Communication Training Improves Patient-Centered Provider Behavior and Screening for
Soldiers' Mental Health Concerns

Susan R. Douglas, Ph.D.^a

Ana Regina Vides de Andrade, Ph.D.^a

Stephanie Boyd, Ph.D.^a

Melanie Leslie, Ph.D.^b

Lynn Webb, Ph.D.^b

Lauren Davis, M.A.^b

Melissa Fraine, MPH^c

Nicole L. Frazer, Ph.D.^c

Ryan Hargraves, M.A.^a

Leonard Bickman, Ph.D.^a

^a Vanderbilt University, Nashville ,TN, USA

^b Vanderbilt University Medical Center, Nashville, TN, USA

^c Behavioral Health Branch, Clinical Support Directorate, Defense Health Agency, Falls Church, VA, USA.

Corresponding author: Dr. Susan Douglas at Vanderbilt University, Peabody College, 230

Appleton Place #552, Hobbs 211B, Nashville, TN 37203 (tel: 615-322-8141, fax: 615-343-9494,

email: susan.douglas@vanderbilt.edu)

Abstract

Objective: To evaluate the effectiveness of training military providers on patient-centered communication behaviors in the context of post-deployment health screening encounters. The half-day interactive workshop included simulated Soldier patients using video technology.

Methods: Using a quasi-experimental design, all health care providers at four military treatment facilities were recruited for data collection during a four- to nine-day site visit (23 trained providers, 28 providers in the control group, and one provider declined to participate). All Soldiers were eligible to participate and were blinded to provider training status. Immediately after screening encounters, providers reported on their identification of mental health concerns and Soldiers reported on provider communication behaviors resulting in 1,400 matched pairs. Electronic health records were also available for 26,005 Soldiers.

Results: The workshop was found to increase (1) providers' patient-centered communication behaviors as evaluated by Soldiers; (2) provider identification of Soldier mental health concerns; and (3), related health outcomes including provision of education and referral to a confidential counseling resource.

Conclusion: Results are promising, but with small effect sizes and study limitations, further research is warranted.

Practice Implications: A brief intensive workshop on patient-centered communication tailored to the military screening context is feasible and may improve key outcomes.

Keywords: patient-centered communication; training; simulated patients; standardized patients; military; mental health screening; post-deployment health concerns; quasi-experimental design

1. Introduction

Maintaining and enhancing the psychological health of Service members is a top priority of the U.S. Department of Defense, with periodic health screening occurring throughout the deployment cycle. The post-deployment health reassessment (PDHRA) is a standardized self-report and structured provider interview that screens for mental and physical health concerns and occurs three to six months post-deployment, which is a critical window during which Service members may report more mental health concerns compared to immediately following deployment [1]. The PDHRA has been found to increase access to care for most Service members [2, 3]. However, Service members who were unwilling to document mental health problems on the self-report were also not identified as in need of care by the provider during the PDHRA encounter. Disclosure of mental health concerns during post-deployment screening is influenced by Service members' beliefs about barriers related to stigma, help-seeking and treatment effectiveness [2, 4-8].

Contextual factors, such as the provider-patient relationship and characteristics of the treatment, provider, and setting, can also influence health care encounters and subsequent health outcomes [9-12]. In military settings, unique contextual factors include a lack of consistency in having a single identified provider over time, reduced patient autonomy and perceived concerns with the confidentiality of medical records (i.e., in limited circumstances, command may be provided with minimal information pertaining to Service members' medical issues). These contextual factors have been found to impact the development of rapport and provider-patient trust, which in turn affected provider-patient communication and Service member satisfaction with care [13].

A quantitative analysis of provider-patient communication patterns from 272 audiotaped PDHRA encounters coded with the Roter Interaction Analysis System (RIAS) [14-16] found that communication patterns were consistent with a physician-centered encounter where the patient plays a passive role [2, 17]. This was indicated by a high prevalence of closed-ended questions and re-statements, and a low incidence of relationship-building statements and provision of health-related psychoeducation. In contrast, provider communication behaviors consistent with a patient-centered approach include asking open-ended questions, developing a therapeutic rapport through legitimizing and empathic statements, providing education on treatment options and effectiveness, and use of activating and partnering statements [18, 19]. There is increasing evidence that effective provider-patient communication is associated with improved patient outcomes [20-24]. Importantly, a patient-centered approach has been associated with increased patient psychosocial disclosure and adherence with treatment recommendations [11, 23, 25, 26], two key outcomes of any health risk appraisal system [27, 28]. Further, patient-centered communication can be effective even in brief health encounters [12, 29, 30] and communication training can improve skills for new and experienced medical professionals [18, 19, 31-33].

Based on these findings and subsequent literature review, a university-government team collaborated to develop and evaluate a workshop that provided training on patient-centered communication skills for health care providers conducting PDHRA screening in the United States Army. Notably, the PDHRA is an atypical medical encounter where the focus is on screening and referral rather than on a physical exam or diagnosis. The encounter is structured, with the provider goals to (1) review self-report responses and provide a brief health assessment, (2) provide education on health issues and health care resources, and (3) make referrals for further evaluation as warranted. It is brief (10 minutes on average) and typically conducted

during a larger deployment readiness event where Soldiers complete multiple requirements. The workshop was contextualized to address these attributes of the PDHRA, resulting in a study that examined the impact of patient-centered communication in an unusual set of circumstances. The study had two aims: (1) to assess the impact of the workshop on provider communication behaviors; and, (2) to evaluate the effectiveness of the workshop on providers' screening of Soldiers' psychosocial concerns

There were three study hypotheses. Compared to pre-workshop baseline data, Soldiers seen by trained providers after the workshop occurred would: (1) rate providers higher on patient-centered communication behaviors; (2) be identified at a higher rate by providers as having mental health concerns for the sub-group of Soldiers who anonymously self-identified with such concerns; and, (3) show a corresponding increase in relevant health outcomes documented in electronic health records including major health concerns, referrals, and provision of health-related education from provider notes on the PDHRA encounter. No changes from before or after the workshop were expected for non-trained providers.

2. Methods

The study was approved by the Institutional Review Boards at Vanderbilt University and the U.S. Army Medical Research and Materiel Command's Office of Research Protections, Human Research Protection Office.

