Screening for Panic Disorder in Individuals Presenting to the Emergency Department with Noncardiac Chest Pain: A Literature Review

By

Laura Prince PA-S, BSc Psychology

Princel3@myumanitoba.ca

Mentors:

Dr. James Bolton, MD, FRCPC

Rebecca Muller PA-C, MSc

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ABSTRACT

Introduction: Individuals with panic disorder (PD) often present to an emergency department (ED) with cardiopulmonary complaints. In the ED, life-threatening causes of chest pain are eliminated, but individuals are discharged without a diagnosis of PD. Left untreated, PD has significant consequences. A screening tool is a simple device that could be implemented to screen for PD in the ED.

Objectives: To identify PD screening tools designed to be used in the ED and compare/contrast them on several dimensions.

Methods: Two databases were used to conduct the literature search. The following search terms and synonyms were used: Screening, Panic Disorder, Emergency Department and Chest Pain. Of the 51 articles located, four were deemed suitable to include in this review, and five screening tools were evaluated.

Results: All screening tools evaluated in this review are brief, taking five minutes or less to administer. The PSS and PHQ-PD are not sensitive (51.8% and 60.9%, respectively). The PDSQ-PD has the highest sensitivity (87.0%) but poor specificity (52.3%). The 7-ICRT has high sensitivity (81.7%) and specificity (87.9%). The PSS-R has fair sensitivity and specificity (70.9% and 75.2%, respectively).

Conclusion: Both the 7-ICRT and the PSS-R could be used in the ED to improve upon current low rates of PD detection by physicians. By implementing a PD screening tool in the ED as a standard of care more individuals will be diagnosed with PD and hopefully receive follow-up with a primary care provider for treatment, thus improving outcomes for patients and the healthcare system.

INTRODUCTION

Anxiety disorders are extremely common; among Manitobans, 23% of the population suffer from anxiety and mood disorders.[1] Panic disorder (PD) is a type of anxiety disorder characterized by recurrent, unpredictable episodes of intense fear known as panic attacks.[2] During a panic attack, an individual may experience a variety of physical symptoms including sweating, shortness of breath, nausea, heart palpitations, and chest pain (Table 1).[2] These symptoms are similar to an acute coronary syndrome, leading many individuals experiencing a panic attack to present to an emergency department (ED).[3] It is well known that panic attacks and PD are common among patients presenting to the ED with non-cardiac chest pain (NCCP).[4] Up to 44% of patients with NCCP meet the criteria for either panic attacks or PD.[5] Unfortunately, the large majority of cases are not recognized by ED physicians.[5,6] A recent study found that in patients with NCCP, ED physicians diagnosed PD in only 7.4% of individuals who met the criteria for PD.[5]

When ED physicians fail to diagnose and treat PD, it results in significant consequences for the patient and the health care system. Individuals with untreated PD experience diminished quality of life,[7] increased suicidal thoughts and suicide attempts.[8-10] Additionally, they have increased rates of work absenteeism and are more likely to be unemployed compared to individuals without PD, thus contributing to lost productivity.[11] PD also has a detrimental impact on the healthcare system. Among individuals with low-risk chest pain, those with increased anxiety are more likely to return to the ED within 30 days.[12] Furthermore, individuals with PD are four times more likely to return to the ED with chest pain and three times more likely to be hospitalized for chest pain than individuals without PD.[13] Return visits to the ED and

subsequent hospitalizations contribute to increased wait times for patients and increased health care costs.

The ED serves as the first point of contact for many individuals with PD, making the detection of the disorder by ED physicians of great importance. By increasing the rate at which ED physicians detect PD, the hope is that more patients would be referred to a health care provider and subsequently receive treatment, thus improving outcomes for the patient and the healthcare system.[6] A screening tool is a simple device that could be implemented as a standard of care in patients with NCCP to screen for PD in the ED.

