized questionnaires. Therefore, care needs to be taken to separate the patient from other family members during responses. Patient computer devices, such as home computers and cell phones, may be monitored and as a result may not be secure. To overcome these issues, providers might issue a computer tablet, but the additional expense of this is an issue. To address issues of costs, we use a proprietary Epic tool to turn the exam room computer into a kiosk for administering questionnaires from Epic's MyChart patient portal.

Implementation of a population-based screening program within an EHR, such as the one for IPV risk described herein, in a confidential way, is a difficult task that requires innovative approaches to data management. In EHR systems, the most widely applied approach to preserve privacy of diagnostic and treatment data is the segmentation of confidential data from the general medical record. In specialty care, management of confidential conditions such as drug abuse can occur in secure "departments" that prevent record viewing by other providers. Providers that are not members of the organizational unit can have what is called "break the glass" access in emergencies, which allows a provider to view the record but notifies a data security officer. However, this approach is difficult to apply in the setting of population screening for IPV.

In primary care settings, where patient care typically involves care of multiple problems, maintaining patient privacy while screening for a confidential condition is difficult. While, for instance, drug abuse issues might be protected by “break the glass”-like functionality in a drug addiction treatment clinic, in primary care clinics, this is not possible. Screening for patients who experience physical or mental abuse in a relationship could result in the introduction of specific codes for such into the medical record such as Z91.41 (personal history of adult physical and sexual abuse) if physicians document violence screening and/or bill for counseling for positive screening. Thus, because of the stigmata of IPV perceived in its victims, deferential privacy and segmentation of the data may be necessary to enable victims to share concerns and events more freely. Even so, because the essence of primary care is the longitudinal follow-up of patients over time, it is critical to somehow notify a provider of a prior positive screening result for IPV and encourage periodic reassessment, even though the finding might be “hidden” in a segmented part of the EHR for privacy.

**Setting:** This study was conducted in a subset of the larger Family Medicine led primary care clinics in the MUSC Health System in the Charleston, South Carolina region. Family medicine clinics were chosen because the demographics of these clinics matched our target population (as opposed to Internal Medicine clinics which serviced an older population). Larger clinics were selected to meet population size estimate goals while addressing limitations in staff available to support clinics during the intervention period.

This study was about to be rolled out across the MUSC Health System when the COVID-19 pandemic hit, closing MUSC’s primary care clinics to in person visits. We did not believe we could maintain privacy in a telehealth remote visit setting. Therefore, we deferred implementation until clinics reopened in October of 2020. However, with no funding available to extend the study, we were forced to begin implementation of the intervention in the first quarter of 2021, so as to be able to complete the study within the scope of the grant. Obviously, this was not ideal, and a longer run-in period would have been preferable.

**Participants:** The participants in this study were the providers, staff, and patients of 15 clinics. The total number of patients seen during the study period was 19,655.

**Table 1. Demographics of study population. Counts and percentages (in brackets) shown.**

Ethnicity	Not Hispanic or Latino	8353 (93.9)
	Hispanic or Latino	377 (4.2)
	Refused/Unknown	165 (1.9)
Race	White or Caucasian	5732 (64.4)
	Other	3163 (35.6)
Insurance	Private/Military/Other	7625 (85.7)
	Medicaid/Medicare	1270 (14.3)
Visit type	New Patient	3126 (35.1)
	Other	5769 (64.9)
Marital Status	Married	3811 (42.8)
	Significant Other	170 (1.9)
	Single	4346 (48.9)
	Widowed	47 (0.5)
	Divorced/Legally Separated	421 (4.7)
	Unknown	100 (1.1)
Age	18-29	2795 (31.4)
	30-39	3132 (35.2)
	40-49	2968 (33.4)

**Incidence:** The US rate of annual IPV reported in women is 5.9%.

**Prevalence:** The lifetime prevalence of IPV is reported to be 25% of all women. The prevalence in the studied population is unknown. However, the prevalence of IPV in South Carolina is known to be higher, with a lifetime relative risk of 1.17.

**METHODS**

**Study Design:** This study uses a randomized step wedge design [12] where each block had a balanced number of encounters for patients in the target age range. Clinics were assigned to 1 of 3 blocks and blocks were randomized in sequence. The blocks are shown in Figure 1.

Control (nurse-led screen)	Intervention Start (nurse-led and confidential/High privacy screen)		
Time Period 0	Time Period 1	Time Period 2	Time Period 3
2020-10-06 – 2021-01-03	2021-01-04 -2021-08-31	2021-09-01-2022-08-31	2022-09-01-2023-03-31
Health West	Health West	Health West	Health West
Carnes	Carnes	Carnes	Carnes
North	North	North	North
Park West	Park West	Park West	Park West
B-Street	B-street	B-Street	B-Street
West Ashley	West Ashley	West Ashley	West Ashley
Ellis Oaks	Ellis Oaks	Ellis Oaks	Ellis Oaks
Ben Sawyer	Ben Sawyer	Ben Sawyer	Ben Sawyer
Sweetgrass	Sweetgrass	Sweetgrass	Sweetgrass
Martello	Martello	Martello	Martello
Hollings	Hollings	Hollings	Hollings
Springview	Springview	Springview	Springview
Coosaw	Coosaw	Coosaw	Coosaw
Daniel Island	Daniel Island	Daniel Island	Daniel Island
Daniel Island 2	Daniel Island 2	Daniel Island 2	Daniel Island 2

