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Use of a self-reported psychosocial distress screening tool as a predictor of need for psychosocial intervention in a general medical setting

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Abstract

This study describes the development of a self-reported psychosocial distress screening tool for a general medical population and criteria to predict the need for psychosocial intervention. The objectives were to develop criteria to determine which patients need in-person screening and establish criteria identifying patients who are more likely to require psychosocial interventions. The outcomes have bearing on reducing initial psychosocial screening workload for medical social workers in high volume medical settings. Furthermore, a criterion for scoring the self-reported tool can predict which patients will need further social work intervention. The results suggest criteria are a score on the adapted Distress Thermometer of five or greater, at least two negative emotions, and a lack of health insurance. The optimal criterion identified 36% (446/1228) of patients in need of in-person screening with the remaining 64% (782/1228) screened low risk through the tool, representing a significant workload reduction.

Keywords

Distress Thermometer; General Medical Population; Predictive Rule; Psychosocial Distress; Screening

Introduction

For people with illness, psychosocial risk factors play an important role in morbidity, mortality, and overall disease outcomes (Katon, 2003; Katon, Lin, & Kroenke, 2007; Pikhart & Pikhartova, 2015). Anxiety and depression are frequently prevalent among patients treated for major medical diseases including diabetes, cancer, cardiovascular disease (e.g. heart disease and stroke), (Young, Ignaszewski, Fofonoff, & Kaan, 2007) and neurological disease (Katon, 2003; Wang & Gorenstein, 2013). Comorbid depression and anxiety impact mortality and are associated with decreased quality of life, decreased adherence to treatment

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recommendations, increased morbidity, and increased use of health care services (Clarke & Currie, 2009; Keefler, Duder, & Lechman, 2001; Zebrack et al., 2015).

Proper and early recognition of psychosocial need can result in prompt intervention, improvement in outcome of co-occurring physical illness, swifter recovery, and reduced in-patient length of stay (Young et al., 2007; Keefler, J., Duder, S., & Lechman, C.). Although patient distress level and need for services are positively related, full psychosocial assessments of all patients in a high-volume medical setting may not be feasible due to limited resources and high demand for services (Katon et al., 2007; Vodermaier, Linden, & Siu, 2009). Many systems are forced to rely on physicians and patients to identify distress and functional limitations (Söllner et al., 2001). This approach to referrals could fail to identify a large number of patients in need of support. It could also result in unequal access to care.

Self-report screening tools can be cost effective for use in busy general medical settings (Katon et al., 2007; Young et al., 2007). Implementation of distress screening in a clinical setting can help to reliably identify emotionally distressed patients and enhance provision of access to mental health services (Gentilello, Ebel, Wickizer, & Salkever, 2005; Katz, Kopek, Waldron, Devins, & Tomlinson, 2004). This can improve patient outcomes and maximize the use of limited treatment resources. Identification of patient needs results in early referrals and allows for the optimum outcome in the shortest possible duration of hospitalization (Söllner et al., 2001).

Numerous studies have addressed improved patient outcomes resulting from distress screening in oncology settings (Garcia et al., 2007; Gentilello, Ebel, Wickizer, Salkever, & Rivara, 2005; Katon et al., 2007). Evidence indicates that the use of psychosocial screening instruments among cancer patients results in reductions in emotional distress, increased quality of life, and improved patient-provider communication (Gentilello, Ebel, Wickizer, & Salkever, 2005; Mystakidou et al., 2007; van Scheppingen et al., 2011; Vodermaier et al., 2009). Hence why The American College of Surgeons (ACoS) Commission on Cancer now mandates the implementation of psychosocial distress screening for every cancer patient treated in ACoS-accredited facilities (Zebrack, Burg, & Vaitones, 2012).

While distress screening among cancer patients is well documented, there is limited research available regarding use of screening tools in a general medicine population. In high-volume settings with limited resources, there is a need to effectively identify and support patients with unmet psychosocial needs and enhance the integration of psychosocial care in patient care (van Scheppingen et al., 2011).