The History & Development of Screening for PD

The search for a screening tool to detect PD in patients with NCCP in the ED began in the 1990s. One of the earliest studies was by Fleet et al., who developed a screening tool from several psychiatric questionnaires and pain measurement scales.[14] In this study, the Agoraphobia Cognitive Questionnaire, the Mobility Inventory for Agoraphobia plus gender, and the location of the chest pain as marked on the Dermatome Pain Map were the best at identifying PD. This screening tool was prospectively validated and correctly classified 73% of participants, with a sensitivity of 66% and a specificity of 75%. According to the authors, this screening tool takes approximately 10 minutes to complete, which is fairly time-intensive for a busy ED. A shorter screening tool, that takes only two to five minutes to complete is the Hospital Anxiety and Depression Scale (HADS).[15] In 2003 Kuijpers et al. investigated whether the HADS could be used in patients with NCCP in the ED setting.[16] The HADS correctly classified 78% of participants and had a sensitivity of 97%; however, the specificity of the HADS was poor at 54%.[16]

Panic Disorder Epidemiology & Diagnostic criteria

Among adults living in the US, PD has a 12-month prevalence of 2-3%[17,18] and a lifetime prevalence of 7%.[18] According to Canadian survey data the 12-month and lifetime prevalence is 1.6% and 3.7%, respectively.[19] Isolated panic attacks are even more common, with an estimated lifetime prevalence of 22.7%.[20] The prevalence of PD is higher among females, occurring at a rate of 2:1.[18] PD often onsets in young adulthood, with a mean age of onset of 30.3 years old.[21]

Panic attacks are brief episodes of intense fear that reach maximal intensity and abate within minutes.[22] PD is characterized by recurrent panic attacks in which the individual begins to fear when the next one will strike.[22] This often results in maladaptive behaviours in an attempt to avoid having a panic attack.[22] The frequency and intensity of panic attacks are variable; they may occur several times a day to a few times per month and can range from mild to severe.[22]

Table 1 DSM-V Panic Disorder Diagnostic Criteria[22]

I. Recurrent episodes of intense fear with 4 or more of the following symptoms:
    1. Palpitations, pounding heart, or accelerated heart rate
    2. Sweating
    3. Trembling or shaking
    4. Sensations of shortness of breath or smothering
    5. Feelings of choking
    6. Chest pain or discomfort
    7. Nausea or abdominal distress
    8. Feeling dizzy, unsteady, light-headed, or faint
    9. Chills or heat sensations
    10. Paresthesias (numbness or tingling sensations)
    11. Derealizations (feelings of unreality) or depersonalization (being detached from oneself)
    12. Fear of losing control or "going crazy"
    13. Fear of dying
II. Additionally, they must experience one of the following for at least one month:
    1. Persistent concern or worry about experiencing additional panic attacks or their consequences (e.g. losing control, having a heart attack, "going crazy")
    2. A significant maladaptive change in behaviour related to the attacks
III. The disorder cannot be better explained by another mental disorder. substance use, or another medical condition

Objectives

This literature review aims to identify the screening tools currently available to screen for PD in patients with NCCP in the ED and compare/contrast screening tools on several dimensions: ease of use, self-administered, completion time, reliability and validity. An additional aspect of this literature review is to determine the challenges associated with implementing a PD screening tool in the ED.

METHODS

Search strategy

The primary author developed the search strategy with assistance from a University of Manitoba librarian with experience in health science literature reviews. The databases PubMed and Psych Info were used to conduct the literature search. A variation of the following search terms and synonyms were used to locate relevant articles in the databases: Screening, Panic Disorder, Emergency Department and Chest Pain (Appendix 1). The search terms generated 59 articles in PubMed and 42 articles in Psych Info.