**Figure 1. Randomized Stepped Wedge design with clinics identified**

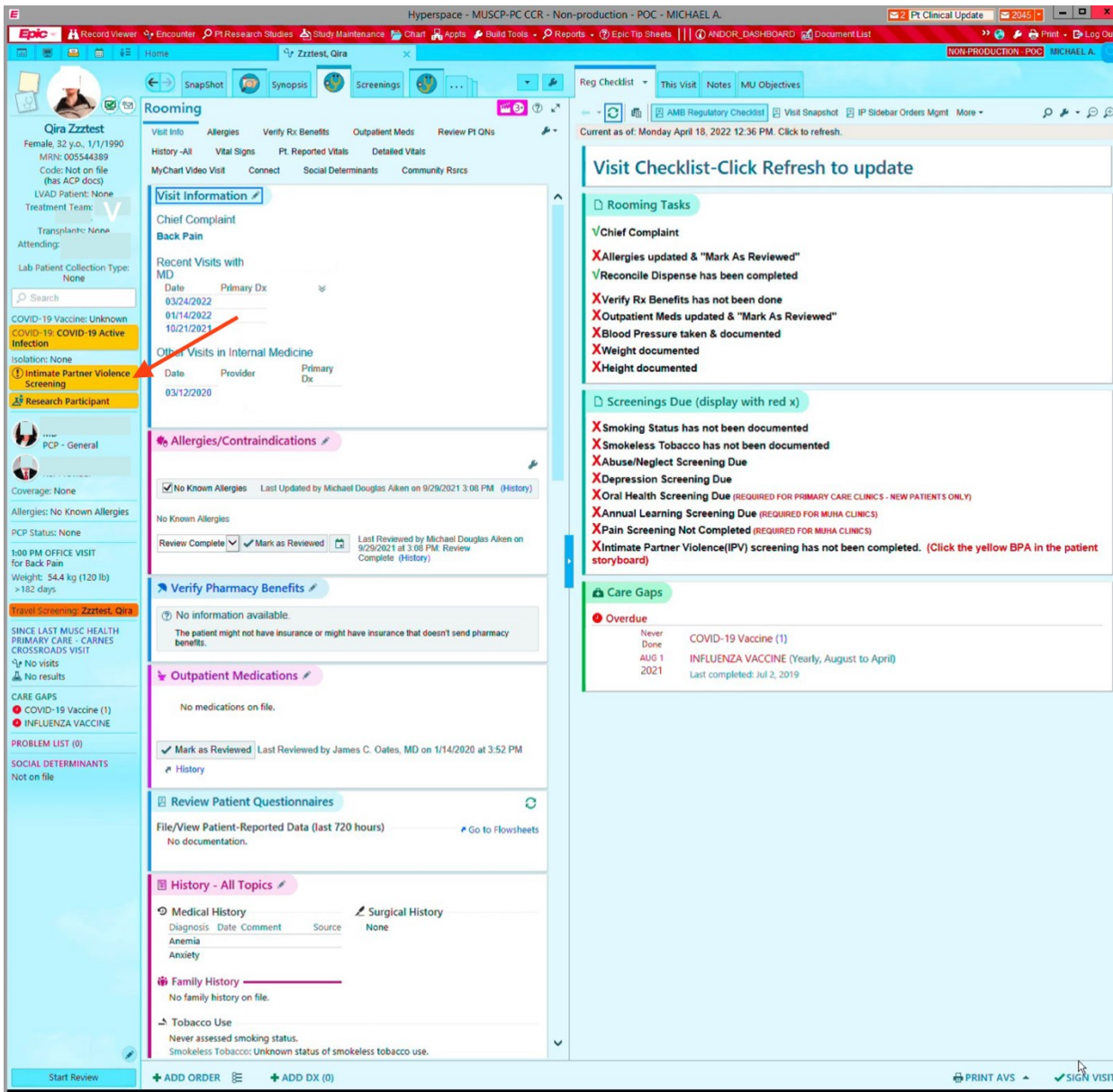
To prepare clinics for participation, we worked with the Primary Care Service Line Director, clinical leaders in Family Medicine clinics and staff to implement the study. Prior to roll out in each clinic, we met with relevant clinic staff and providers to share the following tools and approaches: 1. Manual for clinic operations of the system 2. Online training for helpline 3. Pre-intervention in-service, online education, and certification for clinic staff and providers. Online training was integrated with MUSC’s MyQuest staff education system. Educational materials included tip sheets on intimate partner violence and how to implement screening procedures, video demonstration of EHR use, as well as videos demonstrating suggested scripting for interactions with patients. During the initial week of the roll out, Epic research support personnel were available in the clinics to help providers learn to use software modifications and to answer questions. Provider

support for in-person individual IPV-related training and case consultations was provided by two experts in IPV training and management through-out the implementation and operation of the study.

**Data Sources/Collection:** All data were collected within the Epic EHR system. Data were extracted from Clarity Tables and Chronicles by an experienced full time research data analyst, who acted as an honest broker, anonymizing files prior to analysis while maintaining patient record linkages.

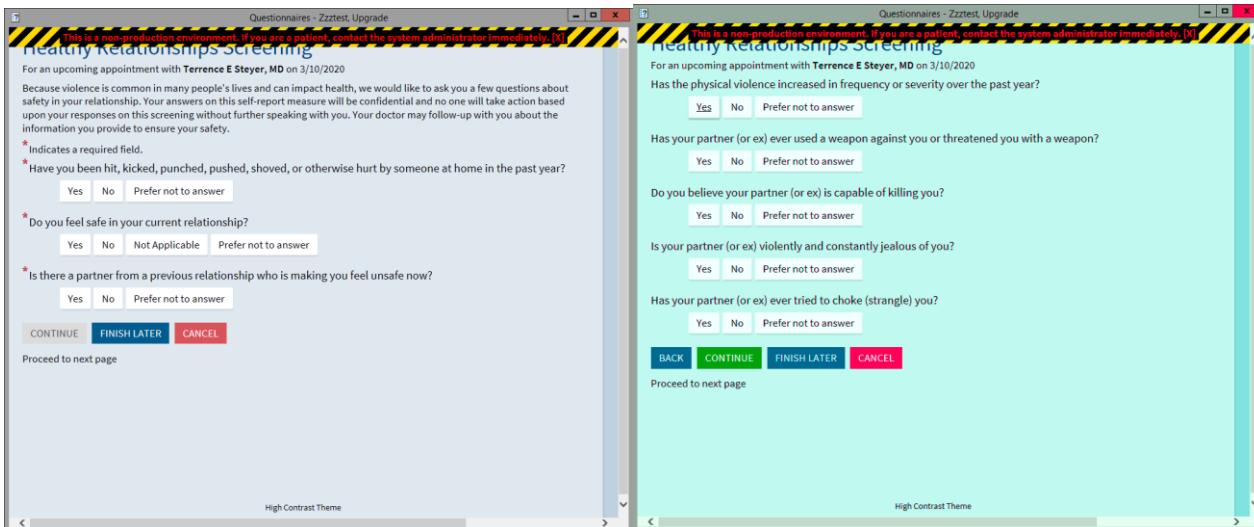
**Interventions:** Working with key stakeholders (i.e., providers, patients, IPV survivors, IPV experts) we adapted an existing program for IPV screening with both paper-based and computer-based components used within Northern California Kaiser Permanente Health System [8] to be fully implemented within the EHR *in a privacy-preserving way*. The implementation included the creation of a registry of targeted patients (women 18 to 49 years of age (the highest risk group)) being seen in primary care clinics.

The EHR workflow used this registry to present an in-menu, non-interruptive alert which notifies medical assistants to screen a patient for IPV on an annual basis (Figure 2). This alert was triggered annually for patients in the target population and was turned off when screening was satisfied. Responding to the (non-interruptive) alert converts the exam room computer to a kiosk-like mode for use by a patient to self-administer an IPV screening questionnaire.