2.1 Study Design

A quasi-experimental research design was used, where Army military treatment facilities were recruited based on numbers of Soldiers who were scheduled to complete PDHRAs according to their deployment dates. Four facility site visits occurred between October 2011 and March 2012. At each site, data were collected over multiple (four to ten) days with the workshop

occurring at the midpoint. Provider and Soldier surveys were administered immediately after the PDHRA encounter, and were completed separately. Soldiers were blinded to the experimental condition (e.g., whether or not the health care provider who conducted the PDHRA interview participated in the workshop). Providers did not have access to surveys administered to Soldiers. In addition to site visit data collection, all electronic records of PDHRA screenings for six months before the first site visit and three months after the last site visit were retrieved for participating providers. All data sources were linked with unique identifiers.

Fifty-two providers were present at the installations for the majority of time during the data collection period and all but one consented to participate in the study. Informed consent procedures were administered by study personnel to all providers participating in data collection. All providers on site during the data collection period were eligible to provide data. Facility program managers chose subgroups of providers to participate in the training workshop. Program managers were asked to select providers to participate in the training workshop based on schedule (e.g., providers who could be made available for a four-hour workshop scheduled on the morning of a specific day). However, because it is possible that providers were chosen for some other unknown reason (e.g., a perceived need for training), analytic procedures were chosen to statistically account for potential differences between providers (see Section 2.5 below).

All Soldiers who participated in PDHRA encounters during the data collection period were eligible to participate. Soldiers entered the military treatment centers with their units, and each group was briefed on the research by study personnel. They were informed that their participation was voluntary and that neither the health care providers nor anyone in the military would have access to their survey responses. Soldiers were shown examples of all research

instruments used to create their unique identifiers. These included two cards received from the provider conducting the PDHRA. One contained a unique number that was entered into the Soldier survey by study personnel in order to link it to the provider survey. The other included the same number along with fields for Soldiers to enter their names, dates of birth, and last four digits of social security number. Soldiers were informed that they would place these cards into a collection box without research staff ever touching them. This box would be sealed and mailed directly to a Department of Defense epidemiologist, who would create a linking file, without anyone from the military treatment facility having access to the contents. Soldier surveys were completed on tablet computers, which were never made accessible to facility staff. Soldiers were encouraged to ask questions both at this briefing and at the time they received the surveys.

2.2 Participants

Of the 51 participating providers, 23 providers participated in the workshop in groups ranging from four to nine providers at each site. Table 1 shows the demographic characteristics for providers. There were no significant differences between the intervention and control groups on gender, age, current military service, or length of healthcare experience. However, trained providers had more experience conducting PDHRAs compared to non-trained providers. Therefore, in order to account for this sampling difference, provider experience conducting PDHRAs was included as a covariate in statistical analyses (described further in Section 2.5 below). Because this variable was not available for all 51 providers, it was modeled by using the five provider demographic variables (age, gender, military service, degree, and months of experience in healthcare) in an ordinary least squares regression. The resulting predicted variable for provider experience conducting PDHRAs had a mean of 16.7 (s.d. = 12.8) for the group of non-trained providers and a mean of 32.4 (s.d. = 17.3) for the group of trained providers.

Insert Table 1 about here

According to electronic health records, 3,752 PDHRAs (representing unique patient encounters) were completed across all four sites during the data collection window. Figure 1 presents a flow chart of the study design. A total of 1,518 Soldiers completed surveys resulting in a 40.5% response rate. Study personnel observed that many Soldiers did not participate due to lack of time as they needed to complete other post-deployment activities. For example, at times there could be hundreds of Soldiers moving through multiple screening checkpoints, including the PDHRA. Study personnel sometimes observed that Soldiers were re-directed to other activities by their commanding officers, leaving no time to participate in the study. Study procedures required personnel to not approach Soldiers directly to solicit participation (nor ask about reasons for declining participation). Although rare, a few Soldiers approached study personnel to ask about the study or take a piece of candy, also stating they did not want to participate.

Insert Figure 1 about here

Of the 1,518 Soldiers who completed surveys, 92.2% (n=1,400) could be matched to providers by linking the unique identifiers present on each survey during post-site visit data management. Table 2 shows no demographic differences by group for participating Soldiers who were matched to providers. Electronic medical records retrieved for the 51 participating providers included all PDHRAs (n = 26,005 unique encounters) completed for six months prior

to the first site visit and three months after the last site visit. As seen in Table 2, there were almost no Soldier demographic differences by group. The exception was a significant difference in gender, with more female Soldiers seen by non-trained providers.

Insert Table 2 about here

2.3 Training Intervention

Training consisted of a half-day workshop that was delivered in a group format by two expert trainers. The workshop incorporated best practice learning strategies for quality communication training including providing evidence of current deficiencies in communication and evidence-based skills to overcome them; skill demonstration; and opportunity for applied practice and feedback [34-36]. Because shorter trainings are often less effective than longer trainings [37-41], training intensity was emphasized. Intensity is not just associated with length, but also with the level of experiential learning and interactivity of learning strategies. Interactive trainings are more effective than didactic only workshops for changing provider practice behavior [34, 36, 42].

Thus, the workshop included several positive and negative examples of audiotaped provider-patient interactions for modeling and discussion. Fifty percent of the workshop time was devoted to practice and feedback on key communication skills outlined in the workshop. Four ‘standardized Soldier’ cases were created utilizing simulated patient (SP) methods common in communication skills training for healthcare professionals [43]. Workshop participants volunteered to conduct a PDHRA interview to practice workshop-acquired skills, followed by feedback from peers and trainers.

In each workshop, four separate providers volunteered to conduct a PDHRA interview (one for each of the simulated patients), followed by feedback from peers and trainers. This represented 100% of workshop participants at two sites, which each had four provider participants, and 67% (4 of 6) and 44% (4 of 9) at the remaining two sites. Notably, after each simulated patient encounter, other providers were given the opportunity to conduct a portion of the interview as part of the feedback portion. That is, if there was an interview segment that a provider thought he or she may have approached differently, the provider was able to volunteer to conduct that portion of the interview using that strategy. Thus, providers were able to observe ways in which different interview techniques could elicit different information from the same patient.

Given the uniqueness of the PDHRA medical encounter, the training focused on both context-free behaviors (e.g., asking open-ended questions) and context-specific behaviors (e.g., providing brief counseling on common post-deployment concerns). Content was structured with the Macy model [32, 33] of patient-centered communication. Language and examples were tailored to the military screening context. Sample content included building therapeutic alliance (e.g., active listening and empathizing), active partnering (e.g., summarizing using the Soldier's language, asking for treatment preferences and goals, check backs for understanding), and providing psychoeducation (e.g., normalizing concerns, legitimizing treatment options, offering resources).