The National Institutes of Health (NIH) Clinical Center (CC) is a research hospital that has 200 inpatient beds, 15 outpatient clinics, and 82 day hospital stations. CC social workers screen all inpatients within one day of admission. However, the psychosocial risk screening process has been challenged by the high volume of admissions on a general medicine unit. In addition, the intensity of patient research schedules and high patient turnover can leave little time for social work screening. As a result, social work often learns of intervention

needs just as the patient is expected to discharge, placing the worker in a perpetually reactive posture.

Research for distress screening indicates the need for measures that incorporate a score above a particular cut-off point that identifies patients in need of available services that they are currently not receiving (Ma et al., 2014; van Scheppingen et al., 2011). The primary aim of this study is to describe the use and efficacy of a brief self-reported psychosocial distress screening tool in a high volume general medicine setting. A second aim is to develop a set of criteria to predict the need for a psychosocial intervention.

Methods

The authors sought to strengthen the strategy of screening patients on a high volume general medicine unit. A key element of this strategy included the use of a patient self-report screening tool to better identify psychosocial distress among respondents and to help determine which respondents were in need of further social work intervention. The use of a screening tool would also provide data about key psychosocial factors that could lead to common criteria that would be predictive of the need for social work intervention in this population. In turn, this would allow social workers at the time of screening upon admission, to proactively identify those patients most likely to require social work intervention.

With the information gained, the social worker could identify patients most in need of an in-person screening and most likely to need a social work intervention by simply reviewing the responses on the tool. The former process relied on the social worker meeting the patient face to face or conducting a chart review in the place of an in-person screening. This was time consuming and unreliable given these patients are often unavailable for an in person meeting as they are participating in tests, procedures, and treatments. Additionally, other providers did not always capture salient psychosocial information in their chart notes.

Various reliable and valid patient self-report screening tools were identified in the literature and considered for implementation as part of this project. The authors considered various tools including the Patient Health Questionnaire (PHQ-9), Center for Epidemiologic Studies Depression Scale (CES-D), Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Hospital Anxiety and Depression Scale (HADS), Brief Symptom Inventory-18 (BSI-18) and Brief Symptom Inventory-53 (BSI-53). Ultimately, The National Comprehensive Cancer Network (NCCN) Distress Thermometer (DT) with associated problem list was used in this study. The NCCN DT has a picture of a thermometer on the left side of the instrument for patients to indicate their level of distress from 0 to 10. On the right side of the instrument is a problem list that includes seven domains with check boxes for patients to indicate yes or no to a specific question.

The NCCN DT was chosen because it takes less than three minutes to complete, can be scored by the social worker in less than two minutes, was easily translated into Spanish, and it could be adapted to include population-specific demographic and social variables (e.g. presence of health insurance and income, stability of living situation, and presence of social supports) that target a broader set of psychosocial factors beyond the numerical DT score.

St. Mary's Regional Health System in Lewiston, ME had adapted the NCCN DT to include questions specific to their patient population. Following this example, the authors adapted the NCCN DT (see Appendix 1 for Screening Tool Sample) to include demographic and social variables, as described earlier, that were linked with the highest frequency needs of this population at NIH. Permission was obtained from the NCCN in August 2012 to adapt the DT.

The highest frequency psychosocial needs and the associated list of questions added to the DT came from a departmental chart review of this population. The chart review spanned a nine month period between 2011 and 2012. From this review, adaptations were made to the DT. The adapted DT screening tool asked respondents to answer questions about health insurance, living situation, source of income, support, and safety. Self-identified concerns in any of these psychosocial factors constituted a stressor. Incorporating the DT, respondents were also asked to rate their level of distress on a scale from 0 (no distress) to 10 (extreme distress) and select factors contributing to their rating, such as worry, unstable living situation/ homeless, or sadness. Factors identified as contributing to distress were also considered stressors.

Creation of pilot criteria

Based on the literature and chart review, a group of responses on the tool, or pilot criteria, was created. Respondents reporting a DT score of five or greater or two or more negative emotions (e.g. sadness, worry, or hopelessness) triggered in-person screening. This pilot criteria was used to inform the social worker's clinical judgment when reviewing responses to the screening tool. Moreover, this study provided an opportunity to rigorously test the pilot criteria or generate a new set of criteria that would more reliably predict the need for in-person psychosocial screening and intervention by a social worker.