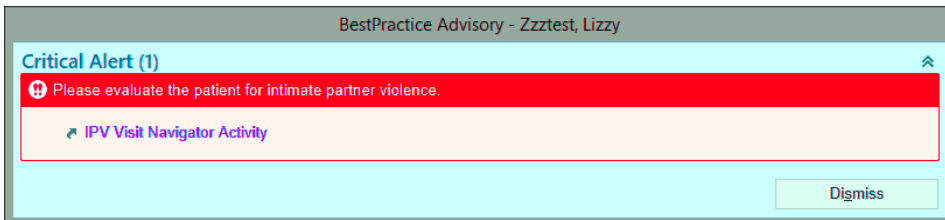
**Figure 2. Non-interruptive alert for annual screening for IPV. Alert indicated by red arrow**

The self-reported questionnaire approach was taken to maximize potential patients' willingness to report for IPV [9]. Because of the difficulties in ensuring a tablet computer or other device was available in all primary care settings and in ensuring the privacy of responses after patient use, we developed this kiosk-style approach. The medical assistant assures the patient is alone, by removing another adult-age family from the room, so that the patient can respond to a 3-item initial screening questionnaire [10] to detect IPV, which if positive, cascades to an additional questionnaire administered to assess risk levels of future harm [11]. This is shown in Figure 3. The approach provides the maximum feasible level of protection for the privacy of patients' responses.



**Figure 3.** This figure shows the patient questionnaire administered in kiosk mode. The second screen (right side) is triggered by a positive response to any of the initial screener questions. Figure used with permission of Epic Systems.

Completion of the questionnaires results in a lock screen for the computer while awaiting the provider’s portion of the visit. If the patient screens positive for IPV, a popup alert notifies the provider (Figure 4). Clicking on the “IPV navigator Activity” takes the provider to an electronic form that provides decision support for IPV care.



**Figure 4.** Blocking style popup alert of a positive screener for IPV

The IPV Visit Navigator is a decision support tool that displays patients’ responses to screening questions, helps the provider further evaluate a patient’s risk level, offers recommended follow-up questions with examples of scripted responses, supports documentation of an IPV specific physical examination, and of counseling. It also allows the provider to record time spent on this issue during the visit to allow potential credit for this time in resource valuation units (RVUs) without billing, which might compromise privacy. The results are stored in an electronic flow sheet hidden from other visit records. Providers then complete reassessments of risk, physical exam findings, and document follow-up recommendations. On return visits, a Blocking BPA reminded providers to access the Navigator to review data. All patients who screened positive were automatically reassessed on their next clinic visit for risk.



IPV  
QNR Response  
Documentation  
Historical QNR Data  
Historical Provider...

**Current Encounter IPV Questionnaire Response**

Musc Rsch Ipv Screening

3/10/2020 11:40 AM EDT - Filed by Patient on 3/10/2020

Question

Have you been hit, kicked, punched, pushed, shoved, or otherwise hurt by someone at home in the past year?  
-- If yes, by whom? (Select all that apply)

Do you feel safe in your current relationship?  
Is there a partner from a previous relationship who is making you feel unsafe now?  
Has the physical violence increased in frequency or severity over the past year?  
Has your partner (or ex) ever used a weapon against you or threatened you with a weapon?  
Do you believe your partner (or ex) is capable of killing you?  
Is your partner (or ex) violently and constantly jealous of you?  
Has your partner (or ex) ever tried to choke (strangle) you?  
Do you feel in danger right now?

Yes  
Husband or Wife  
No  
Yes  
Yes  
Yes  
Yes  
No  
No  
Yes !!

Danger Assessment Total Score (range: 0 - 5)

3 (High risk for significant physical harm or being killed in the future) !!

Figure 5. Summary of responses presented to the provider

IPV  
QNR Response  
Documentation  
Historical QNR Data  
Historical Provider...

**IPV Provider Assessment Smartform**

This Smartform is confidential and will not appear anywhere else in the patients chart.

**Suggested verbiage for physician**

As your doctor, I am concerned about your safety in your relationship. I want you to know that you are not alone and help is available. I do have several follow-up questions that may assist me in best being able to help you.

**Provider Follow-up Safety Questions**

Does your partner have access to a firearm? Yes No Pt Declined

Is your partner here at the clinic today? Yes No

I am concerned that you are in danger. For your safety do you want me to help you connect to police to make a report and keep you safe? Yes No

For your safety do you want me to help you connect to the local domestic violence shelter to hear about ways to stay safe either remaining in the relationship or how to leave is a safe way? Yes No

**Facilitated Hand Off to National Hotline**

Given you said that you are in fear of danger today, we are very concerned and are reluctant to have you leave without hearing more about safety planning. I want you to know that I am concerned about your safety, but I understand that it can be intimidating to reach out for help or to know what resources are available. I want to share the number to the National Domestic Violence Hotline with you, which is an organization that specializes in providing expert support on relationship abuse and can help connect you to local resources. It is a 24/7 hotline that is confidential, anonymous, free of cost and accessible through phone, chat or text. The advocates at The Hotline are highly trained and here to help with whatever you feel ready to do. I can connect you to them if you feel comfortable with that, how does that sound?

**Contact National Domestic Violence Hotline: 800-799-7233**

Protocol:

- 1) Call Hotline with patient in a private room from clinic phone.
- 2) With patient's permission provide screening results to hotline advocate.
- 3) Pass phone to patient.
- 4) Leave room for patient privacy.
- 5) After call is complete, review plan with patient for next steps.
- 6) Schedule follow-up visit.

Was a call to the hotline made? Yes No Pt declined

**Additional Useful Psychoeducation if patient is hesitant**

Domestic violence is common and happens in all kinds of relationships. This is not your fault. It usually does not go away on its own and tends to get worse and more frequent over time. It can have significant impact on your health and well-being. There are people who can help you and we have many resources available at MUSC. Remember, you are not alone.

If patient is reluctant to contact IPV hotline here are some tips Additional Provider Tips

**Physical Exam**

Was a physical exam performed? Yes No Pt declined

Skin Positive Normal Comment

Abrasion Positive Negative Comment Bruising Positive Negative Comment

Burn Positive Negative Comment Ecchymosis Positive Negative Comment

Burn on left arm

Erythema Positive Negative Comment Laceration Positive Negative Comment

Lesion Positive Negative Comment Petechiae Positive Negative Comment

Musculoskeletal Positive Normal Comment

Decreased ROM Positive Negative Comment Decreased Strength Positive Negative Comment

Pain Positive Negative Comment Swelling Positive Negative Comment

Tenderness Positive Negative Comment Bony Tenderness Positive Negative Comment

Please document any other relevant physical / neurological findings. Anything documented in this section is protected from the rest of the patients chart.