Study Selection

The articles generated from the search terms were filtered in their respective database based on language and date of publication. As part of the inclusion criteria, articles had to be published in English between January 1st, 2010 and September 1st, 2020. Only articles published within the last decade were included to give the most up-to-date perspective on this topic. The search resulted in 39 articles in PubMed and 25 articles in PsycINFO. These articles were saved to a reference manager and duplicates were removed, yielding 51 articles. Due to the paucity of research on this topic, studies from across the globe were included. All 51 article titles were reviewed and subsequently eliminated if deemed unrelated to the topic. This resulted in 11

articles. The same process was completed for the abstracts of the remaining articles, resulting in six articles. Full texts were evaluated and included if the study was conducted in an ED, consisted of participants over the age of 18 with a chief complaint of chest pain or related cardiopulmonary symptoms and used a screening tool to identify patients with PD. There are a total of four articles included in this review.

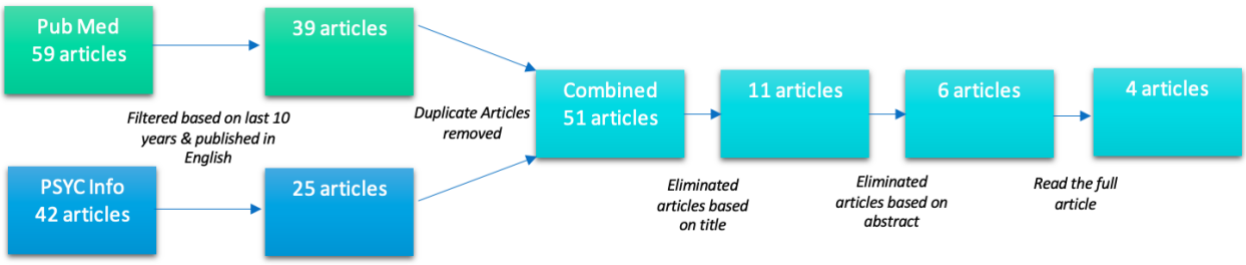

Figure 1 Methods for article selection

RESULTS

PSS & PSS-R

The Panic Screening Score (PSS) was derived and validated in 2011 by Foldes-Busque et al.[23] The objective was to develop a screening tool that could aid ED physicians in identifying PD in patients with NCCP.[23] The PSS is a 4-item screening tool that includes two dichotomous questions (ambulance use and history of an anxiety disorder) and two Likert scale questions (fear of heart attack and fear of choking). This screening tool was developed using a logistic regression analysis from three self-report instruments: The State-Trait Anxiety Inventory, the Agoraphobic Cognitions Questionnaire, and the Anxiety Sensitivity Index. Participants were also asked about self-reported panic attacks. A total score ≥6 on the PSS indicates PD is likely present. The Anxiety Disorder Interview Schedule for DSM-IV (ADIS-IV) was used to establish

a diagnosis of PD and acted as the reference standard against which the PSS could be compared. During the derivation phase of the PSS, the sensitivity was 63% and specificity was 84% (Table 2). During the validation phase, the sensitivity fell to 53% while the specificity remained relatively unchanged. The positive predictive value was 72% and the negative predictive value was 71%.

In 2018, Foldes-Busque et al. attempted to externally validate the PSS and create a modified version of the PSS with enhanced sensitivity, specificity and discriminate validity.[6] Similar to the study in 2011, the ADIS-IV was used as the reference standard for diagnosis. Using a generalized linear model with a log link and Poissons working model, the Revised Panic Screening Score (PSS-R) was developed. This screening tool is two items longer than the original PSS; however, four of the items assessed are dichotomous, which helps keep this screening tool brief. The items included are as follows: age less than 60, fear of choking, feeling overwhelmed, fear of dying during the episode of chest pain, history of a panic attack in the past four weeks, an episode of racing heart, feeling faint or shortness of breath for no reason in the last six months. Compared to the original PSS, this screening tool does not include ambulance use or a history of an anxiety disorder. As mentioned by the author, eliminating ambulance use from the PSS-R makes the PSS more applicable to various populations around the globe, not just developed countries.[6] Additionally, the removal of 'history of anxiety disorder' from the PSS-R may enhance the ability of the PSS to detect the first presentation of PD. The one item that remained the same between the two versions of the PSS is fear of choking. The PSS-R uses a cut-off score of ≥11, whereas the original PSS uses a cut-off score of ≥6. According to the authors, the original PSS takes approximately 1 minute to complete (Table 3); however, it did not approximate the completion time for the revised version. The PSS-R is a better screening tool