The Social Work Department (SWD) partnered with the Nursing Department to distribute the screening tool to all patients upon admission to the general medicine unit. This process was piloted for one month and then fully implemented starting in May, 2013. Data analyzed for this study included admissions from 1 May 2013 through 31 July 2015. Collaboration with the Nursing Department was critical to implementation as all patients are seen by a nurse upon admission. The SWD provided training to nursing staff on the screening tool implementation procedures. As part of the nursing admission assessment, each patient was provided a screening tool by the admitting nurse. Patients were to complete and return the tool to their nurse who then placed it in a designated mail slot within a staff-only privacy protected area. SWD staff would then retrieve the tools, review them, and follow up as necessary. Completed tools were kept in a locked cabinet in a secure area within the SWD. Figure 1 details the flow of the process.

Each individual self-report screening was given a unique code to maintain anonymity during the analysis process. Responses from each tool were entered into a spreadsheet designed to be compatible with statistical analysis software. Audits of the participant's electronic medical record were conducted to capture data related to demographics, follow up actions, and interventions.

The patient population that completed the screening tool were enrolled in a clinical trial at the NIH CC and their enrollment was not a factor in their participation in psychosocial screening. Each respondent included in the analysis was admitted to the general medicine unit at the NIH CC, willing to complete the screening tool, and had the ability to speak, read, and write in English or Spanish.

Analytical considerations to develop an optimal criterion

Fisher's exact test (for 2×2 tables) and *t*-test were used to compare responses to the screening tool questions between (1) those who received in-person screening against those who did not and (2) those who received social work interventions against those who did not.

Two analytic steps are needed to develop optimal criteria in which patients most likely to need a social work intervention and are assigned to an in-person screening, and to discriminate these from patients who are less likely to need social work intervention and are therefore not pursued. The first step is to determine which set of screening tool responses best predict a respondent's need for social work intervention. To address this question, logistic regression models were fit to the data, and Receiver Operating Characteristic (ROC) curves were examined to maximize true positive rates and minimize false positive rates. Each point on the ROC curve represents the sensitivity and specificity corresponding to a decision threshold. A large area under the ROC curve (or AUC) reflects high sensitivity and specificity (see Figure 2). Chi-square tests were used to compare AUCs from different sets of predictors.

The second analytical step needed to develop optimal criteria is to determine the cutoff values to use on the set of predictors identified in the first step. These values will filter out respondents who do not need intervention and will identify those who do.

There are many ways to determine the optimal cutoff points for the best predictors, depending on what is important, e.g. sensitivity, specificity, negative predictive value, or positive predictive value. Two measures were used that are commonly suggested: (1) Youden's *J* statistic, which is the vertical distance between the diagonal line on an ROC plot (see Figure 2) and the point on the ROC curve. It is equal to sensitivity plus specificity minus 1. The point with largest distance is optimal; and (2) the distance between each point on the ROC curve and the (0, 1) point, i.e. the upper left corner of the graph. It is equal to the square root of $(1 - \text{sensitivity})^2$ plus $(1 - \text{specificity})^2$. The point with smallest distance is optimal.

Data were analyzed using SAS version 9.4 statistical software (SAS Institute Inc., Cary, NC). *P*-values less than 0.05 were considered statistically significant.

Results

From May 2013 through July 2015 there were 2,555 admissions to the CC General Medicine Unit 5NW. Of the 2,555 admissions, 1,228 (48%) completed a screening tool. It is not clear how many of the remaining 1,327 did not receive a tool or received a tool but did not complete it as that was not tracked.

Characteristics of the analytical sample are provided in Table 1. Seventy-four percent of the study participants were White. There were 841 females (69%) and 387 males (32%). The majority of the respondents were non-Hispanic or Latino (89%). More than half (52%) were married and the remaining were single, divorced, widowed, other or unknown. The mean age of the participants was 46 years old with a standard deviation of 14.9.