Insert SmartText

Figure 6. Navigator for helping the provider conduct a brief counseling interview, assess risk, document care, and refer the patient if needed

Referral for IPV further care was managed in two ways. In settings of immediate risk to the patient, there was a protocol for immediate outreach to hospital security and a nurse specialist providing IPV support to the Emergency Department. For lower-risk cases, patients were provided psychoeducation and offered a referral to a national hotline for counseling and support for IPV victims. In cases where the abuse of the victim was observed by children, the provider was reminded in the documentation tool to immediately refer the case to state child protective services, as required by law, and contact information was given.

At a population level, screening is tracked for the entire eligible clinic population using a combination of decision support alerting rules. The non-interruptive reminder for medical assistants to screen patients remains active until a patient is screened. In screener negative patients, the non-interruptive reminder for medical assistants is turned off for one-year. In screener positive patients, the reminder for medical assistants to screen remains active for one-year to encourage repeat screening. In addition, in screener positive patients, providers continue to receive pop-up alerts reminding them of the presence of hidden IPV data on an ongoing basis in subsequent primary care visits and to allow providers to trigger re-screening of patients.

We tested the navigator tools for provider assessment and management of IPV risk using trained standardized patients in a controlled setting. Standardized patients were given scripts to perform with various types of issues related to IPV. Primary care providers from Family Medicine Clinics interviewed these simulated patients completing patient management forms. Both providers and standardized patients provided feedback on improvements to the protocols and screening processes which were used to further refine workflows for optimal patient-provider interactions.

**Control Condition:** MUSC developed and deployed an institution-wide protocol for screening patients for IPV signs or symptoms in 2019. When patients were roomed in all outpatient clinics, nurses completed a check list where they screened, based on professional judgment (e.g., did not directly ask standardized questions) for a variety of factors. One of those factors, as shown in Figure 7, was Abuse/Neglect Screening. Clicking on this item, opened a second menu for nurses to document either the absence of any evidence of abuse/neglect or the presence of different risk factors. Selecting the “caregiver degrades or threatens patient”, “abuse/neglect suspected”, “evaluation for abuse”, “excessive fear/withdrawn or guarded behavior” or “has unexplained injuries or bruises” was considered a positive screener for spousal abuse risk.

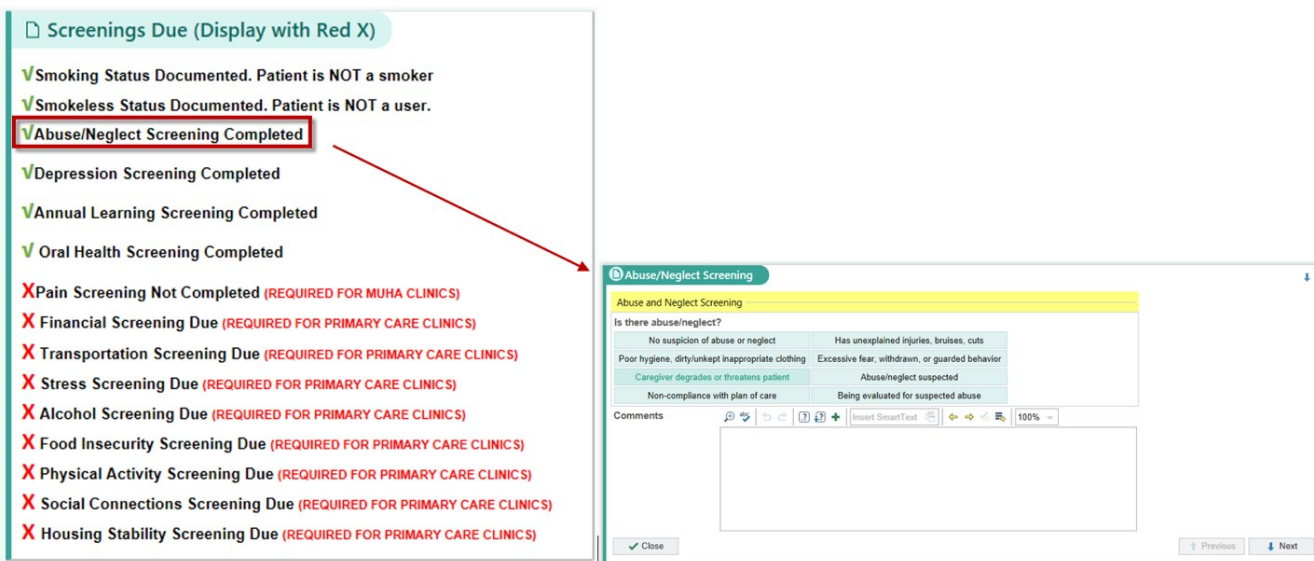


Figure 7. Control intervention: a nursing checklist for screening and documentation of risk during rooming

**Measures:** The primary outcome measure for the study was the rate at which patients were screened for IPV across the clinics. The secondary outcome was the rate at which patients at risk for IPV were detected by screening procedures. Other outcomes included the severity of risk observed in patients, physician compliance with IPV management tools, rates of diagnosed IPV (by physicians) and the rate of referrals for post-visit counseling to a national hotline.

**Limitations:** The planned rollout of the intervention for this study was interrupted by the COVID-19 pandemic, limiting time in a baseline measurement phase. The number of clinics in the randomized block design and the types of clinics (exclusion of Internal Medicine clinics and OB/GYN clinics) were reduced because of ongoing issues with activation in clinic care.

## RESULTS

**Principal Findings:** Across the entire study, 51% of patients were screened using the Nurse-led method and 28% using the high privacy self-report method (Table 2). The triggering of pop-up screening alert which indicates the assignment of high privacy self-report screen had important effects on the overall rate of screening for IPV, increasing the rate of screening using either method to 65.3% (odds ratio versus Nurse-led screening only, 2.35 (2.26-2.44, P<0.001)).