in comparison to the original PSS. The PSS-R has higher sensitivity than the original PSS (70.9% vs. 51.8%, respectively) and similar specificity. In addition, the discriminant validity of the revised version was enhanced with a AUROC of 0.78 compared to 0.69.

PHQ-PD & PDSQ-PD

The Patient Health Questionnaire (PHQ) is a self-administered screening tool derived from the Primary Care Evaluation of Mental Disorders (PRIME-MD). It was designed to detect various mental illnesses in the primary care setting including, depression, eating disorders, anxiety, somatoform disorders and alcohol use disorders.[24] The PHQ panic disorder module (PHQ-PD) is a 15-item screening tool based on the DSM-IV criteria for PD that has been validated in a variety of primary care populations.[25-27] It has demonstrated internal consistency in various populations and convergent validity with other validated anxiety measures such as the Anxiety Sensitivity Index.[3] The PHQ-PD takes around 5 minutes to complete and consists of 4 dichotomous questions and a checklist of 11 panic attack symptoms; therefore, it is longer than both the PSS and revised PSS. The four dichotomous questions included are as follows: in the last four weeks have you experienced an anxiety attack, has this ever happened before, do these anxiety attacks occur without warning, and do you worry about experiencing another one in the future. The 11 symptoms included are identical to those which make up the criteria for PD in the DSM-IV.

Unlike the studies conducted by Foldes-Busque et al., which used the ADIS-IV as the reference standard, Sung et al. used the structured clinical interview for DSM-IV panic disorder module (SCID-IV-PD). Both the ADIS-IV and SCID-IV have been shown to increase diagnostic accuracy and are considered gold standards in evaluating anxiety disorders.[28] This study used the PHQ-PD to screen for panic attacks and PD which were treated as mutually exclusive categories.

The original scoring algorithm for the PHQ-PD resulted in poor discriminative ability for panic attacks (AUC= 0.54%, 95% CI=0.49-0.58); therefore, two additional algorithms were attempted. The second algorithm had the highest discriminative ability with an AUC of 0.66 (95% CI=0.58-0.73) and correctly classified 75.3% of participants; however, it only had a sensitivity of 40.4%. Similar to the detection of panic attacks, the original algorithm performed poorly for detecting PD (AUC=0.68, 95% CI=0.61-0.75). Once again, the second modified algorithm had the best discriminative ability for PD with a AUC of 0.75, and correctly classified 81.7% of participants. The sensitivity and specificity of the modified algorithm for PD was 60.9% and 90.65%, respectively. Compared to the PSS-R, the sensitivity of the PHQ-PD is 10% lower; however, the specificity is much higher, and the AUC is relatively the same (0.78 vs. 0.76, respectively).

The Psychiatric Diagnostic Screening Questionnaire (PDSQ) is a self-report screening tool that was developed to identify DSM-IV Axis I disorders.[29] The PDSQ-PD is a reliable screening tool with strong psychometric properties, including good internal consistency, convergent and discriminant validity, and criterion validity.[30-32] The PDSQ has 13 subscales, one of which is specific for PD. The PD module of the PDSQ (PDSQ-PD) consists of 8 dichotomous questions has a recommended cut-off score of ≥4. Similar to the PHQ-PD, it takes less than 5 minutes to complete. In this study, the ability of the PDSQ-PD to detect both panic attacks and PD was evaluated against the reference standard ADIS-IV.