The responses to the first four questions and the distress level on the screening tool are shown in Table 2. These data provide an overall snapshot of the general psychosocial profile and average DT score of the sample. Of the sample, 1017 (87%) respondents reported having health insurance. Similarly, 1059 (87%) lived with others versus living alone 158 (13%). The overwhelming majority, 1137 of respondents (95%), reported having a source of income; 1124 (93%) reported having social support and safety. The average DT score was 2.91 with a standard deviation of 2.88.

Table 3 provides an overview of the variables contributing to a respondent's DT score by reporting the frequency with which variables were selected by the sample. Worry was the most selected variable and was selected by 373 (30%) of respondents. This was followed by sadness, 111 (9%), and hopelessness, 41 (3%). Substance use was selected by 2 (<1%) respondents. The average number of stressors selected out of the possible six was 0.46 and the average number of negative emotions, which comprised three of the six stressors, was 0.43. Of note, 822 (67%) of respondents selected zero stressors in relationship to their DT score.

Table 4 reports Fisher's exact test results and filters the sample by those who met the cut off for the pilot criterion based on their self-report on the DT for an in-person screening in comparison to those who did not meet the pilot criterion. Table 4 details the responses to the first four questions and the DT score by need of in-person psychosocial screening based on the pilot criterion and thereby provides a side by side comparison of the general psychosocial profiles of the sample when divided based on the pilot criterion. The results show that respondents identified as in need of in-person screening were more likely to be uninsured (18% vs. 11%, $p = 0.004$), had no source of income (8% vs. 4%, $p = 0.01$), and had higher DT scores (6.7 vs. 1.3, $p < 0.0001$).

Similarly, Table 5 reports Fisher's exact test results and filters the sample by those who met the cut off for the pilot criterion (e.g. positive) based on their self-report on the DT for an in-person screening in comparison to those who did not meet the pilot criterion (e.g. negative). This table captures the stressors related to the DT score to provide a comparison of those variables. The data shows that the average number of stressors contributing to the distress of respondents who required in-person screening was 1.16, compared to 0.18 items in those who did not require in-person screening, where $p < 0.0001$. Also, of those who required in-person screening, there was an average of 1.08 negative emotions selected (e.g. sadness, worry, hopelessness) as compared to 0.17 negative emotions selected among those who did not require in-person screening, where $p < 0.0001$.

Sadness, worry, and hopelessness (negative emotions) all had statistically significant differences for the two groups of respondents. For the group of respondents requiring in-

person screening, worry was selected by 68%, sadness by 29%, and hopelessness by 11%. For the group of respondents that did not require in-person screening, worry was selected by 16%, sadness by 1%, and hopelessness by 0.2%. The difference in responses between both groups was statistically significant for all three negative emotions, $p < 0.0001$. Lodging was selected as a stressor by 3% of those who met criteria for in-person screening compared to 0.5% of those who did not, where $p = 0.0004$. Homelessness/unstable living situation was selected by 5% of those who required in-person screening compared to 0.3% of those who did not, where $p < 0.0001$.

Table 6 reports Fisher's exact test results and provides a comparison of the first four questions and DT score of respondents who received a social work intervention versus those who did not. The results show that respondents who needed intervention were more likely to be uninsured (21% vs. 12%, $p = 0.0008$), had no source of income (9% vs. 4%, $p = 0.007$), and had higher DT scores (4.9 vs. 2.5, $p < 0.0001$).

Similarly, Table 7 reports Fisher's exact test results and shows the data related to items on the screening tool that contributed to distress for those who received social work intervention versus those who did not. The data shows that the average number of stressors contributing to distress for those who received intervention was 0.92, compared to 0.36 items in those who did not receive intervention, where $p < 0.0001$. Also, of those who received intervention, there was an average of 0.86 negative emotions selected (e.g. sadness, worry, hopelessness) as compared to 0.34 negative emotions selected among those who did not receive intervention, where $p < 0.0001$.

Sadness, worry, and hopelessness (e.g. negative emotions) all had statistically significant differences for the two groups of respondents. Of those who received intervention, worry was selected by 53%, sadness by 24%, and hopelessness by 9%. For the group of respondents who did not receive intervention, worry was selected by 26%, sadness by 6%, and hopelessness by 2%. The p values for each of these items, comparing those who received intervention with those who did not, was $p < 0.0001$. Homelessness/Unstable Living Situation was selected by 4% of those who received intervention compared to 1% of those who did not, where $p = 0.024$.