**Table 2. Screening completion rate**

	Nurse-led screening	High privacy PVS
Screenings assigned (visits)	56887	34157
Screening completed (visits, control and intervention conditions)	29046	9707
Screening completed (visits, percent from assigned, control and intervention conditions)	51.06%	28.42%

**Table 3. Responses of patients screening (one or more positive responses) to the High privacy PVS questions**

“Do you feel safe in your current relationship?”	Frequency	Percent	Valid Percent	Cumulative Percent
No	12	0.124	0.124	0.124
Not Applicable / Prefer not to answer	1366	14.072	14.072	14.196
Yes	8329	85.804	85.804	100.000
Missing	0	0.000		
Total	9707	100.000		

“Have you been hit, kicked, punched, pushed, shoved, or otherwise hurt by someone at home in the past year?”	Frequency	Percent	Valid Percent	Cumulative Percent
No	9563	98.517	98.517	98.517
Prefer not to answer	54	0.556	0.556	99.073
Yes	90	0.927	0.927	100.000
Missing	0	0.000		
Total	9707	100.000		

“Is there a partner from a previous relationship who is making you feel unsafe now?”	Frequency	Percent	Valid Percent	Cumulative Percent
No	9576	98.650	98.650	98.650
Prefer not to answer	63	0.649	0.649	99.299
Yes	68	0.701	0.701	100.000
Missing	0	0.000		
Total	9707	100.000		

Table 4 and Figure 8 display odds ratios of completing any screen type using mixed-effects multilevel analysis. Patients are less likely to complete screening in visits other than their first visit to the provider (OR 0.8, p-value < 0.001). Races other than White are slightly less likely to complete screening (OR 0.96, p=0.027). Patients who are not married are less likely to complete screening except for Unknown marital status (OR 1.36, p-value=0.002), although only widowed and divorced group reached statistical significance in multilevel analysis (OR 0.79, p-value=0.022 and OR 0.82, p-value < 0.001, respectively) in multilevel analysis. Persons on Medicaid/Medicare are less likely to complete screening (OR 0.78, p-value < 0.001). The odds ratio of completing any screening decreases for older patients (OR 0.93, p-value=0.001 for 30-39 year-olds; OR 0.93, p-value=0.002 for 40-49 year-olds).

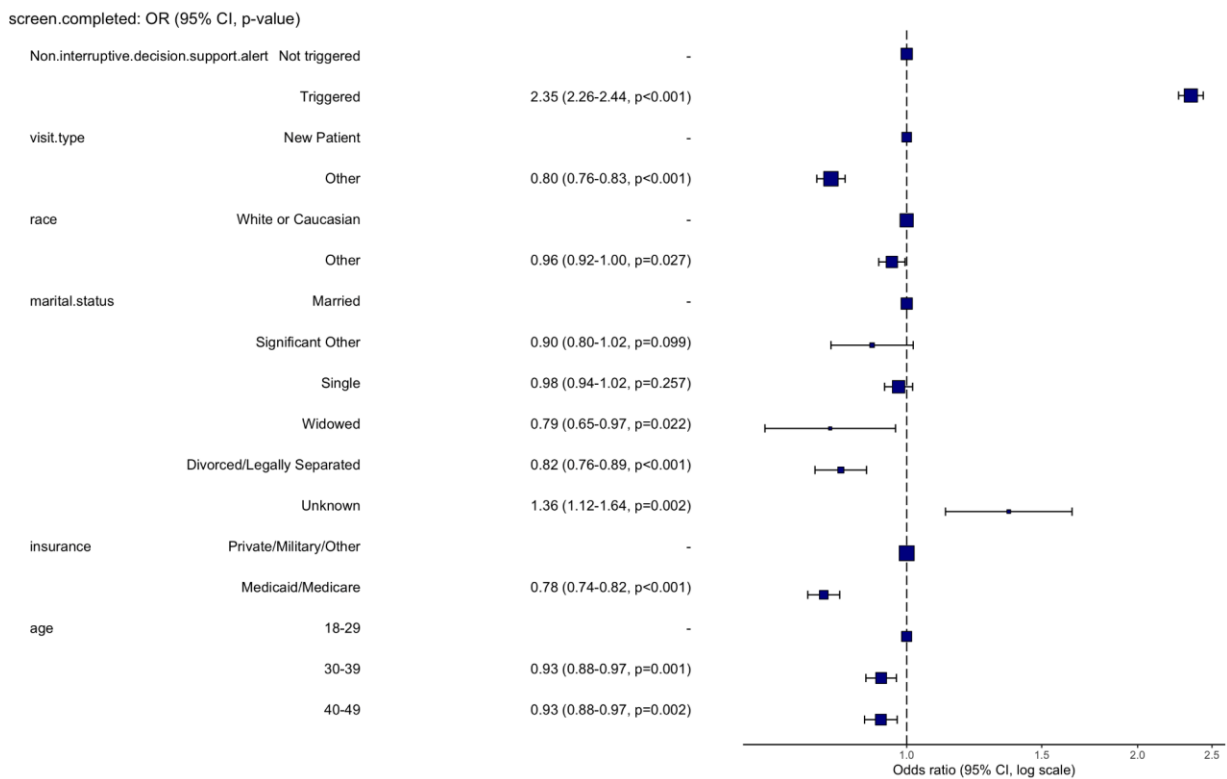


Figure 8. Odds ratio of completing any screen based on mixed-effects logistic regression model (Model 1)

**Table 4. Results of multilevel mixed-effects analysis with IPV screening completion as dependent variable (Model 1)**

		No screening	Any screening completed	OR (univariable)	OR (multilevel)
<b>Non-interruptive decision support alert</b>	<b>Not triggered</b>	<b>12462 (54.8)</b>	<b>10268 (45.2)</b>	-	-
	<b>Triggered</b>	<b>11854 (34.7)</b>	<b>22303 (65.3)</b>	<b>2.28 (2.21-2.36, P&lt;0.001)</b>	<b>2.35 (2.26-2.44, P&lt;0.001)</b>
Race	White or Caucasian	14145 (41.4)	20019 (58.6)	-	-
	Other	10171 (44.8)	12552 (55.2)	0.87 (0.84-0.90, P<0.001)	0.96 (0.92-1.00, P=0.027)
Marital status	Married	9227 (41.3)	13104 (58.7)	-	-
	Significant Other	506 (43.7)	651 (56.3)	0.91 (0.80-1.02, P=0.104)	0.90 (0.80-1.02, P=0.099)
	Single	12632 (43.3)	16570 (56.7)	0.92 (0.89-0.96, P<0.001)	0.98 (0.94-1.02, P=0.257)
	Widowed	217 (49.4)	222 (50.6)	0.72 (0.60-0.87, P=0.001)	0.79 (0.65-0.97, P=0.022)
	Divorced/Legally Separated	1562 (48.3)	1670 (51.7)	0.75 (0.70-0.81, P<0.001)	0.82 (0.76-0.89, P<0.001)
	Unknown	172 (32.7)	354 (67.3)	1.45 (1.21-1.75, P<0.001)	1.36 (1.12-1.64, P=0.002)
Insurance	Private/Military/Other	19071 (41.3)	27142 (58.7)	-	-
	Medicaid/Medicare	5245 (49.1)	5429 (50.9)	0.73 (0.70-0.76, P<0.001)	0.78 (0.74-0.82, P<0.001)
Ethnicity	Not Hispanic or Latino	23123 (42.9)	30748 (57.1)	-	-
	Hispanic or Latino	889 (40.9)	1284 (59.1)	1.09 (1.00-1.19, P=0.063)	-
	Refused/Unknown	304 (36.1)	539 (63.9)	1.33 (1.16-1.54, P<0.001)	-
Age	18-29	6619 (40.3)	9789 (59.7)	-	-
	30-39	8833 (43.5)	11487 (56.5)	0.88 (0.84-0.92, P<0.001)	0.93 (0.88-0.97, P=0.001)
	40-49	8864 (44.0)	11295 (56.0)	0.86 (0.83-0.90, P<0.001)	0.93 (0.88-0.97, P=0.002)