2.4 Measures

Two surveys, completed immediately following the PDHRA encounter, were collected at site visits. Soldiers rated providers on three measures of patient-centered communication. Context free behaviors were assessed using items from two published measures with excellent

psychometric properties: the Communication Assessment Tool ([44], 14 of 15 items retained, Cronbach's alpha = 0.98) and the Physician's Humanistic Behaviors Questionnaire ([45]; 6 of 25 items retained, Cronbach's alpha = 0.83). Context specific behaviors were assessed using a measure developed for this study called the PHDRA Interview Behaviors (9 items, Cronbach's alpha = 0.87). Items were based on PDHRA-specific training directives and included asking about specific areas of concern (e.g., alcohol use, emotional health, physical health), providing psychoeducation on deployment-related health problems and common reintegration issues, and inquiring about access to and satisfaction with treatment (e.g., gave advice about how to access care, asked if Soldier was already getting treatment for reported concerns, asked how satisfied Soldier was with treatment for reported concerns). Responses were scored as yes (1) or no (0). For all three measures higher scores are better.

Two additional questions asked whether the Soldier or others (e.g., friends and family) thought s/he had mental health concerns. When combined as a single binary item, 30% of the sample self-identified with a mental health concern. In the absence of a true gold standard of whether or not the Soldier was experiencing mental health problems, this self-report was considered the benchmark.

Providers completed a brief post-encounter survey with three items assessing aspects of screening for mental health problems called the Provider Mental Health Screen (Cronbach's alpha = 0.72). Items included questions about discussion of mental health concerns (presence or absence during the interview), perceived disclosure of mental health concerns (disclosed all, under-reported symptoms, or exaggerated symptoms), and level of agreement that the Soldier could benefit from further evaluation for mental health symptoms (4-point Likert scale). Higher scores indicate a positive screening result.

The PDHRA process is captured on an electronic form (DD Form 2900) and included provider documentation of the encounter. Items for problems noted included physical health, exposure to chemicals or environmental hazards, depression, post-traumatic stress disorder, anger/aggression, suicidal ideation, social/family conflict, alcohol use, or other unspecified. These were summed (range from 0 to 9) with an item score of 1 for items endorsed as a major concern and 0 for items endorsed as minor (or none). Items for provider documentation of referrals were combined as: any medical referral (which included up to 17 options for primary and specialty care) scored as 0 (none) to 1 (one or more); and, Military One Source referral, scored as 0 (none) to 1 (present). Military One Source is a confidential resource available to Soldiers who prefer to seek care outside of the military health care system, with up to six telephone consultations permitted for a range of mental health and family related issues. Providers also indicated whether education or information on health care concerns and benefits took place during the encounter. Table 3 presents descriptive statistics at baseline for all study measures.

Insert Table 3 about here

2.5 Statistical analyses

All analyses included the created variable, predicted PDHRA experience in months, as a covariate to account for the significant differences between groups as discussed previously. In addition, all analyses controlled for the nesting of Soldiers within providers, with a significant intraclass correlation (ICC) of 5.5% ($p = 0.006$), but did not control for the nesting of providers and Soldiers within site since the ICC for site was non-significant ($ICC = 1.5\%$, $p = n.s.$) [46].

Aims one and two (part I) were essentially pre- and post-intervention comparisons, with multiple unique Soldier encounters that occurred during a span of two to five days before or after the workshop, which was scheduled around the midpoint of four- to ten-day site visits. Hierarchical models were used to account for shared variance (i.e., Soldiers clustered within providers) and to allow for predictor variables at varying hierarchical levels (i.e., Soldier- and provider-reported variables). For aim one, with normally distributed outcome variables, hierarchical linear regression models (HLM) were used to assess the impact of training on provider communication behaviors as rated by Soldiers. For aim two, part I, providers' identification of Soldier mental health concerns had a highly skewed distribution (63.5% with a score of zero). Hierarchical regression models with a Poisson log-linear distribution are recommended for modeling count and skewed data [47-49] and thus were used to estimate whether training improved providers' ability to identify Soldiers' mental health concerns.

Outcome variables for aim two, part II, were extracted from electronic health records for PDHRA encounters that occurred before and after the workshop. Although still a pre- and post-intervention comparison, the long time series of several months of electronic health record data available allowed the use of the Difference-in-Difference approach. The Difference-in-Difference approach is commonly used in quasi-experimental evaluations where before and after program data is available for an experimental and control group [50-53]. Having baseline data, the Difference-in-Difference approach allows comparison of outcome change (before and after a program) between providers participating in the workshop (the intervention group) vs. those not participating (the control group). This method is intended to control for some of the effects of potential selection bias that may occur due to sampling differences in quasi-experiments. For valid estimates, it was assumed that no time-varying differences exist between groups (i.e., that

in the absence of the workshop, the difference in outcomes would increase or decrease at the same rate in both groups).

Effect sizes are reported by type of analysis. Cohen's D [54] statistics are reported for continuous outcome variables and are interpreted as follows: 0.2 (small), 0.5 (medium), and 0.8 (large). Incidence rate ratios (IRRs) are reported for categorical outcome variables and can be interpreted similarly to odds ratios, where they represent the ratios of probability of outcome between groups [55].

3. Results

The study began with 51 providers with no attrition. To explore whether there were sampling differences between Soldiers who completed a survey and those who did not, we compared demographics between the Soldiers who completed surveys ($n = 1,518$) and the population of possible Soldiers during the site visit data collection time period ($N = 3,752$). There were no differences in gender ($\chi^2 = 0.01, 1, p = 0.919$), age ($\chi^2 = 0.81, 3, p = 0.847$), and military grade ($\chi^2 = 3.76, 1, p = 0.053$).

Of the 1,518 Soldier surveys and 3,092 provider surveys completed, 1,400 could be matched to each other during data cleaning procedures and thus were available for use in analyses. This represents 92.2% of the Soldier data and 45.3% of the provider data. To explore whether there were sampling differences, we compared Soldier demographics, study measures, provider group (intervention or control) and time (pre- or post-workshop) between those who had matched Soldier-provider surveys and those who did not.

For the Soldier surveys, 118 were not matched to provider surveys. There were no differences in gender ($\chi^2 = 0.08, 1, p = 0.784$), age ($\chi^2 = 6.49, 3, p = 0.092$), and military grade ($\chi^2 = 0.36, 1, p = 0.550$). Similarly, there were no differences in study measures including the

Communication Assessment Tool ($t = -0.48, p = 0.631$), the Physician's Humanistic Behaviors Questionnaire ($t = -0.66, p = 0.511$), the PHDRA Interview Behaviors ($t = -0.43, p = 0.666$), and self-reported mental health concerns ($t = 0.28, p = 0.779$). Experimental group was not available for non-matched surveys. There was a significant difference by time, with slightly more of the unmatched surveys occurring before the workshop (55.1%) compared to after the workshop (44.9%; $\chi^2 = 5.62, 1, p < 0.05$).

