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## Development and assessment of a community-based screening tool for mental health disorders among people who inject drugs

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### Abstract

**Introduction.**—The prevalence of mental health disorders among people who use drugs is high and well documented. This hard-to-reach population faces a very low awareness and access to mental health care, especially in developing countries. The objectives of this study were to design and assess a quick screening tool (QST) that community-based organisations (CBO) could

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Conflict of Interest

The authors have no conflicts of interest.

Supporting Information

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routinely apply to a Vietnamese population of people who inject drugs (PWID), in order to refer them appropriately to mental health specialists.

**Methods.**—We devised a tool that included nine questions covering anxiety, depression, suicide risk and psychotic symptomatology. Its use required no specific background and 2 h training. Specificity and sensitivity of the QST were assessed in a population of 418 PWID recruited via respondent driven sampling, using the Mini International Neuropsychiatric Interview questionnaire plus clinical evaluation as a reference standard. Acceptability was assessed using a self-administered anonymous questionnaire submitted to all CBO members who used the QST.

**Results.**—CBO members considered the QST easy to use, relevant and helpful to deal with mental health issues. Area under the curve for detection of any symptom using the QST was 0.770. The maximum sensitivity and specificity were reached with a cut-off of 2 [sensitivity was 71.1% (95% confidence interval 62.4, 78.8), specificity was 75.9% (70.5, 80.7)].

**Discussion and Conclusions.**—The QST appeared to be both efficient and well accepted. Given the burden of mental health problems among hard-to-reach PWID in developing countries, community-based screenings such as this one could be a particularly appropriate response.

### Keywords

community setting; mental health; people who inject drugs; screening test

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### Introduction

The prevalence of mental health disorders among people who use drugs is high and well documented [1–4]. The most common disorders are major depressive disorder, anxiety disorders and suicide risk [5–9]. Among people who inject drugs (PWID), the prevalence of depression is up to 50% [10,11], higher among women than men [1,12]. Suicide is also frequent [6,13–15], and people who use heroin are 14 times more likely to die by suicide than peers in the general population [16]. Overlap between suicide and overdose is evident and up to 50% of overdoses are associated with suicidal intent among patients treated for their addiction [17,18].

Methamphetamine use has become a major public health concern in different parts of the world [19,20] and is highly associated with several psychiatric manifestations [21–25]. The prevalence of psychosis among methamphetamine users is 11 times higher than in the general population [23], the most common psychotic symptoms being suspiciousness, unusual thought content, hallucinations and bizarre behaviour [26]. Within the context of polydrug use, recreational methamphetamine use is associated with a two to three times increase of psychotic symptoms [27] and there is a strong dose–response effect between number of days of methamphetamine use and these symptoms [24]. Methamphetamine use also is associated with an increased risk of suicide and depression [28–30].

Psychiatric comorbidities among PWID are associated with poorer health-related outcomes, particularly efficiency of anti-retroviral treatment for HIV infected patients, and lower quality of life [3,31–33]. People who use drugs and suffer from mental disorders are more likely to engage in high-risk sexual and drug injection-related behaviours [34–36], and

mental health service utilisation is associated with lower likelihood of sharing injection material [37].

The need for an adapted screening tool to identify mental health problems [3,36,38] as well as the necessity to improve the integration of mental health and substance use services and systems [7,39,40] have been already emphasised in different contexts. Considering the limited access to mental health care in many parts of the world, especially in key populations, it has frequently been suggested to develop innovative non-professional/community-based interventions to facilitate an access to care for all [41–43]. Some tools to screen for mental health among people who use drugs are already available. However, most of them, mainly diagnosis tools, are quite complicated, time-consuming, require intensive training, are poorly adapted to use by peers and not designed to the specific mental health concerns related to methamphetamine use [44–49]. Other tools are more adapted to a community screening context but have more often a limited focus, not taking into account depressive/psychotic symptoms and suicide risk together [50–53].

Drug use in Vietnam has clearly shifted from opium to heroin during the 1990s, and since the 2000s methamphetamine is becoming more and more popular [54,55]. Mental health disorders among Vietnamese PWID are frequent, represent a heavy burden and have negative consequences [56–59]. However, mental health services in the general population still have a lot of challenges to face such as lack of psychiatrists, lack of mental health legislation and insufficient preventive measures or mental health information to the public [56,60]. Most of the subjects suffering from psychiatric disorders are not aware of their mental health status and do not seek help, support and treatment.