These data were also used to test the sensitivity (Table 8) and specificity (Table 9) of the pilot criteria in identifying respondents that required in-person screening and/or social work intervention. The pilot criteria for in-person screening was a DT score greater than or equal to five or two or more negative emotions. Figure 2 shows ROC curves when different sets of items from the screening tool are used. The numbers in the legend represent the area under the ROC curve, also called AUC, for each set of predictors. For example, if one uses distress level and sadness to predict whether a respondent needs an intervention, the corresponding AUC is 0.7046. The set of predictors with highest AUC is considered best because it maximizes sensitivity and specificity. Results show that DT score, combined with lack of health insurance and number of negative emotions, have the highest AUC (0.7238).

Chi-square tests were utilized to compare different AUCs. The result of the tests showed that the AUC for DT score alone was statistically higher than that of the number of stressors

alone (0.7025 vs. 0.6541, p value = 0.02) as was the number of negative emotions alone (0.7025 vs. 0.6570, p value = 0.03). AUC comparisons also showed that the AUC for DT score combined with lack of health insurance and number of negative emotions together was statistically higher than that of DT score alone (0.7238 vs. 0.7025, p value = 0.025). This analysis suggests that the combination of DT score, lack of health insurance, and number of negative emotions is a better set of predictors than the combination of DT score and number of negative emotions.

To determine the optimal cutoff points for DT score, lack of health insurance, and number of negative emotions, the two measures (e.g. Youden's J and distance to the (0,1) point) described in the Methods section were examined for each of 70 possible combinations of cutoff values. Based on distance to the Youden's J statistic, the pilot criteria ranked sixth of the possible 70 combinations. The combination that ranked first was a DT score greater than or equal to five or two or more negative emotions or lack of health insurance. Based on the (0,1) point, the pilot criteria ranked 20th of the possible 70 combinations. The combination that ranked first was a DT score greater than or equal to five or two or more negative emotions or lack of health insurance. If this new criteria were implemented on the entire sample size of 1228, 446 (36%) respondents would have required in-person screening versus 350 (29%) under the pilot criteria. For the Youden's J statistic and the (0,1) point the new criteria performed better than the pilot criteria.

Table 8 compares the sensitivity of the pilot and new criteria. Of the 197 participants who received intervention, 108 (55%) screened positive with the pilot criteria, and 126 (64%) screened positive with the new criteria. In other words, the new criteria better identified those who needed intervention.

Table 9 compares the specificity of the pilot and new criteria. Of the 1,014 participants who did not receive intervention, 777 (77%) screened negative with the pilot criteria, and 701 (69%) screened negative with the new criteria. In other words, the pilot criteria did a better job at excluding those who did not need intervention.

Discussion

Due to the lack of ultra-short screening tools for non-cancer populations and based on the strong literature for distress screening in the oncology population, the DT screening tool was selected (Zebrack et al., 2012, 2015). Guided by this literature and the NIH SWD's knowledge of the target population, the pilot criteria were developed. The DT screening tool and pilot criteria were created to more effectively capture the psychosocial needs of the target population in a setting with low staffing levels and high patient volumes. The results suggest efficient identification of patients in need of psychosocial intervention in an in-patient general medical population in a research hospital.

The sensitivity measure shows the new criteria, DT score greater than or equal to five, or two or more negative emotions, or lack of health insurance, is 10% more sensitive than the pilot criteria: DT score greater than or equal to five or two or more negative emotions. The new criteria are more likely to identify respondents who need intervention.

The new criteria set has 8% less specificity than the pilot criteria and will therefore select more patients for in-person screening that may not need social work intervention. However, this is considered a lesser error compared to missing patients who may need intervention. It is more important to identify patients who are likely to need intervention than to exclude those who may not. Therefore, the 10% increase in sensitivity of the new criteria overshadows its 8% decrease in specificity.