For the provider surveys, 1,692 were not matched to Soldier surveys. Soldier demographics were not available for non-matched surveys. There was a significant difference for the study measure Provider Mental Health Screen ($t = 2.16, p < 0.05$), with a slightly higher average score for non-matched surveys (mean = 0.69, s.d. = 1.0) compared to matched surveys (mean = 0.61, s.d. = 0.9). There was no difference by experimental group (45.7% non-matched surveys for trained providers, 54.3% for non-trained providers; $\chi^2 = 2.68, 1, p = 0.102$). There was a significant difference by time, with fewer non-matched surveys before the workshop (37.0%) compared to after the workshop (63.0%; $\chi^2 = 14.90, 1, p < 0.001$).

3.1 Aim One: Workshop Improved Provider-Patient Communication

As can be seen in Table 4, trained providers were rated significantly higher on two measures of patient-centered communication behaviors by Soldiers seen after the workshop compared to ratings by Soldiers seen before the workshop (Communication Assessment Tool and PDHRA Interview Behaviors, Workshop by Time estimated interaction parameters). Thus for trained providers, these translated into small effects of the workshop for context-free behaviors, measured with the Communication Assessment Tool (Cohen's $D = 0.29$), and context-specific behaviors, measured with the PDHRA Interview Behaviors (Cohen's $D = 0.26$). For non-trained providers, there was no change on the PHDRA Interview Behaviors and lower ratings on the

Communication Assessment Tool in how they were rated by Soldiers seen before and after the workshop. There were no significant differences by time and group for the Physician's Humanistic Behaviors Questionnaire. In addition, there were no significant effects for providers' predicted PDHRA experience on any of the three measures of patient-centered communication.

Insert Table 4 about here

3.2 Aim Two, Part I: Workshop Increased Provider-Reported Identification of Mental Health Concerns for Soldiers with Mental Health Problems

This analysis examined the effect of training on providers' identification of Soldier mental health concerns, for Soldiers who self-identified with such concerns, using the Provider Mental Health Screen. The results of the hierarchical regression model with a Poisson link are reported in Table 5. We included Soldier self-report of having or not having mental health problems as a binary covariate in the model. There was no significant effect for providers' predicted PDHRA experience and no baseline differences in provider identification of Soldier mental health concerns by time or between the intervention and control groups (Workshop and time estimated parameters). For all providers, there was a strong positive association between Soldier- and provider-identified mental health concerns (Soldier concerns estimated parameter), where Soldiers with self-identified problems were over three times as likely to be identified by providers compared to Soldiers without self-identified problems.

Insert Table 5 about here

There was no pre-post workshop difference in trained provider's identification for Soldiers who did not self-identify as having mental health concerns (measured by Workshop*Time estimated parameter). The last three rows shown in Table 5 tested the effect of the workshop, time, and the interaction of workshop by time accounting for Soldier self-reported mental health concerns. There was a small effect of time by Soldier self-reported mental health concerns (Time by Soldier Concerns interaction parameter). The estimated beta was negative, indicating that for Soldiers with self-identified mental health concerns there was a significant decrease in non-trained provider-identified concerns over time from baseline to post-workshop. The three-way interaction of workshop by time by Soldier-identified mental health concerns was significant. Among Soldiers who self-identified with mental health concerns, those seen by trained providers were 1.8 times more likely to be identified as such compared to those seen by non-trained providers.

3.3 Aim Two, Part II: Workshop Increased Provider Documentation of Relevant Health

Outcomes

This analysis examined the effect of training on providers' report of Soldier health outcomes as a result of the PDHRA encounter documented on the DD Form 2900 including number of major concerns, referrals given, and provision of health-related education. The results of the difference-in-difference analyses are presented in Table 6. There was a significant effect for providers' predicted PDHRA experience on the total number of major concerns, with more experienced providers noting more concerns. The original hypothesis of a time by workshop effect was validated for four of the five measures with small effects. Trained providers documented significantly more major concerns, Military One Source referrals, and provision of education on benefits and health-related concerns for Soldiers seen after the workshop compared

to Soldiers seen prior to the workshop. There were no differences by time for non-trained providers with the exception of the two outcomes related to provision of education, where there was a significant decrease in documented information on benefits and health concerns. There was no effect of training (time by workshop interaction) on whether any medical referrals were given. It should be noted that the likelihood of finding significant differences increases with sample size, although effect size is a population parameter and thus not affected by sample size [53].

Insert Table 6 about here

For the provision of education variables, there were main effects. Before the intervention, non-trained providers reported more encounters with this type of psychoeducation was documented as present than did trained providers. There were small negative effects of time for both types of education, indicating that documentation of information on benefits and health concerns provided by non-trained providers decreased after the time when the workshop was held.

4. Discussion and Conclusion

4.1 Discussion

The evaluation findings were promising with all hypotheses upheld albeit with small effect sizes. Importantly for implementation purposes, the training workshop was found to improve providers' patient-centered communication behaviors as evaluated by Soldiers. On two of three measures, Soldiers rated both context-free and context-specific communication behaviors

significantly higher for screening encounters conducted by trained providers after the workshop compared to before, whereas there were no differences by time for non-participating providers.

There was no difference by time and group on one measure of patient-centered communication, the Physician's Humanistic Behaviors Questionnaire. This may be partially explained by the substantial revision of the measure as included in the study compared to the published version [45]. With only six of the original 25 items retained, fully half of the items pertained to negative provider behaviors (e.g., in a hurry, made uncaring remarks, short tempered or abrupt). In comparison the Communication Assessment Tool [44], which was found to differ by time for the two groups, consisted of 14 items that were all positively worded. It should be noted that Soldiers were blind to training status of the providers.

A key outcome of any health screening process is increased patient psychosocial disclosure [27, 28]. This is particularly important for military populations, where disclosure of mental health concerns during screening can be limited by stigma and other barriers [2, 4-8]. Given that the PDHRA has been found to be a physician-centric encounter in previous research [2, 17], it was hypothesized that a more patient-centered approach during screening would result in increased identification of Soldier mental health concerns where warranted (i.e., for Soldiers who self-identified with such concerns). When we accounted for Soldiers' self-identified mental health concerns, the hypothesis was validated. Among Soldiers who self-identified with mental health concerns, those seen by trained providers were 1.8 times more likely to be identified as such compared to baseline, with no difference found for non-trained providers. This finding lends support to the effect of the workshop increasing not only providers' sensitivity but also their specificity in identifying Soldiers' mental health concerns. Notably, providers were blind to Soldiers' self-reported mental health concerns on the survey.