The first objective of this study was to design a quick screening tool (QST) that community-based organisation (CBO) staff could routinely utilise with a Vietnamese population of PWID, in order to refer them appropriately to mental health specialists. The purpose of this test is not to replace a clinical diagnosis, but rather to detect PWID with any psychiatric manifestation significant enough to require referral for assessment and support.

The second objective was to assess the screening tool's performance (sensitivity/specificity) and its acceptability for CBO members/PWID.

## Methods

### Design

We conducted a cross-sectional survey among PWID in Hai Phong, which was part of the DRUG use and Infections in ViEtnam (DRIVE) research program [61].

### Recruitment and participants

Participants were recruited using a standard respondent driven sampling (RDS) strategy [62,63] with 20 initial 'seeds' who were each given three coupons to distribute to potentially eligible participants (details of the sampling strategy have been previously described [64]). The RDS eligibility criteria were: (i) age 18 or older; (ii) ability to provide informed consent; (iii) current injection drug use, verified by skin marks; and (iv) positive urine test

for opiates or methamphetamines (injected or smoked). After inclusion in the DRIVE study, a random selection of participants took place to conduct further psychiatric assessment via the Mini International Neuropsychiatric Interview (5.0.0) (MINI) questionnaire and the QST. Between October 2019 and January 2020, 1268 PWID were recruited in the RDS. Among them, 978 were randomly selected to undergo both QST screening and MINI interview with clinical evaluation but 560 (57%) were already enrolled in a previous RDS survey. Hence, data from 418 participants were analysed for this report.

### **Data collection on sociodemographic characteristics, drug/alcohol use and medical status**

Data were collected by trained interviewers using a face-to-face questionnaire on sociodemographic characteristics, drug and alcohol use, and blood samples for HIV and hepatitis C virus screening were taken. The variable ‘daily heroin use’ referred to a use at least once a day in the past month. ‘Regular methamphetamine use’ referred to use at least four times in the past month. Hazardous and binge drinking in the last 6 months were assessed using the Alcohol Use Disorders Identification Test questionnaire [65,66]. The variable ‘regular poly-substance use’ was defined as the number of substances regularly consumed among the following: alcohol (Alcohol Use Disorders Identification Test score of 3 or more for women and 4 for men, over the last 6 months), heroin (injected at least once a day in the past month) and methamphetamine (at least four times in the past month).

### **Development of the quick screening tool**

The QST final version included nine questions addressing the main mental health issues faced by PWID, that is, anxiety, depression, suicide risk and psychotic symptomatology:

- Four questions exploring anxiety and depression from the Patient Health Questionnaire (PHQ)—4, an ultra-brief self-report questionnaire about anxiety and depression validated in large population samples and recommended in settings with limited resources [67,68]; score for each question ranged from 0 (not at all) to 3 (nearly every day);
- Two questions reflecting suicide risk: past history of suicide attempt and current suicidal ideation, scored 0 (no) or 2 (yes);
- Three questions on psychotic symptoms, extracted and adapted from the MINI and exploring persecutory ideas, auditory hallucinations and mind reading [69], common psychotic symptoms reported by the PWID screened positive for a psychotic syndrome during a previous MINI administration and scored 0 (absent) or 2 (present).

Modules for anxiety disorders diagnosis were not included because the objective was to focus on disorders requiring immediate intervention. In addition, this would have greatly prolonged the interview (six modules). An earlier longer version of questionnaire included two more questions on psychotic symptoms extracted from the MINI (reference ideas and voice commenting). During a pilot assessment, it appeared that these two questions were difficult to administer, often misunderstood and generated further questions and explanations. Moreover, removing these two questions did not change the ability of the questionnaire to detect the PWID diagnosed with a psychotic episode through the MINI.

Hence, the final version of the QST included only nine questions after removal of the two questions on reference ideas and voice commenting. In this final version, QST score ranged from zero to 22. The QST was administered by peers (CBO staff, who had histories of drug use) after a short in-person group training (2 h) conducted by a psychiatrist.