As with the PHQ-PD, the PDSQ-PD does not adequately detect the presence of panic attacks. Using the recommended cut-off score of ≥4 on the PDSQ-PD resulted in a low sensitivity (31.9%). In order to maximize its sensitivity for panic attacks, a cut-off score of ≥1 was used; however, this resulted in a sensitivity of only 55.3%, a poor discriminative ability (AUC= 0.57, 95% CI= 0.47-0.67) and only correctly classified 53.3%. Conversely, the PDSQ-

PD had an acceptable discriminative ability for PD, with a AUC= 0.79 (95% CI=0.71-0.87). Using the cut-off score of 4 did not result in optimal sensitivity for PD (56.5%) but it correctly classified 75.8%. Using the cut-off score of ≥1 yielded the highest sensitivity for PD (87.0%) but the participants correctly classified dropped to 62.8%. Compared to the PHQ-PD, the PDSQ-PD has a significantly higher sensitivity for detecting PD (60.9% vs. 87.0%). That being said, the PHQ-PD has higher specificity than the PDSQ-PD (90.65% vs. 52.3) and a greater percentage of correctly classified participants (81.7% vs. 62.8%).

The PDSQ-PD sensitivity is also greater than that of the revised PSS (87.0% vs. 75.2) but its specificity is significantly lower (75.2% vs. 52.3%). Additionally, when comparing the PHQ-PD or PDSQ-PD to the revised PSS, it is important to note that the sample size used by Sung et al. was substantially smaller than the sample size used by Foldes-Busque et al.

7-item clinician rating tool

Sung et al. developed the 7-item clinician rating tool (7-ICRT) with the goal of identifying panic attacks or PD in patients with cardiopulmonary complaints.[33] This screening tool was developed using a multivariate model based on 13 symptoms of PD as found in the DSM-V. Seven of the 13 symptoms of panic attacks were shown to aid in the identification of patients with either panic attacks or PD including: Heart palpitations, accelerated heart rate, or a pounding heart; Derealization; Paresthesia; Feeling short of breath or smothered; Chills or hot flushes; Feeling dizzy, unsteady lightheaded or faint; Fear of losing control or going crazy.[33] This model achieved a high discriminative ability for detecting panic attacks or PD (AUC= 0.90). Using a cut-off score of ≥3 resulted in the best performance with a sensitivity of 81.7%, a specificity of 87.9% and 85% correctly classified.

The 7-ICRT can be completed based on the information collected in a 5-minute interview with a patient. It is one item longer than the PSS-R, but it is more sensitive and specific than both the PSS and PSS-R. The 7-ICRT is also more sensitive than the PHQ-PD (81.7% vs. 60.9%); however, it is slightly less specific (87.9% vs. 90.65%). In comparison to the PDSQ-PD, the 7-ICRT is 5.3% less sensitive but 35.6% more specific. Additional benefits to the 7-ICRT is that it correctly classified a greater percentage of participants and contains fewer items than the PHQ-PD and PDSQ-PD.

Table 2 Performance Characteristics of the Panic Disorder Screening Tools

Author & Date	Screening Tool	Participants (n)	Sensitivity (%)	Specificity (%)	Positive Predictive Value	Negative Predictive Value	Positive Likelihood ratio	Negative Likelihood ratio	AUC	% correctly classified
Foldes-Busque[23] et al. 2011	PSS Derivation (95% CI)	201	63	84	74%	76%	3.9375	0.4404	0.78	
	PSS Validation (95% CI)	306	53	85	72%	71%	3.5333	0.5529		
Foldes-Busque[6] et al. 2018	PSS (original) (95% CI)	1102	51.8	74.8			2.05	0.65	0.69	
	revised PSS (95% CI)		70.9	75.2			2.89	0.39	0.78	
Sung[3] et al. 2018	PHQ-PD (95% CI)	200	60.9	90.65			6.5130	0.4316	0.76	81.7
	PDSQ-PD (95% CI)		87.0	52.3			1.8244	0.2492	0.79	62.8
Sung[33] et al. 2018	7-Item Clinician Rating Tool (95% CI)	200	81.7	87.9			6.7262	0.2081	0.90	85.0