Review of electronic health records showed significant effects of this brief workshop on related health outcomes for the entire population of more than 25,000 Soldiers seen for health screening for a period of several months before and after the training. Trained providers noted more overall major health concerns as a result of the screening interview, which corresponded to the study findings of increased provider-identification of mental health concerns. While there were no effects of the workshop on medical referrals, this is consistent with other research, which has found an association between patient-centered care and decreased utilization of health care services [56]. There was a workshop effect of more referrals given for Military One Source by trained providers. Military One Source is a confidential resource available to Soldiers who prefer to seek care outside of the military health care system. Soldiers gain access to non-medical counseling for psychosocial issues, such as family-related problems or post-deployment concerns (www.militaryonesource.mil). A corresponding increase was found in the provision of education on benefits and health-related concerns. Notably, referral to Military One Source and provision of health-related education were context-specific behaviors emphasized in the training workshop. While the effects of the study workshop on provider behavior were small, any improvements in provision of referrals to Military One Source and health-related education are promising. For Soldiers who are reluctant to identify themselves as having mental health concerns or are unwilling to seek care, normalization of concerns through psychoeducation and access to confidential services can be effective ways to address barriers related to stigma and negative beliefs about help-seeking [2, 4-8].

4.2 Conclusion

There were several limitations to the study and as such, results should be interpreted with caution. Foremost, the quasi-experimental research design introduced the possibility of alternate

explanations for any findings, namely due to the potential for selection bias or baseline differences between the intervention and control groups. Randomization of providers to the intervention and control groups was not considered feasible given the high volume and pressure to meet deployment readiness deadlines at the military treatment facilities. Comparison of provider demographic characteristics by group found no baseline differences with the exception of more months of experience conducting PDHRA screenings. Therefore, providers' predicted PDHRA experience was included as a covariate in statistical analyses (and found to have a significant main effect in one of nine models). In addition, all analyses accounted for the clustering of Soldiers within providers. Where there was a long enough time series, the Difference-in-Difference approach was used, which is intended to eliminate some of the effects of selection bias by controlling for observable and non-observable characteristics that might differ between groups [50-53]. As shown in Table 6, the assumptions for Difference-in-Difference models were largely upheld with no baseline pre-workshop group differences on health outcomes derived from electronic health records. However, given the provider demographic differences noted above, and the findings that the two types of education differed in trajectory over time (increasing for trained providers and decreasing for non-trained providers), it is possible that the average pre-post change in outcome would differ across groups regardless of the training.

Multiple data sources were utilized with comparisons from baseline to post-workshop for the two experimental groups. However, another limitation of the study was that some of the surveys (7.8% of Soldier surveys and 54.7% of provider surveys) could not be matched and thus were not used in analyses. When matched Soldier surveys were compared to non-matched Soldier surveys or the population of Soldiers seen for PDHRA encounters during the site visit data collection

time period, there were no differences in demographic characteristics or study measures.

However, on average the group of Soldiers with non-matched provider surveys were rated as having a slightly higher rate of provider-identified mental health concerns compared to Soldiers with matched provider surveys. Given concerns about stigma among military service members [2, 4-8], this finding raises the possibility that concerns about confidentiality or other barriers may have decreased the rate of survey participation for Soldiers with provider-rated mental health concerns. While it is unknown whether these Soldiers would have rated providers differently in terms of patient-centered care, notably the study also included electronic health record data for the entire population of screening encounters for a multi-month period with no missing data. The consistency in findings between the two data sources lends support for the validity of study findings.

4.3 Practice Implications

To our knowledge no other patient-centered communication interventions are specific to the health screening context, much less a military context. While sustained coaching over time might be a more desirable instructional model, provider work schedules and competing training demands make intensive short term engagements that include demonstration of desired behaviors and real time feedback on performance a more realistic training strategy. There is evidence that even brief trainings or single episodes of feedback allow professionals to reflect on performance and can result in modified behaviors [20, 57].

Despite its brevity, the study workshop was found to improve providers' patient-centered communication behaviors, increase identification of Soldier's mental health concerns, and impact relevant health outcomes as documented in electronic medical records. Although the effects were small, the results of this study indicate that brief communication training is a

promising approach to improving provider patient-centered behaviors in a military health screening context. A patient-centered approach appears feasible during brief health screening encounters and shows promise in improving identification of Soldier mental health concerns and related health outcomes.

This study establishes that additional research is warranted to further explore the effectiveness of patient-centered communication on improving health screening outcomes.

Ideally, such research would utilize randomized control designs to determine the most effective methods to increase the impact of training on changing provider behavior. It is unknown whether the modest effects found in this study could be improved by more robust research design, modification of current training activities, increased intensity of training, or some combination of the above.

Acknowledgements

This research was carried out in cooperation with Force Health Protection and Readiness (FHP&R). The U.S. Army Medical Research Acquisition Activity, 820 Chandler Street, Fort Detrick MD 21702-5014 is the awarding and administering acquisition office. This work was supported by the Office of the Assistant Secretary of Defense for Health Affairs and the United States Army Medical Research and Materiel Command under Award No. W81XWH-09-2-0172. Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the Department of Defense. The views expressed in this article are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. government.

The authors would like to thank the countless individuals who contributed to this project, with special consideration for our Soldiers and those who provide care for them. Thanks also to Lisa Rawn, Darlene Whetsel, Alan Johnstone, and all the simulated patients at the Center for Experiential Learning and Assessment at Vanderbilt University Medical Center for their dedication to presenting accurate and compassionate portrayals of Soldiers in need of care.

References

- [1] Milliken CS, Auchterlonie JL, Hoge CW. Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq war. *JAMA* 2007;298:2141-8.
- [2] Bickman L, Douglas Kelley S, Leslie M, Vides De Andrade AR, R.P. H, Lambert WE, et al. Program evaluation of Post-Deployment Health Assessment (PDHA) and Reassessment (PDHRA) Processes; 2009. Available online at the Defense Technical Information Center (DTIC) <http://handle.dtic.mil/100.2/ADA5280632009>.
- [3] Leslie MW, Douglas Kelley S, Hargraves RP, Boyd SD, Davis L, Bickman L. Evidence of under-reporting of behavioral health problems by high-risk individuals during a standardized screening. American Public Health Association Annual Meeting. Washington DC; 2011.
- [4] Drapalski AL, Milford J, Goldberg RW, Brown CH, Dixon LB. Perceived barriers to medical care and mental health care among veterans with serious mental illness. *Psych Serv* 2008;59:921-4.
- [5] Hoge CW, Castro CA, Messer SC, McGurk D, Cotting DI, Koffman RL. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med* 2004;351:13-22.
- [6] Hourani L, Bender R, Weimer B, Larson G. Comparative analysis of mandated versus voluntary administrations of post-deployment health assessments among Marines. *Mil Med* 2012;177:643-8.
- [7] Kim P, Britt T, Klocko R, Riviere L. Stigma, negative attitudes about treatment, and utilization of mental health care among soldiers. *Mil Psychol* 2011;23:65-81.