### **Assessment (validity) of the quick screening tool**

The QST was compared to a reference standard consisting of a systematic MINI (5.0.0) questionnaire completed with a systematic clinical evaluation. Since the objective of the QST is to detect participants with any significant psychiatric manifestation, an overall positive QST score was compared to being clinically diagnosed with suicide risk or at least one of these two disorders: current major depressive disorder or current psychotic disorder. The MINI has been validated in many contexts and populations [69–80]. Its Vietnamese version was already validated during a previous phase of this project [81]. The purpose of the QST is not to differentiate between the disorders mentioned above, but to identify individuals who require a psychiatric intervention (thorough psychiatric assessment and psychiatric care if necessary). As a result, its validity was systematically assessed by pooling all items, with no intent to break them into three subscales (current major depressive disorder, current psychotic disorder and suicide risk).

After informed consent, participants were first administered the screening tool by trained CBO members. Then, during a second session, a trained psychiatrist from the mental health department of the Haiphong's University Hospital who was blinded for the QST results administered the MINI and performed a clinical evaluation, all in the same second session. The whole visit took place in the CBO offices. This clinical evaluation was implemented in the DRIVE study to serve several objectives: (i) identify the most severe cases to engage in care; (ii) confirm the MINI diagnosis and complete it if necessary; and (iii) establish the chronology between psychotic symptoms and methamphetamine use.

The other aim of this tool is to serve as a prevention and awareness tool. Acceptability and usefulness of the QST was assessed using a short self-administered anonymous questionnaire submitted to all CBO members who used the QST in the DRIVE project. This questionnaire included questions on relevance of the QST, usefulness in everyday practice, ease of use, discomfort with the screening questions and duration of completion. A complete version of this questionnaire can be found in Appendix S2.

### **Data analysis**

Participants of RDS survey 4 who met the eligibility criteria but had already been enrolled in previous RDS surveys of the DRIVE project were excluded from our analyses, leaving only PWID who had not experienced any kind of intervention related to the DRIVE project. A sensitivity analysis with a larger sample size was conducted after excluding only the participants who underwent a structured intervention (CBO case management, assistance to access methadone and/or HIV care, administrative documents, etc.) through their inclusion in a DRIVE cohort, leaving only naïve participants and those with no follow up between the previous RDS surveys of the DRIVE project they were enrolled in. First, we described the participant characteristics of the whole sample, then we conducted a receiver operating

characteristic (ROC) curve analysis to determine the QST performance score across the different cut-off points and estimated the area under the curve (AUC). The reference standard used for the ROC analysis was the MINI completed with the clinical evaluation. The exact conservative Clopper Pearson (1934) method was used to compute intervals for the sensitivity and specificity. These analyses were performed with R software version 4.0.2 (R Core Team, 2020). The threshold for statistical significance was set at  $P < 0.05$ .

The study was approved by the Hai Phong University of Medicine and Pharmacy, Icahn School of Medicine at Mount Sinai and New York University Institutional Review Boards.

## Results

Sociodemographic characteristics of our sample are presented in Table 1. Mean (SD) age in the sample was 40.3 years (8.7), 397 (95%) were male.

All participants injected heroin and were screened positive for heroin in urine; 31.6% reported being treated with methadone at the time of the survey. Methamphetamine use in the last month was reported by 44% of the participants (22.7% of them declared regular methamphetamine use). Altogether, 128 participants (30.6%) presented at least one of the following three psychiatric disorders according to the psychiatrist clinical evaluation: a major depressive disorder (88 subjects, 21.1% of the sample), a current psychotic disorder (73 subjects, 17.5%) and a suicide risk (33 subjects, 7.9%). Very small discrepancies were observed between the diagnoses based on the MINI alone and those based on the combination of MINI with psychiatrist clinical evaluation: 1.2% for major depressive disorder, 2.3% for psychotic disorder and 4.3% for suicide risk.