Table 3 Characteristics of the Panic Disorder Screening Tools

Author & Date	Screening tool	Method of Administration	Number of Items	Time to complete
Foldes-Busque[23] et al. 2011	PSS	Not specified	4 items	~1 minute
Foldes-Busque[6] et al. 2018	PSS-R	Not Specified	6 items	Not specified
Sung[3] et al. 2018	PHQ-PD	Self-report questionnaire	15 items	< 5minutes
	PDSQ-PD	Self-report questionnaire	8 items	< 5minutes
Sung[33] et al. 2018	7-ICRT	Clinician administered	7 items	Can be filled out based on info collected within 5 minutes of talking with patient

DISCUSSION

Comparison of Screening Tool Characteristics

The ideal screening tool for detecting PD in the ED would be easy to administer within minutes while remaining highly sensitive and specific. In a busy ED a screening tool must not slow the process of caring for a patient. The shortest screening tool was the original PSS, which consists of four items and takes approximately one minute to complete. The authors of the PSS-R did not state how long it takes to complete on average; however, it is only two items longer than the original PSS and could also be completed within minutes. The PHQ-PD was the lengthiest screening tool in terms of items; however, it only takes five minutes to complete. An additional time saving component to the PHQ-PD and the PDSQ-PD, is they are both self-report questionnaires that can be completed without a practitioner present. In comparison, the 7-CRT is intended to be administered by a healthcare provider, increasing the amount of time spent with a patient. Overall, any of the screening tools evaluated could be implemented in an ED setting without substantially increasing the amount of time spent with the patient.

When developing a screening tool, the sensitivity must remain high to maximize the identification of individuals with the condition and eliminate the possibility of false negatives.[24,26,31] Of the screening tools evaluated, the PDSQ-PD had the highest sensitivity for detecting PD (87.0%), followed by the 7-ICRT (81.7%) and the PSS-R (70.9%). The high sensitivity of PDSQ-PD would have the ability to identify more individuals with PD than the 7-ICRT or the PSS-R. However, the specificity of the PDSQ-PD was poor (52.3%), which would result in a large proportion of false-positives. In comparison, the PSS-R and 7-ICRT have fair (75.2%) and good (87.9%) specificity and would have a lower false-positive rate. The PSS and

PHQ-PD both had poor sensitivity and would not be effective screening tools for identifying PD in patients with NCCP in the ED.

Which screening tool is best for the ED setting

The PDSQ-PD has the highest sensitivity of all the screening tools evaluated and is brief enough to be used in the ED. However, due to the poor specificity, if implemented into clinical practice, individuals without PD would receive an unnecessary referral to a health care provider for a more thorough evaluation. As a result, the workload for primary care providers would increase along with health care costs. Therefore, the PDSQ-PD has limited utility for screening for PD in the ED.

The PSS-R is a screening tool that has the potential to be used to identify PD in the ED. It has fair sensitivity and specificity, as well as an acceptable AUC. It is a short enough screening tool that it would not drastically increase the amount of time a clinician spends with a patient. Before implementing this screening tool into clinical practice, it would be ideal to improve the sensitivity and specificity.

The 7-ICRT is the strongest screening tool in several dimensions. It has good sensitivity and specificity in addition to moderate positive and negative predictive value. Moreover, it has the highest AUC of all the screening tools evaluated. This screening tool would be ideal to use in a busy ED as it can be completed based on the information collected during a 5-minute patient interview. Unlike the other screening tools evaluated, the 7-ICRT is designed to screen for both panic attacks and PD; it does not differentiate between the two. As a result, this screening tool would capture a larger group of individuals. Using a screening tool that identifies both panic attacks and PD can be seen as beneficial, as panic attacks are a main component of PD. Although not all individuals who experience a panic attack will meet the criteria for PD, a proportion these

individuals will develop PD in the future. As with other screening tools, it would be the responsibility of the primary care provider to determine if the individual truly meets the criteria for PD.