- [8] Stecker T, Fortney JC, Hamilton F, Ajzen I. An assessment of beliefs about mental health care among veterans who served in Iraq. *Psych Serv* 2007;58:1358-61.
- [9] Di Blasi Z, Harkness E, Ernst E, Georgiou A, Kleijnen J. Influence of context effects on health outcomes: a systematic review. *Lancet*. 2001;357:757-62.
- [10] Lelievre S, Schultz K. Does computer use in patient-physician encounters influence patient satisfaction? *Canadian Fam Physician* 2010;56:e6-12.
- [11] Roter DL, Erby LH, Adams A, Buckingham CD, Vail L, Realpe A, et al. Talking about depression: an analogue study of physician gender and communication style on patient disclosures. *Patient Educ Couns* 2014;96:339-45.
- [12] Thompson DA, Yarnold PR, Williams DR, Adams SL. Effects of actual waiting time, perceived waiting time, information delivery, and expressive quality on patient satisfaction in the emergency department. *Ann Emerg Med* 1996;28:657-65.
- [13] Davis JD, Engel CC, Mishkind M, Jaffer A, Sjoberg T, Tinker T, et al. Provider and patient perspectives regarding health care for war-related health concerns. *Patient Educ Couns* 2007;68:52-60.
- [14] Roter D. The Roter method of interaction process analysis Balimore, MD: Bloomberg School of Public Health, Johns Hopkins University; 2006.
- [15] Roter D, Larson S. The Roter interaction analysis system (RIAS): utility and flexibility for analysis of medical interactions. *Patient Educ Couns* 2002;46:243-51.
- [16] Sandvik M, Eide H, Lind M, Graugaard PK, Torper J, Finset A. Analyzing medical dialogues: strength and weakness of Roter's interaction analysis system (RIAS). *Patient Educ Couns* 2002;46:235-41.

- [17] Douglas Kelley S, Boyd SD, Perkins CE, Hargraves RP, Leslie MW, Bickman L. Communication patterns during health screening interviews with a high risk population. International Conference on Communications in Healthcare. Chicago, IL; 2011.
- [18] Levinson W, Lesser CS, Epstein RM. Developing physician communication skills for patient-centered care. *Health Affair* 2010;29:1310-8.
- [19] Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. *Academic Med* 2001;76:390-3.
- [20] Beach MC, Roter DL, Saha S, Korthuis PT, Eggly S, Cohn J, et al. Impact of a brief patient and provider intervention to improve the quality of communication about medication adherence among HIV patients. *Patient Educ Couns* 2015;98:1078-83.
- [21] Hojat M, Louis DZ, Markham FW, Wender R, Rabinowitz C, Gonnella JS. Physicians' empathy and clinical outcomes for diabetic patients. *Academic Med* 2011;86:359-64.
- [22] Makoul G, Zick A, Green M. An evidence-based perspective on greetings in medical encounters. *Arch Intern Med* 2007;167:1172-6.
- [23] Ratanawongsa N, Karter AJ, Parker MM, Lyles CR, Heisler M, Moffet HH, et al. Communication and medication refill adherence: the Diabetes Study of Northern California. *JAMA Intern Med*. 2013;173:210-8.
- [24] Windover AK, Boissy A, Rice TW, Gilligan T, Velez VJ, Merlino J. The REDE model of healthcare communication: Optimizing relationship as a therapeutic agent. *J Patient Exper* 2014;1:8-13.
- [25] Golin C, Thorpe C, DiMatteo MR. Accessing the patient's world: patient-physician communication about psychosocial issues. In: Earp JL, French EA, Gilkey MB, editors.

Patient advocacy for health care quality: strategies for achieving patient-centered care.

Sudbury, MA: Jones and Bartlett Publishers; 2008. p. 185-214.

[26] Zolnieriek KB, Dimatteo MR. Physician communication and patient adherence to treatment: a meta-analysis. *Med Care* 2009;47:826-34.

[27] French C, Rona RJ, Jones M, Wessely S. Screening for physical and psychological illness in the British Armed Forces: II: Barriers to screening--learning from the opinions of Service personnel. *J Med Screen* 2004;11:153-7.

[28] Rona RJ, Hyams KC, Wessely S. Screening for psychological illness in military personnel. *JAMA*. 2005;293:1257-60.

[29] Locke R, Stefano M, Koster A, Taylor B, Greenspan J. Optimizing patient/caregiver satisfaction through quality of communication in the pediatric emergency department. *Pediatr Emerg Care* 2011;27:1016-21.

[30] Wissow LS, Roter D, Bauman LJ, Crain E, Kercksmar C, Weiss K, et al. Patient-provider communication during the emergency department care of children with asthma. The National Cooperative Inner-City Asthma Study, National Institute of Allergy and Infectious Diseases, NIH, Bethesda, MD. *Med Care* 1998;36:1439-50.

[31] Dwamena F, Holmes-Rovner M, Gaulden CM, Jorgenson S, Sadigh G, Sikorskii A, et al. Interventions for providers to promote a patient-centred approach in clinical consultations. *Cochrane Database Syst Rev* 2012;12:CD003267.

[32] Kalet A, Pugnaire MP, Cole-Kelly K, Janicik R, Ferrara E, Schwartz MD, et al. Teaching communication in clinical clerkships: models from the macy initiative in health communications. *Acad Med* 2004;79:511-20.