Distribution of the QST score in our sample is showed in Figure 1. A score of zero was observed for 232 subjects (55.5% of our sample) and interquartile ratio (Q1–Q3) was 3 (0–3). Only 0.7% of the participants provided the response ‘don’t know/no answer’ for the questions regarding psychotic symptoms and past suicide attempts. Regarding the performance of the QST, the AUC was 0.770 (see Figure 2 for ROC curve and Table 2 for details regarding cut-offs). Optimal sensitivity and specificity were reached with a positivity threshold set to 2 [sensitivity was 71.1% (95% confidence interval [CI] 62.4, 78.8), specificity was 75.9% (CI 70.5, 80.7)]. Assuming a true prevalence rate of 30.6% for psychiatric disorder, the positive predictive value was 56.5% (CI 50.7, 62.1) and negative predictive value was 85.6% (CI 81.8, 88.7) (the impact of prevalence rate on predictive values is shown in Figure 3). Among the 37 false negative QST participants, 24 were clinically diagnosed with depression, 16 with a psychotic syndrome and seven with a suicide risk (some participants had multiple disorders).

### Sensitivity analyses

A sensitivity analysis was conducted among the 622 participants who had participated in one or several RDS surveys but did not report any follow up or treatment. The QST showed similar performance to those found in the main analysis. The QST AUC was 0.785. Sensitivity was 69.7% (CI 62.1, 76.6), specificity was 81.1% (CI 77.3, 84.7). Assuming a true prevalence rate of 30.6% for psychiatric disorder, the positive predictive value was



62.0% (CI 56.8, 66.9) and negative predictive value was 85.8% (CI 82.8, 88.5) (78.1% of the participants were correctly classified).

### Acceptability of the questionnaire

Among the 12 CBO members who submitted the QST during RDS4, 10 of them responded to the short questionnaire assessing acceptability and usefulness of QST from the professional point of view. Each CBO member had previous work experience with PWID and administered the QST to at least 200 people in this study, over 1 year. All members declared this tool was helpful in addressing mental health problems among PWID. The QST was considered very easy to use (mean score for ease of use was 8 on a scale of 1 to 10) and usual duration of completion was 5 to 10 min. All members rated the relevance of QST in their everyday work with a score ranging from 5 to 10 (mean score was 6.6, on a scale of 1 to 10) which indicate a good relevance of the test in their practice (see Supporting Information for a complete version of the questionnaire).

### Discussion

The QST used in our survey to screen for mental health disorders in the community shows acceptable performance (sensitivity, specificity), is of short duration (5–10 min) and appears adapted to the substance-induced disorders met by PWID, including stimulants. CBO members considered it as an easy to use, relevant and helpful tool to introduce mental health. It requires no specific background and a very short training. To our knowledge, it is the first tool specifically designed to be used in the community by non-professionals/peers to help identify and refer people who use drugs, to mental health services. Considering the urgent need to develop community-based interventions to facilitate appropriate psychiatric referral and mental health care for people who use drugs [39–42], this tool appears valuable. Indeed, CBOs seem to be the most, if not the only ones, able to reach this hard-to-reach population and offer prevention intervention, similar to what has been done for HIV [61]. Furthermore, patients likely to go undetected through the QST would logically be those with the least severe symptoms, which is consistent with our objective to identify the most vulnerable patients, who require urgent care.

A crucial point is the acceptability of the tool by peers and the PWID themselves. Drug-related stigma represents a barrier for access to care and harm reduction services in Vietnam [82,83]. Stigma associated with psychiatric disorders and their treatment is particularly high in countries such as Vietnam where the psychiatric resources are limited [84–86]. Psychiatrists are overwhelmed with the most severe cases admitted in the hospitals and after discharge, can only propose a limited follow up or even no follow up, particularly if the patients are coming from surrounding provinces [85]. Implementing alternative interventions, including prevention, information, early detection of psychiatric disorders and follow up of patients recently discharged from the hospital, is crucial [87,88]. Considering the burden associated with drug use, HIV status and psychiatric comorbidities, the support of peer networks, usually very well organised in the countries where the official health-care system is not sufficient, is pivotal [89]. The CBO members were initially reluctant to be involved in the assessment and care of peers for mental health aspects despite a long



experience of harm reduction interventions with them. It was not the case anymore for most of them after brief training and regular practice of the QST and CBO members felt much more comfortable in introducing mental health concerns with PWID. Regular contact and feedback from the psychiatrists accepting to work in the CBO offices played a major role. Evaluation of the cost-effectiveness of the intervention, taking into account salary fees for CBO members is necessary to highlight the benefit of this alternative and innovative intervention [90–92].