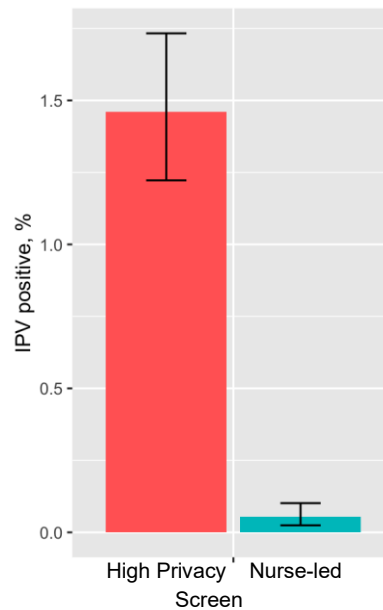
**Table 5. Results of univariate and multilevel analysis with High privacy PVS screen positive as dependent variable (Model 2)**

		Not positive	Positive	OR (univariable)	OR (multilevel)
Visit type	New Patient	3070 (98.2)	56 (1.8)	-	-
	Other	5693 (98.7)	76 (1.3)	0.73 (0.52-1.04, P=0.079)	-
Race	White or Caucasian	5658 (98.7)	74 (1.3)	-	-
	Other	3105 (98.2)	58 (1.8)	1.43 (1.01-2.02, P=0.044)	1.06 (0.72-1.55, P=0.778)
Marital status	Married	3788 (99.4)	23 (0.6)	-	-
	Significant Other	166 (97.6)	4 (2.4)	3.97 (1.15-10.46, P=0.012)	2.98 (1.01-8.80, P=0.048)
	Single	4266 (98.2)	80 (1.8)	3.09 (1.97-5.03, P<0.001)	2.11 (1.26-3.53, P=0.004)
	Widowed	46 (97.9)	1 (2.1)	3.58 (0.20-17.56, P=0.217)	3.19 (0.42-24.20, P=0.262)
	Divorced/Legally Separated	399 (94.8)	22 (5.2)	9.08 (4.99-16.49, P<0.001)	8.26 (4.50-15.17, P<0.001)
	Unknown	98 (98.0)	2 (2.0)	3.36 (0.53-11.58, P=0.103)	2.48 (0.57-10.87, P=0.227)
Insurance	Private/Military/Other	7533 (98.8)	92 (1.2)	-	-
	Medicaid/Medicare	1230 (96.9)	40 (3.1)	2.66 (1.81-3.85, P<0.001)	1.94 (1.28-2.93, P=0.002)
Ethnicity	Not Hispanic or Latino	8228 (98.5)	125 (1.5)	-	-
	Hispanic or Latino	372 (98.7)	5 (1.3)	0.88 (0.31-1.96, P=0.790)	-
	Refused/Unknown	163 (98.8)	2 (1.2)	0.81 (0.13-2.57, P=0.766)	-
Age	18-29	2739 (98.0)	56 (2.0)	-	-
	30-39	3092 (98.7)	40 (1.3)	0.63 (0.42-0.95, P=0.028)	0.70 (0.45-1.08, P=0.110)
	40-49	2932 (98.8)	36 (1.2)	0.60 (0.39-0.91, P=0.018)	0.63 (0.38-1.04, P=0.068)

Patients were less likely to complete screening in visits other than their first visit to the provider (OR 0.8, p-value < 0.001). Races other than White are slightly less likely to complete screening (OR 0.96, p=0.027). Patients who are not married are less likely to complete screening except for Unknown marital status (OR 1.36, p-value=0.002), although only widowed and divorced group reached statistical significance in multilevel analysis (OR 0.79, p-value=0.022 and OR 0.82, p-value < 0.001 respectively) in multilevel analysis. Persons on Medicaid/Medicare are less likely to complete screening (OR 0.78, p-value < 0.001). The odds ratio of completing any screening decreases for older patients (OR 0.93, p-value=0.001 for 30-39 year-olds; OR 0.93, p-value=0.002 for 40-49 year-olds).

### Impact of screening on the identification of patients at risk for IPV:

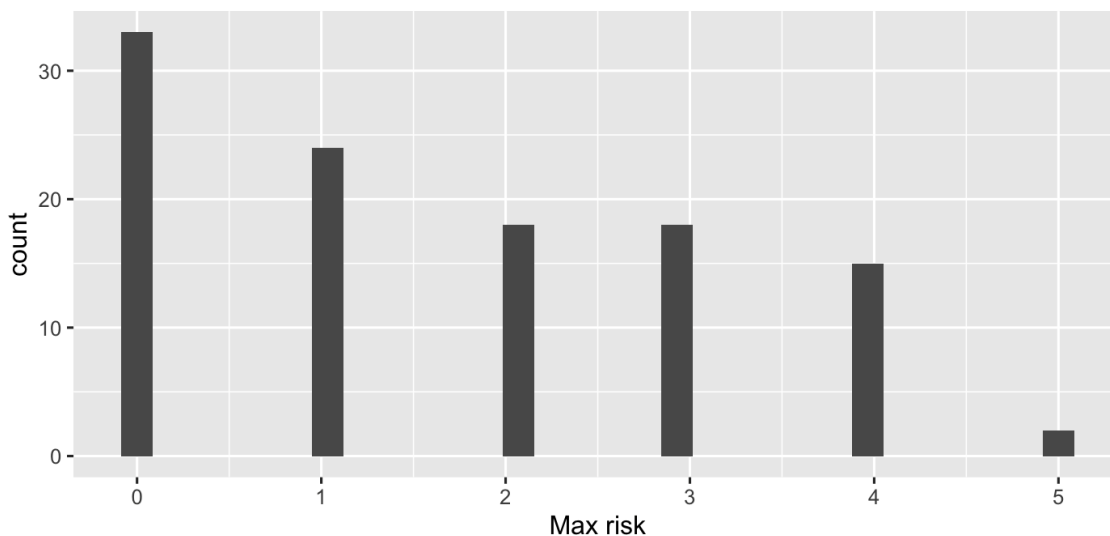
The confidential (High privacy) screen was much more effective in identifying patients with potential IPV risk. Only 9 patients were identified as being at risk for IPV using the baseline screener (0.05% (0.02%-0.1%, 95% CI)). One-hundred thirty patients were identified as being at risk with the self-reported questionnaire (1.46% (1.22%-1.73%, 95% CI)) as shown in Figure 9.