- [33] Yedidia MJ, Gillespie CC, Kachur E, Schwartz MD, Ockene J, Chepaitis AE, et al. Effect of communications training on medical student performance. *JAMA* 2003;290:1157-65.
- [34] Aspegren K. BEME Guide No. 2: Teaching and learning communication skills in medicine-a review with quality grading of articles. *Med Teach* 1999;21:563-70.
- [35] Maguire P, Pitceathly C. Key communication skills and how to acquire them. *BMJ* 2002;325:697-700.
- [36] Merckaert I, Libert Y, Razavi D. Communication skills training in cancer care: where are we and where are we going? *Curr Opin Oncol* 2005;17:319-30.
- [37] Cheraghi-Sohi S, Bower P. Can the feedback of patient assessments, brief training, or their combination, improve the interpersonal skills of primary care physicians? A systematic review. *BMC Health Serv Res* 2008;8:179.
- [38] Fallowfield L, Jenkins V, Farewell V, Solis-Trapala I. Enduring impact of communication skills training: results of a 12-month follow-up. *Br J Cancer* 2003;89:1445-9.
- [39] Joos SK, Hickam DH, Gordon GH, Baker LH. Effects of a physician communication intervention on patient care outcomes. *J Gen Intern Med* 1996;11:147-55.
- [40] Levinson W, Roter D. The effects of two continuing medical education programs on communication skills of practicing primary care physicians. *J Gen Intern Med* 1993;8:318-24.
- [41] Rao JK, Anderson LA, Inui TS, Frankel RM. Communication interventions make a difference in conversations between physicians and patients: a systematic review of the evidence. *Med Care* 2007;45:340-9.

- [42] Forsetlund L, Bjorndal A, Rashidian A, Jamtvedt G, O'Brien MA, Wolf F, et al. Continuing education meetings and workshops: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev* 2009;CD003030.
- [43] Whetsel D, Douglas Kelley S, Leslie MW, Boyd SD, Rawn L, Webb L. 'Just answer the question sir': Using SPs in a training intervention to enhance military health providers' communication skills. Poster presented at the Annual Conference of the Association of Standardized Patient Educators. San Diego, California 2012.
- [44] Makoul G, Krupat E, Chang CH. Measuring patient views of physician communication skills: development and testing of the Communication Assessment Tool. *Patient Educ Couns* 2007;67:333-42.
- [45] Weaver MJ, Ow CL, Walker DJ, Degenhardt EF. A questionnaire for patients' evaluations of their physicians' humanistic behaviors. *J Gen Intern Med* 1993;8:135-9.
- [46] Raudenbush SW, Liu XF. Statistical power and optimal design for multisite randomized trials. *Psychological Methods*. 2000; 5(2):199-213.
- [47] Rosenbaum PR, Rubin DB. Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *Am Stat* 1985;39:33-8.
- [48] Rubin DB, Thomas N. Matching using estimated propensity scores: relating theory to practice. *Biometrics*. 1996;52:249-64.
- [49] Rubin DB. Estimating causal effects from large data sets using propensity scores. *Ann Intern Med* 1997;127:757-63.
- [50] DiTella R, Schargrodsky E. Do police reduce crime? Estimates using the allocation of police forces after a terrorist attack. *Am Econ Rev* 2005;94:115-33.

- [51] Gertler PJ, Martinez S, Premand P, Rawlings LB, Vermeersch CMJ. Impact Evaluation in Practice. Washington DC: The World Bank; 2011.
- [52] Gius M. Using a difference-in-differences approach to estimate the effects of teacher merit pay on student performances. *East Econ J* 2008;39.
- [53] Puhani P. The treatment effect, the cross difference, and the interaction term in nonlinear 'difference-in-difference' models. *Econ Lett* 2012;115:85-7.
- [54] Cohen J. A power primer. *Psychol Bull* 1992;112:155-9.
- [55] Sullivan GM, Feinn R. Using effect size- or why the p value is not enough. *J Grad Med Educ* 2012;4:279-82.
- [56] Bertakis KD, Azari R. Patient-centered care is associated with decreased health care utilization. *J Am Board Fam Med* 2011;24:229-39.
- [57] Pichert JW, Moore IN, Karrass J, Jay JS, Westlake MW, Catron TF, et al. An intervention model that promotes accountability: peer messengers and patient/family complaints. *Jt Comm J Qual Patient Saf* 2013;39:435-46.

Table 1. Participating Provider Characteristics (n=51)

	Intervention (n=23) % or Mean (sd)	Control (n=28) % or Mean (sd)	X² (df) or t - value
<i>Gender¹</i>			
Male	52.2%	57.1%	0.13 (1)
Female	47.8%	42.9%	
<i>Age¹</i>	47.0 (12.2)	49.9 (10.3)	0.9
<i>Current Military Service¹</i>			
Currently in military	47.8%	28.6%	2.00 (1)
Not currently in military	52.2%	71.4%	
<i>Degree¹</i>			
Physician Assistant	73.9%	64.3%	0.54 (1)
Other (Physician or Nurse Practitioner)	26.1%	35.7%	
<i>Provider Experience²</i>			
Months of experience in healthcare	198.6 (156.9)	136.5 (116.7)	1.3
Months of experience with PDHRA	37.3 (29.1)	20.0 (15)	2.1*

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

¹ These variables were available from site records and thus are present for all participants.

² These variables were collected on a background survey administered to all providers who participated in the workshop. Only 15 (53%) of providers who did not participate in the workshop completed the survey. This was due to a large and unexpected addition to the roster of providers to meet an unusually high workload at one of the study sites. After the change in staff, these new providers did agree to post-encounter data collection but time constraints prevented the collection of the more extensive background survey.

Table 2. Soldier Characteristics for the Small Sample of Site Visit Participants Matched to Providers and the Larger Population of PDHRA Encounters

	Site Visit Participants Matched to Providers (n=1,400)				Population of PDHRA Encounters (n=26,005)			
	Total %	Intervention %	Control %	X ² (df)	Total %	Intervention %	Control %	X ² (df)
<i>Gender</i>								
Male	93.8	93.7	94.0	0.08 (1)	90.8	91.2	90.3	5.28 (1)*
Female	6.2	6.3	6.0		9.2	8.8	9.7	
<i>Age</i>								
18-24	41.4	38.8	43.9	4.13 (3)	30.6	30.3	30.9	6.33 (1)
25-29	29.3	31.4	28.7		31.8	32.5	31.1	
30-39	23.6	24.3	21.6		28.2	27.9	28.5	
40 or over	5.7	5.5	5.8		9.4	9.3	9.6	
<i>Military Grade</i> ¹								
Enlisted	90.7	90.4	91.0	0.15 (1) ²	88.2	88.6	87.9	2.76 (1)
Warrant Officer	0.6	0.4	0.7		0.7	0.5	0.9	
Commissioned Officer	8.7	9.2	8.2		11.0	10.9	11.1	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

¹ Military Grade is enlisted (E1-E9), commissioned officers (O1-O9), and warrant officers (WO1-WO5).

² Degrees of freedom = 1 because military grade was re-categorized into levels (enlisted v officer) for analysis purposes because there were too few in each cell.