Both the PSS-R and 7-ICRT have the potential to be used in the ED to screen for PD in patients with NCCP. The 7-ICRT has better psychometric properties, albeit including panic attacks. In contrast, the PSS-R specifically aims to detect individuals with PD but has lower sensitivity and specificity. If providers in a given health system prefer a lower false-negative rate and are prepared to accommodate cases that may not meet the threshold for full PD, the 7-ICRT would be suitable. Conversely, if providers were willing to accept a greater number of false-positives and false-negatives in exchange for a screening tool specifically for PD, they may opt for the PSS-R. Both of these screening tools have the ability to improve upon the current low rates of PD detection in the ED and would help ED physicians decide a patient may benefit from follow-up with a primary care provider.

The Benefits and Challenges of Screening Tools

The rate at which ED physicians identify PD in individuals with NCCP is low. Current research estimates that greater than 90% of PD cases remain undiagnosed in patients who present to the ED with NCCP.[5,10,34] A screening tool would aid ED physicians in identifying patients who may be suffering from PD, allowing them to recommend follow-up with a primary care provider for long-term management. Ideally, this would result in functional and symptomatic improvement among the patients and decrease the number of return visits to the ED.

ED physicians see a high volume of patients and must do so in the most efficient manner possible. One of the main challenges associated with implementing a screening tool in the ED is the time constraints placed upon clinicians. To assess the feasibility of using a screening tool for

PD in the ED, Bokma et al. implemented the Hospital Anxiety and Depression Scale (HADS).[35] The main challenges identified by ED staff that prevented them from using the HADS was "not having enough time" and "prioritizing more important tasks in the ED".[35] Another barrier encountered was patient refusal; 15% of the patients in this study did not participate in screening. Of those who did participate, only 50% agreed to complete a more thorough evaluation via the Compositive International Diagnostic Interview (CIDI). The majority of patients who refused to complete the HADS did so because they "saw no value in psychiatric screening".[35] Interestingly, those who did not want to complete the CIDI stated that they would prefer to see their primary care provider to discuss the issue.[35] Beginning to utilize a screening tool for PD in the ED would not be without challenges. Although the screening tools discussed in the review would not dramatically increase the amount of time spent assessing a patient, clinicians may still feel resistant to spending an extra five minutes with a patient.

Brief Interventions for Panic Disorder

Once PD is detected, it is essential that a patient receives treatment to prevent poor outcomes for the patient and the healthcare system. Although ED physicians often refer individuals with PD to their primary care provider for treatment,[36] there is literature suggesting that brief interventions for PD in the ED can be beneficial.[37-40] A recent study compared two brief forms of CBT, a pharmacologic intervention and care as usual in patients with PD and NCCP in the context of an ED setting.[40] The CBT sessions were administered by psychologists and consisted of either seven 1-hour sessions or a single 2-hour session. The pharmacologic intervention used was paroxetine, which was initiated and managed by the ED physician over a period of six months. All three interventions were superior to care as usual in reducing the severity of PD. The authors concluded that ED physicians should consider some form of therapeutic intervention in

patients who present with NCCP due to PD.[40] Another possible solution for individuals with PD who present with NCCP is a CBT-based self-help intervention.[38] Preliminary evidence suggests that this form of intervention would be more widely accepted in the ED setting compared to clinician-administered CBT. However, further research would be required to determine if this form of intervention is beneficial to patients suffering from PD.[38]

LIMITATIONS AND FUTURE DIRECTIONS

This literature review has several limitations that must be addressed. This review is not comprehensive. Only two databases were used to locate relevant articles and other articles on this topic may exist. Furthermore, this review is limited by the inclusion criteria of articles from the past decade and articles published in English; therefore, older screening tools used to detect PD in the ED and articles published in other languages were not included. A further limitation is the global perspective of this review. As a result, the conclusions may not apply to the general Canadian population. Bias may also be present as article selection was completed by the primary author alone. Additionally, the four articles included in the review are from two primary authors; two studies published by Sung et al. and two by Foldes-Busque et al. This limits the variety of perspectives on this topic and could contribute to bias in this review. Lastly, due to the lack of information on this topic, the quality of the articles included in this review may not be of the highest caliber.