**Figure 9. IPV positive detection rate by each screen type**

There were 144 positive screening results in 130 patients with the high privacy screening protocol. Table 5 depicts results of univariate and mixed-effects statistical analysis estimating the likelihood of being screened positive on the confidential screen. The analysis demonstrated that patients who are not married are several times more likely to be screened positive: OR 2.98, p-value=0.048 for patients reporting “significant other” marital status; OR 2.11, p-value=0.004 – single patients; OR 3.19, p-value=0.262 – widowed; OR 8.26, p-value < 0.001 – divorced/legally separated. Persons on Medicaid/Medicare are almost twice more likely to be screened positive (OR 1.94, p-value=0.002). Other factors such as race and age were insignificant in multilevel analysis: races other than white have a slightly higher chance of being screened positive (OR 1.06, p-

value=0.778); the odds ratio of being screened positive decreases with age (OR 0.7, p-value=0.11 for age group 30-39; OR 0.63, p-value=0.018 for age group 40-49).

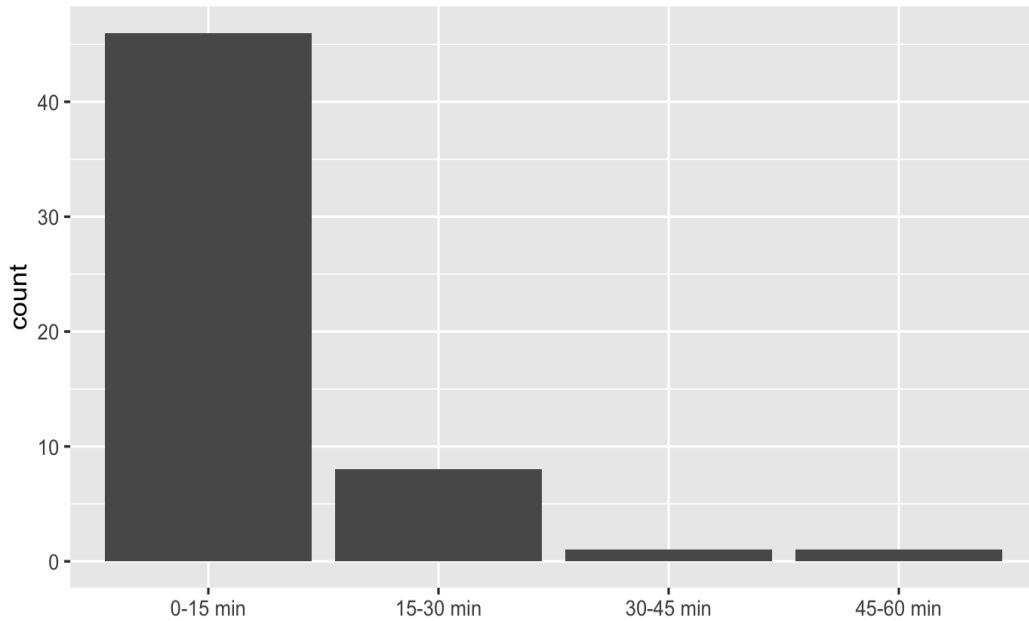


**Figure 10. Distribution of 111 patients' responses to the Danger 5. Scores greater than 1 indicate very high risk. If a patient was positive across several visits, the visit with maximum score is used in this figure.**

Follow on risk screening with the Danger 5 occurred in 111 (out of 130) patients in 125 visits. Danger 5 assesses level of risk for future severe physical injury or possible IPV related death. Figure 10 shows that the population identified by High privacy PVS screener was truly at high risk of future negative physical outcomes of IPV. Of 111 patients completing screening, 55 were at "very high risk" of future IPV related physical harm (2 or more positive answers.) Only 33 patients had negative responses to all of the Danger 5 questions.

**Outcomes:** Physician compliance with the popup BPA for IPV care was high with almost all providers complying with the alert in encounters where the Danger 5 assessment was completed. In 63 encounters (50.4%), physicians used the template to IPV related document care. Physicians attempted to perform physical examinations to confirm IPV history. In 36 encounters, reported counseling on injury prevention (Z71.89); and 26 cases of confirmed adult abuse were diagnosed (T74.111). Handoff for counseling and follow up by the National IPV Hotline was offered in 42 cases and accepted in 4 cases. While counseling patients occasionally required substantial additional time, in the vast majority of cases, the reported time was 15 minutes or less. (Figure 11).





**Figure 11. Reported physician time in counseling services for IPV**

**Table 6. Diagnoses and Procedures**

**Frequencies for ICD10**

ICD10	Frequency	Percent	Valid Percent	Cumulative Percent
T74.111 (Adult physical abuse, confirmed)	15	12.000	12.000	12.000
Z71.89 (Counseling on injury prevention)	25	20.000	20.000	32.000
T74.111 and Z71.89	11	8.800	8.800	40.800
Missing	74	59.200	59.200	59.200
Total	125	100.000		

**Frequencies for Was a physical exam performed?**

Was a physical exam performed?	Frequency	Percent	Valid Percent	Cumulative Percent
No	20	16.000	16.000	16.000
Pt declined	14	11.200	11.200	27.200
Yes	29	23.200	23.200	50.400
Missing	62	49.600	49.600	100.000
Total	125	100.000		

**Frequencies for Was a call to a hotline made?**

<b>Was a call to a hotline made?</b>	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
No	21	16.800	16.800	16.800
Pt declined	38	30.400	30.400	47.200
Yes	4	3.200	3.200	50.400
Missing	62	49.600	49.600	100.000
Total	125	100.000		

### **Acceptability of Screening:**

A subset of patients (n=15) who screened positive for IPV, after providing informed consent, agreed to participate in a follow-up telephone qualitative interview to gather information on acceptability of this self-report IPV screening approach within their primary care visit. Twelve of the 15 participants completed the interview. All participants (100%) reported acceptability of being asked the IPV questions during their visit as well as being asked via self-report on the computer. All respondents (n=10, two declined to answer) indicated being satisfied or very satisfied with the physician follow-up.