Table 3. Descriptive Statistics for Study Measures and Electronic Health Records at Baseline (Pre-Workshop)

Measure	N	Range	Total Mean (s.d.)	Intervention Mean (s.d.)	Control Mean (s.d.)
<i>Soldier-report</i>					
Communication Assessment Tool ¹	1,372	1 - 5	4.1 (0.9)	4.1 (0.9)	4.0 (0.9)
Physician's Humanistic Behaviors Questionnaire ¹	1,381	1 - 4	3.4 (0.5)	3.5 (0.5)	3.4 (0.5)
PHDRA Interview Behaviors ²	1,362	0 - 9	6.0 (2.5)	6.3 (2.3)	5.8 (2.6)
Self-identified mental health concern	1,368	0 - 1	0.3 (0.5)	0.3 (0.5)	0.3 (0.5)
<i>Provider-report</i>					
Provider Mental Health Screen ²	3,092	0 - 3	0.7 (1.0)	0.7 (1.0)	0.6 (0.9)
<i>PDHRA (DD Form 2900) Provider Documentation</i>					
Total number of major concerns	26,005	0 - 7	0.2 (0.6)	0.3 (0.7)	0.1 (0.5)
Any medical referral made	26,005	0 - 1	0.2 (0.4)	0.2 (0.5)	0.3 (0.6)
Military One Source referral made	26,005	0 - 1	0.01 (0.1)	0.01 (0.1)	0.01 (0.07)
Education/information on benefits	26,005	0 - 1	0.6 (0.5)	0.5 (0.5)	0.7 (0.4)
Education/information on health concerns	26,005	0 - 1	0.8 (0.4)	0.8 (0.4)	0.8 (0.4)

Note: Total scores for Soldier-report measures were calculated if at least 80% of items were completed (Total N = 1,400 matched to providers).

¹Average total scores [43]

²Summed total scores (scales developed for the study).

Table 4. Results of Hierarchical Linear Model Regressions Estimating Soldiers' Ratings of Provider-Patient Communication in the PDHRA Encounter

Parameter	Estimated Betas	Std. Error	t	Cohen's D
Communication Assessment Tool (n=1372)				
Intercept ^(a)	4.07	0.11	37.15***	
Predicted PDHRA experience	0.00	0.00	0.07	-
Time (pre - post) ^(b)	-0.15	0.07	-2.09*	-0.17
Workshop ^(c)	0.10	0.13	0.76	-
Time * Workshop ^(d)	0.26	0.10	2.56*	0.29
Physician's Humanistic Behaviors Questionnaire (n=1381)				
Intercept ^(a)	3.37	0.06	60.49***	
Predicted PDHRA experience	0.00	0.00	0.64	-
Time (pre - post) ^(b)	-0.08	0.04	-1.91	-
Workshop ^(c)	0.10	0.07	1.55	-
Time * Workshop ^(d)	0.08	0.06	1.52	-
PHDRA Interview Behaviors (n=1362)				
Intercept ^(a)	5.99	0.29	21.16***	
Predicted PDHRA experience	-0.00	0.01	-0.40	-
Time (pre - post) ^(b)	-0.35	0.20	-1.78	-
Workshop ^(c)	0.49	0.34	1.47	-
Time * Workshop ^(d)	0.62	0.28	2.23*	0.20

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Note: Interpretation of Cohen's D [54] effect sizes: 0.2 (small), 0.5 (medium), 0.8 (large).

^{a)} Intercept measures average ratings for non-trained providers before the intervention; ^{b)} Time measures the average pre-post change in ratings for non-trained providers; ^{c)} Workshop measures the average group (trained vs. non trained) rating differences before the intervention; and ^{d)} Time*Workshop interaction measure the additional average ratings trained providers (compared to non-trained providers) get after the workshop.

Table 5. Results of Poisson Loglinear Regression Estimating Providers' Identification of Soldiers' Mental Health Concerns Controlling for Soldier's Self-Reported Mental Health Concerns (n = 1361)

Parameter	Estimated Betas	Std. Error	Wald's Z	Incidence Rate Ratio (IRR)
Intercept	-1.07	0.22	-4.90 ***	
Predicted PDHRA Experience	-0.00	0.00	-0.20	-
Workshop	0.13	0.22	0.58	-
Time (pre - post)	0.22	0.16	1.36	-
Soldier-identified MH concerns	1.22	0.16	7.40***	3.39
Workshop * Time	-0.33	0.23	-1.41	-
Workshop * Soldier-Concerns	0.04	0.28	-0.14	-
Time * Soldier-Concerns	-0.40	0.16	-2.55*	0.67
Workshop * Time * Soldier-Concerns	0.60	0.26	2.29*	1.83

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 6. Results of Difference-in-Difference Analysis Estimating Providers' Documentation of Soldier Health Outcomes from PDHRA Encounter Using Electronic Medical Records (n = 26,005)

Parameter	Estimated Betas	Std. Error	t-value	Cohen's D
<i>Total number of major concerns</i>				
Intercept	0.10	0.06	1.75	
Predicted PDHRA Experience	0.00	0.00	2.18*	0.01
Workshop	-0.05	0.07	- 0.67	-
Time	0.00	0.01	0.01	-
Time * Workshop	0.07	0.02	4.80***	0.12
<i>Any medical referral given</i>				
Intercept	0.26	0.05	5.63***	
Predicted PDHRA Experience	0.00	0.00	1.26	
Workshop	-0.07	0.06	-1.24	-
Time	-0.01	0.01	-1.31	-
Time * Workshop	-0.02	0.01	-1.46	-
<i>Military One Source referral given</i>				
Intercept	0.01	0.00	1.25	
Predicted PDHRA Experience	0.00	0.00	0.70	
Workshop	0.00	0.01	0.10	-
Time	-0.00	0.00	-0.24	-
Time * Workshop	0.01	0.00	4.95***	0.14
<i>Education / information on benefits</i>				
Intercept	0.72	0.10	6.88***	
Predicted PDHRA Experience	-0.00	0.00	-0.75	
Workshop	-0.22	0.14	-1.64	
Time	-0.06	0.00	-13.31***	-0.12
Time * Workshop	0.06	0.01	10.57***	0.13
<i>Education / information on health concerns</i>				
Intercept	0.79	0.09	8.82***	
Predicted PDHRA Experience	0.00	0.00	0.40	
Workshop	-0.13	0.12	-1.12	
Time	-0.07	0.00	-16.07***	-0.16
Time * Workshop	0.08	0.01	13.67***	0.19

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Note: Interpretation of Cohen's D [54] effect sizes: 0.2 (small), 0.5 (medium), 0.8 (large)

Figure 1. Flow Chart of Study Design