It is important to mention that PD screening tools are intended to be used in patients only after a negative cardiac workup, therefore serious or life-threatening conditions can be addressed in a timely fashion. Additionally, PD can occur in individuals with cardiac conditions. By screening for PD only in individuals with NCCP, it will exclude individuals with active cardiac conditions who may also have PD.

One area for future investigation may be to include one additional question to the 7-ICRT "Have you experienced an episode/event similar to this before?". This may help differentiate between someone who has PD or who has experienced an isolated panic attack. Another area for future research is to evaluate the PSS-R in other Canadian EDs where English is the primary language, as the PSS-R was developed in Quebec, a primarily French-speaking population, and was derived from the French versions of validated questionnaires.

CONCLUSION

PD is common among individuals presenting to the emergency department with non-cardiac chest pain; however, the large majority of individuals with PD leave the emergency department undiagnosed. Both the 7-ICRT and the PSS-R have the potential to be used in the ED to improve upon current low rates of PD detection by physicians.

It is important to recognize that there are challenges associated with the implementation of a PD screening tool in the ED. The time constraints placed upon clinicians in the ED and the need to prioritize high acuity patients would act as barriers to its implementation. Additionally, not all patients would be open to psychiatric screening.

By implementing a PD screening tool, more individuals with PD would be identified and could receive treatment. Several studies that have demonstrated the benefits of brief CBT interventions with as little as a single session. Additionally, pharmacologic treatments prescribed and managed by ED physicians have also been shown to be beneficial. Screening for PD should be the standard of care when a patient is identified as having NCCP, because identifying and treating PD has the potential to reduce functional impairments, improve quality of life and decrease return visits to the ED.

Appendix 1. Search Strategy

The following search strategy was used to identify relevant articles in the database PubMed:
("screen*"[Title/Abstract] OR "assess*"[Title/Abstract] OR "evaluat*"[Title/Abstract]) AND (("anxiety"[Title/Abstract] OR "anxiety"[MeSH Terms]) AND ("emergency service, hospital"[MeSH Terms] OR ("emergency department"[Title/Abstract] OR "emergency unit"[Title/Abstract] OR "emergency ward"[Title/Abstract] OR "emergency outpatient"[Title/Abstract]))) AND "chest pain"[All Fields]

The search strategy used in Psych Info to identify relevant articles is as follows:
1. emergency services/ or emergency management/ or emergency medicine.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh] (9783)
2. (emergency department or ER or emergency room*).ti,ab. (16023)
3. 1 or 2 (21390)
4. anxiety/ or anxiety sensitivity/ or health anxiety/ or performance anxiety/ or social anxiety/ or speech anxiety/ or exp anxiety disorders/ or anxiety management/ or generalized anxiety disorder/ or panic/ or panic attack/ or panic disorder/ or post-traumatic stress/ or exp stress/ (226893)
5. (anxiety or anxieties).ti,ab. (199387)
6. 4 or 5 (331577)
7. screening/ or exp health screening/ or exp screening tests/ or exp diagnosis/ or exp psychiatric evaluation/ or symptom checklists.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures, mesh] (245101)
8. (screen* or evaluat* or assess*).ti,ab. (1191257)
9. 7 or 8 (1335780)
10. (chest pain or heart attack or myocardial infraction or MI).ti,ab. (7352)
11. 3 and 6 and 9 and 10 (42)

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