If guidance is created based on DT score alone, 5 or more is the optimal cutoff based on Youden's *J* statistic and 4 or more is optimal based on the distance to the (0,1) point. Four or more has a higher sensitivity than 5 or more (57% and 53% respectively). In the DT literature studies of the oncology population, 4 or more seems to be the agreed upon cutoff for significance (Ma et al., 2014). This study confirms that a DT cutoff score of 4 or more in a general medicine population is reasonable. Unique to the findings was the added variable of lack of health insurance to the new criteria.

In terms of workload management, the data provide evidence that the overwhelming majority, 64% (782/1228), of patients admitted to the general medicine unit will not need in-person screening and not require an intervention. While each patient still needs to be screened, the results suggest that the majority can be screened through the tool and optimal criterion alone. Even though the new criterion is 8% less specific, the very use of the self-report tool combined with the optimal criteria will allow the social worker to spend their time seeing patients with obvious psychosocial needs. In other words, the optimal criterion, when applied to the sample, shows that only 36% (446/1228) will need an in-person screening. There is a relevant concern in the literature and among medical social workers that SWDs who deploy a screening tool will have increased referral volumes. However, the results from this study confirm literature that suggests that use of a screening tool helps prioritize patient referrals and interventions and therefore, workflow (Meijer et al., 2013). The screening tool allows a social worker to get an initial psychosocial snapshot of a patient at the time they are admitted. It allows for more efficient triage, identification of need, and focused delivery of psycho-social intervention. Moreover, these data suggest that deploying a tool for use among the general medical population is viable, efficient, and effective.

Limitations

The limitations of this study include use of a tool adapted and customized for this research setting. The DT portion of the tool has been validated in oncology populations but not in a general medicine population. That reduces the reliability and validity of the adapted tool and limits the generalizability of the results. However, given the strength of the DT in the oncology literature, it is reasonable to hypothesize application to other patient populations as is the case with the pain scale across different diagnostic groups. Further research that tests the reliability and validity of the adapted DT screening tool is necessary.

Although these data were obtained from a relatively large sample, they are from a single institution that requires patients be enrolled in a clinical trial, which may limit generalizability to other general medicine populations. The nature of the setting, a federally funded research hospital, further limits the applicability to these findings in other settings.

This is specifically true in the case of the inclusion of lack of health insurance in the screening tool and as part of the new rule. The uniqueness of this environment is such that the NIH does not require or collect health insurance information. However, it is imperative, in medical social work practice, to have and know this information in order to help patients access care in the community. Research that includes various patient populations in various medical settings would strengthen the literature.

Additional limitations are that there is no way to ensure each patient is given the self-report screening upon admission, or if the tool is given that the patient's tool is preserved until the social worker can retrieve it. Inevitably some tools will be misplaced or lost. Entering patient responses directly into the electronic medical record would reduce this possibility.

Further discussion is also needed in relationship to the floor of the sensitivity measure and the ceiling of the specificity measure. For this study, the sensitivity measure was 64% and the specificity was 69% but it is not clear if those ranges are acceptable.

Conclusion

Despite the limitations, this paper provides evidence that the use of a self-report screening tool is a feasible and vital aspect of a robust strategy for prioritizing patients on high-volume general medical units. Moreover, customizing the DT to be institution or population-specific allows for further insight and the development of criteria which can reasonably predict which patients are most likely to require social work intervention. In the case of this study, the analysis suggests that these criteria are a score on the DT of five or greater, or two or more negative emotions, or lack of health insurance. These criteria would identify 64% (782/1228) of the sample who could be screened simply by their responses on the tool, allowing the social workers to allocate their time to meeting the needs of the 36% (446/1228) of patients who require social work support. This research was supported by the Intramural Research Program of the NIH Clinical Center.