### **DISCUSSION**

The intervention in this study had three components, all of which were shown to be important and potentially effective in this study. The first component was the use of a non-interruptive alert to remind providers to screen for IPV on an annual basis. This alert resulted in increased both nurse-led screening and use of the High privacy PVS checklist screening. The second component of the intervention was high privacy screening by self-report. This process identified many more patients potentially at risk for IPV, while also characterizing the risk level of patients identified. The low rate of identification of IPV by the nurse-led approach calls into question its effectiveness in settings of limited resource availability. From the 125 visits where screening was positive in 77 (61.6 %) cases patient answered one of the Danger 5 questions affirmatively. This suggests the confidential PVS screening was specific, finding true cases at risk for IPV. The third component of the intervention was a physician-decision support system for assessment of risk and management. The decision support template was used in only 63 of 125 identified cases (about 50%). Diagnoses of adult abuse were made in 26 cases, and referral to the IPV hotline was offered in 42 cases (but accepted in only four). The results show the potential for primary care screening using advanced decision support systems to impact care of patients experiencing or at risk for IPV.

A voluntary approach to screening has some limitations. Patients that were older, single, of non-white race and had public insurance were screened less frequently. This was particularly concerning in the case of patients with public insurance as these patients were much more likely to screen positive for IPV risk. Physician compliance to the popup blocking alert needs further evaluation to understand how to add complex conversations about IPV and risk into busy primary care schedules.

The rate of patients' acceptance of referral for counseling was relatively low (4/42 cases); longer term follow up may be needed to help patients address the complex challenges of IPV risk in ongoing relationships. Provider incentives for compliance with the screening and counseling process may be important in future dissemination efforts. The protocol does require significant effort by clinic staff and assessment of its impact

on clinic productivity may be warranted. However, the elimination of non-scientific-based screening programs that are ineffective may yield sufficient time to allow more effective ones to be performed in practice.

**Conclusions:** A three-part EHR-based intervention appeared to be highly effective in both increasing the frequency of screening and the number of patients identified as at risk for significant future physical IPV related injuries. However, further work may be needed in optimizing the complex process of adding counseling for IPV risk prevention in persons detected to be at risk. While providers appear ready to refer patients for ongoing counseling outside of the visit, few patients were ready to accept it. Among patients who screened positive, the intervention was well accepted.

**Significance:** IPV is a prevalent, underdiagnosed, and undertreated condition in primary care environments. This study demonstrates the feasibility of using advanced decision support techniques and data segmentation (to protect patients' privacy) to address this issue in primary care settings.

**Implications:** A larger scale study across multiple institutions may be warranted. Adapting this approach for implementation in other EHR systems (Cerner, NextGen, etc.) may be warranted. Replication outside of the scope of COVID-19 related impacts on the healthcare system may be warranted.

## List of Publications and Products

### Software:

<https://comlib.epic.com/>

### Publications

Keeping it Just Between Us: Confidential Population-Level Intimate Partner Violence (IPV) Screening, Evaluation, and Referrals in Primary Care Clinics. Epic User Group Meeting 2.2020. Verona WI.

Primary Care Screening for Confidential Conditions in a Segmented Electronic Health Record: Application to Intimate Partner Violence. Podium Abstract Presentation. AMIA Fall Symposium 2022.

Confidential Screening for and Management of Intimate Partner Violence Risk using a Commercial Electronic Health Records System. Leslie Lenert, Vanessa Diaz, Kit Simpson, Christine Hahn, Michael Aiken, Elizabeth Swartz, Luke Sox, Ekaterina Pekar, Naomi Ennis, Alyssa Rheingold. medRxiv 2023.02.11.23284286; doi: <https://doi.org/10.1101/2023.02.11.23284286>

### References

1. Nelson HD, Bougatsos C, Blazina I. Screening women for intimate partner violence: a systematic review to update the U.S. Preventive Services Task Force recommendation. *Ann Intern Med* 2012;156:796–808, W – 279, W – 280, W – 281, W – 282.

2. Dichter ME, Ma.karoun L, Tuepker A, *et al.* Middle-aged Women's Experiences of Intimate Partner Violence Screening and Disclosure: 'It's a private matter. It's an embarrassing situation'. *J Gen Intern Med* 2020;35:2655–61.
3. Tu J, Penti B. How We Talk About 'Perpetration of Intimate Partner Violence' Matters. *J Am Board Fam Med* 2020;33:809–14.
4. Frazier T, Yount KM. Intimate partner violence screening and the comparative effects of screening mode on disclosure of sensitive health behaviours and exposures in clinical settings. *Public Health* 2017;143:52–9.
5. Kennedy AC, Prock KA. 'I Still Feel Like I Am Not Normal': A Review of the Role of Stigma and Stigmatization Among Female Survivors of Child Sexual Abuse, Sexual Assault, and Intimate Partner Violence. *Trauma Violence Abuse* 2018;19:512–27.
6. Lustig L, Fishenson E, Natan MB. Characteristics of Women Presenting at the Emergency Department Who Choose Not to Disclose Being Subjected to Intimate Partner Violence. *J Interpers Violence* 2022;37:NP12133–45.
7. Dichter ME, Wagner C, Goldberg EB, *et al.* Intimate Partner Violence Detection and Care in the Veterans Health Administration: Patient and Provider Perspectives. *Womens Health Issues* 2015;25:555–60.
8. Decker MR, Frattaroli S, McCaw B, *et al.* Transforming the healthcare response to intimate partner violence and taking best practices to scale. *J Womens Health* 2012;21:1222–9.
9. Hussain N, Sprague S, Madden K, *et al.* A comparison of the types of screening tool administration methods used for the detection of intimate partner violence: a systematic review and meta-analysis. *Trauma Violence Abuse* 2015;16:60–9.
10. Feldhaus KM, Koziol-McLain J, Amsbury HL, *et al.* Accuracy of 3 brief screening questions for detecting partner violence in the emergency department. *JAMA* 1997;277:1357–61.
11. Messing JT, Campbell JC, Snider C. Validation and adaptation of the danger assessment-5: A brief intimate partner violence risk assessment. *J Adv Nurs* 2017;73:3220–30.
12. Hemming K, Haines TP, Chilton PJ, *et al.* The stepped wedge cluster randomised trial: rationale, design, analysis, and reporting. *BMJ* 2015;350:h391.