Appendix 1. Screening Tool

Please complete and return to nurse

NIH Clinical Center Social Work Department Patient Screening Tool

Today's Date: _____ Patient Date of Birth: _____

Patient Name (Last, First, Middle) _____

Name of person completing this form if other than patient: _____

1. Health Insurance (check all that apply):
☐ Medicare ☐ Medicaid ☐ Tri-Care ☐ None
☐ Private/Employer-sponsored Insurance (write in carrier): _____
☐ Insurance from my country: _____ ☐ Other: _____

2. Living Situation: ☐ Alone ☐ With Others (if selected, check all that apply):
☐ Adult Children ☐ Children under 18 ☐ Spouse ☐ Significant Other
☐ Parents ☐ Foster Parents ☐ Grandparents ☐ Legal Guardian
☐ Roommate(s) ☐ Sibling(s) ☐ Caregiver ☐ Other: _____

3. Source of Income (check all that apply):
☐ Social Security Disability ☐ Salary/Wages ☐ Income from spouse/partner/family/friends
☐ SSI/SSD ☐ Retirement Income ☐ None
☐ Social Security Retirement ☐ Pension ☐ Other: _____
☐ Public Assistance ☐ Savings/Investments

4. Support & Safety:
 When you need help, is there someone in your life who can help you with things like a ride to medical appointments, cooking, cleaning, shopping, etc.? ☐ Yes ☐ No

Comments: _____

5. Instructions: **First**, please circle the number (0-10) that describes how much distress you have been experiencing in the past week including today.

Extreme distress 10
9
8
7
6
5
4
3
2
1
0 No distress

Second, please indicate if any of the following items are contributing to your distress:
☐ Unstable Living Situation/ Homelessness
☐ Sadness
☐ Worry
☐ Hopelessness
☐ Loneliness
☐ Substance Use
☐ Other: _____
☐ Other: _____

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Figure 1.
Process flow for administering, collecting, and scoring the tool.

Figure 2.
ROC Curves for Comparisons.

Table 1Demographics of patients completing the screening tool ($N = 1228$).

		<i>N</i>	% ^a
Gender	Female	841	68.5
	Male	387	31.5
Race	White	909	74.0
	Black/African American	136	11.1
	Asian	79	6.4
	Multiple Race	20	1.6
	Am. Indian/Alaska Nat.	5	0.4
	Hawaiian/Pac. Island	3	0.2
	Unknown	76	6.2
Ethnicity	Not Hispanic or Latino	1092	88.9
	Hispanic or Latino	132	10.7
	Unknown	4	0.3
Marital status	Married	643	52.4
	Single	417	34.0
	Divorced/Separated	119	9.7
	Widowed	39	3.2
	Other	10	0.8
Age (years)	Average (SD)	46.0 (14.9)	

^aMay not add up to 100% because of rounding.

Table 2

Responses to first four questions and distress level on the patient screening tool.

		<i>N^a</i>	%
Health insurance	Yes	1017	86.7
	No	156	13.3
Living situation	With others	1059	87.0
	Alone	158	13.0
Source of income	Some	1137	94.7
	None	64	5.3
Support and safety	Either/Both	1124	93.4
	Neither	79	6.6
Distress level (0–10)	Average (SD)	1167	2.91 (2.88)

^aSome totals do not add up to 1228 because of missing responses.

Table 3Items on the patient screening tool contributing to distress ($N = 1228$).

	# who checked item	%
Homelessness/unstable living	19	1.5
Sadness	111	9.0
Worry	373	30.4
Hopelessness	41	3.3
Lodging	15	1.2
Substance use	2	0.2
Number of stressors (out of 6) average (SD)	0.46 (0.77)	
Number of negative emotions (out of 3) average (SD)	0.43 (0.71)	

Table 4

Responses to first four questions and distress level on the patient screening tool, by need of in-person screening under the pilot criteria.^a

		Negative screening (in-person screening not needed) (<i>N</i> = 878)	Positive screening (in-person screening needed) (<i>N</i> = 350)	<i>p</i> -value ^b
Health insurance	<i>N</i> (non-missing)	840	333	0.004
	Yes	88.6%	82.0%	
	No	11.4%	18.0%	
Living situation	<i>N</i> (non-missing)	868	349	0.26
	With others	86.3%	88.8%	
	Alone	13.7%	11.2%	
Source of income	<i>N</i> (non-missing)	858	343	0.010
	Some	95.8%	91.8%	
	None	4.2%	8.2%	
Support and safety	<i>N</i> (non-missing)	860	343	0.52
	Either/Both	93.7%	92.7%	
	Neither	6.3%	7.3%	
Distress level (0–10)	<i>N</i> (non-missing)	822	345	<0.0001
	Average	1.3	6.7	

^aPilot screening rule: need in-person screening (positive screening result) if distress level ≥ 5 or number of negative emotions ≥ 2.

^bTwo-sided *p*-value based on Fisher's exact test for 2 × 2 tables, and *t*-test for distress level.

Table 5

Items on the patient screening tool contributing to distress, by need of in-person screening under the pilot criteria.^a

	% who checked item, among those with negative screening result (N = 878)	% who checked item, among those with positive screening result (N=350)	p-value ^b
Homelessness/Unstable living	0.3	4.6	<0.0001
Sadness	1.1	28.9	<0.0001
Worry	15.5	67.7	<0.0001
Hopelessness	0.2	11.1	<0.0001
Lodging	0.5	3.1	0.0004
Substance use	0.1	0.3	0.49
Number of stressors (out of 6) average	0.18	1.16	<0.0001
Number of negative emotions (out of 3) average	0.17	1.08	<0.0001

^aPilot screening rule: need in-person screening (positive screening result) if distress level ≥ 5 or number of negative emotions ≥ 2.

^bTwo-sided *p*-value based on Fisher's exact test for 2 × 2 tables, and *t*-test for number of stressors and number of negative emotions.

Table 6

Responses to first four questions and distress level on the patient screening tool, by receipt of SW intervention.

		Did not receive SW intervention (<i>N</i> = 1014)	Received SW intervention (<i>N</i> = 197)	<i>p</i> -value ^a
Health insurance	<i>N</i> (non-missing)	972	184	0.0008
	Yes	88.5%	78.8%	
	No	11.5%	21.2%	
Living situation	<i>N</i> (non-missing)	1004	196	0.25
	With others	86.5%	89.8%	
	Alone	13.5%	10.2%	
Source of income	<i>N</i> (non-missing)	995	191	0.007
	Some	95.6%	90.6%	
	None	4.4%	9.4%	
Support and safety	<i>N</i> (non-missing)	996	191	0.63
	Either/Both	93.6%	92.7%	
	Neither	6.4%	7.3%	
Distress level 0–10)	<i>N</i> (non-missing)	971	179	<0.0001
	Average	2.5	4.9	

^aTwo-sided *p*-value based on Fisher's exact test for 2 × 2 tables, and *t*-test for distress level.

Table 7

Items on the patient screening tool contributing to distress, by receipt of SW intervention.

	% who checked item, among those who did not receive SW intervention (<i>N</i> = 1014)	% who checked item, among those who received SW intervention (<i>N</i> = 197)	<i>p</i> -value ^a
Homelessness/Unstable living	1.2	3.6	0.024
Sadness	6.1	23.9	<0.0001
Worry	25.6	53.3	<0.0001
Hopelessness	2.3	9.1	<0.0001
Lodging	1.0	2.0	0.26
Substance use	0.2	0.0	1.0
Number of stressors (out of 6) average	0.36	0.92	<0.0001
Number of negative emotions (out of 3) Average	0.34	0.86	<0.0001

^aTwo-sided *p*-value based on Fisher's exact test for 2×2 tables, and *t*-test for number of stressors and number of negative emotions.

Table 8

Sensitivity of pilot and new criteria.

	# screened ^a	# who received SW intervention	Of those who received SW Intervention, # who screened positive	Sensitivity (True positive rate)
Pilot rule	1211	197	108	54.8% (108/197)
New rule ^b			126	64.0% (126/197)

^aThis number (1211) is different from 1228 because those for whom we do not know whether they received SW intervention are excluded.

^bNew screening rule: Distress level ≥ 5, or ≥ 2 negative emotions, or lack of health insurance.

Table 9

Specificity of pilot and new criteria.

	# screened ^a	# who did not receive SW intervention	Of those who did not receive SW Intervention, # who screened negative	Specificity (true negative rate)
Pilot rule	1211	1014	777	76.6% (777/1014)
New rule			701	69.1% (701/1014)

^aThis number (1211) is different from 1228 because those for whom we do not know whether they received SW intervention are excluded.