The QST includes questions for depression (from PHQ-2 questionnaire), for anxiety (from Generalised Anxiety Disorder two-item questionnaire), questions related to suicide and three questions on psychotic experience. This tool aims to properly screen for psychiatric disorders requiring referral to a psychiatrist and avoid, as much as possible, unnecessary referral in a context of sparse psychiatric resources. A cut-off set to 2 was used to reach optimal specificity and sensitivity without privileging one over the other. We could expect higher sensitivity but screening for mental health with a tool used by non-professionals with less than 10 questions is a challenge. This sensitivity is probably increased due to the fact that the three questions on psychotic symptoms are extracted from the MINI but it is not a major concern if we consider that the objective is simply to detect PWID needing mental health support and not provide a precise diagnostic. On the other hand, compared with the three modules of the MINI, the QST also includes two questions validated to screen for anxiety disorders (Generalised Anxiety Disorder two-item, included in the PHQ-4) in primary care which probably improve the sensitivity of the tool to detect for any mental health disorder. Considering the poor predictive performances of the tools available to assess suicide risk, [93] the two questions of the QST on suicide risk reflects probably more the intensity of the psychological distress of the participants than the imminence of a suicide. Overall, the sensitivity seems acceptable regarding the complexity of the task but performance should also be evaluated with other tools such as the Brief Psychiatric Rating Scale (BPRS) which assess the global psychopathology or the General Health Questionnaire [94]. It should be noted that assessment of psychotic symptoms differs notably between the MINI and the BPRS and a comparison with the BPRS could provide a useful validation of the QST. Predictive values of this tool have been computed using a theoretical prevalence of psychiatric disorder and suicide risk similar to the prevalence in our sample (i.e. 30.6%). However, the prevalence of psychiatric disorders was lower in our population sample than in many other studies conducted among PWID [95,96], and nearly one-third of our subjects had already been treated with methadone, which is associated with lower depression rates [97]. Considering only moderate to severe depression, a recent meta-analysis focusing on PWID showed a pooled prevalence of 59.7% [95]. Similarly, a recent survey conducted among young people who used drugs in Vietnam showed that criteria for moderate to severe depression were found in 50% of the subjects [98]. These data therefore suggest that the proportion of people who need to be referred to a psychiatrist would be higher in the target population and positive predictive value will be greater. For instance, the positive and negative predictive values would be 74.7% and 72.4%, respectively, when the prevalence of any disorder is 50% (as shown in Figure 3).

Some limitations need to be discussed. First, and as discussed earlier, psychotic symptoms were screened using questions extracted from the MINI questionnaire, also used as the

‘reference-standard’ together with the clinical evaluation, which could bias the calculation of the sensitivity level. However, our objective is to propose a global screening tool rather than a diagnosis tool, therefore we believe it is not a major concern. In addition, assessment of a psychotic disorder via the MINI questionnaire involves a subjective appraisal of ‘bizarre’ answers by the interviewer, reflecting the inappropriateness of the perception, contrary to the QST. Furthermore, the psychiatrists were asked to confirm the MINI diagnosis according to their clinical evaluation. Hence, we felt that using the MINI questionnaire plus clinical evaluation as a reference standard is still relevant. A second limitation is related to the homogeneity of the population sample in our study, all heroin injectors and recruited in close networks through RDS. The validation of the QST should also be proposed in other population with different profiles of drug use, location, age. The systematic positive classification of a subject with a history of suicide attempt was decided to reach maximum sensitivity, based on the fact that past suicide attempt has been shown to be one of the more reliable predictive factor of a future suicide attempt, more than suicidal ideations [99]. Finally, the acceptability of the QST was assessed by CBO members who were also involved in its development, meaning that, even though answer were anonymous et constructive criticism was welcomed, this assessment might lack external validity.

## Conclusions

Our findings suggest that the QST is a relevant and acceptable tool to screen for major psychiatric disorders among PWID in a community setting. Given the burden of mental health problems among hard-to-reach people who use drugs in developing countries with sparse psychiatric services, the QST tool represent a first step to identify those needing care. The next challenge is the organisation of an acceptable referral and provision of psychiatric care for this marginalised population.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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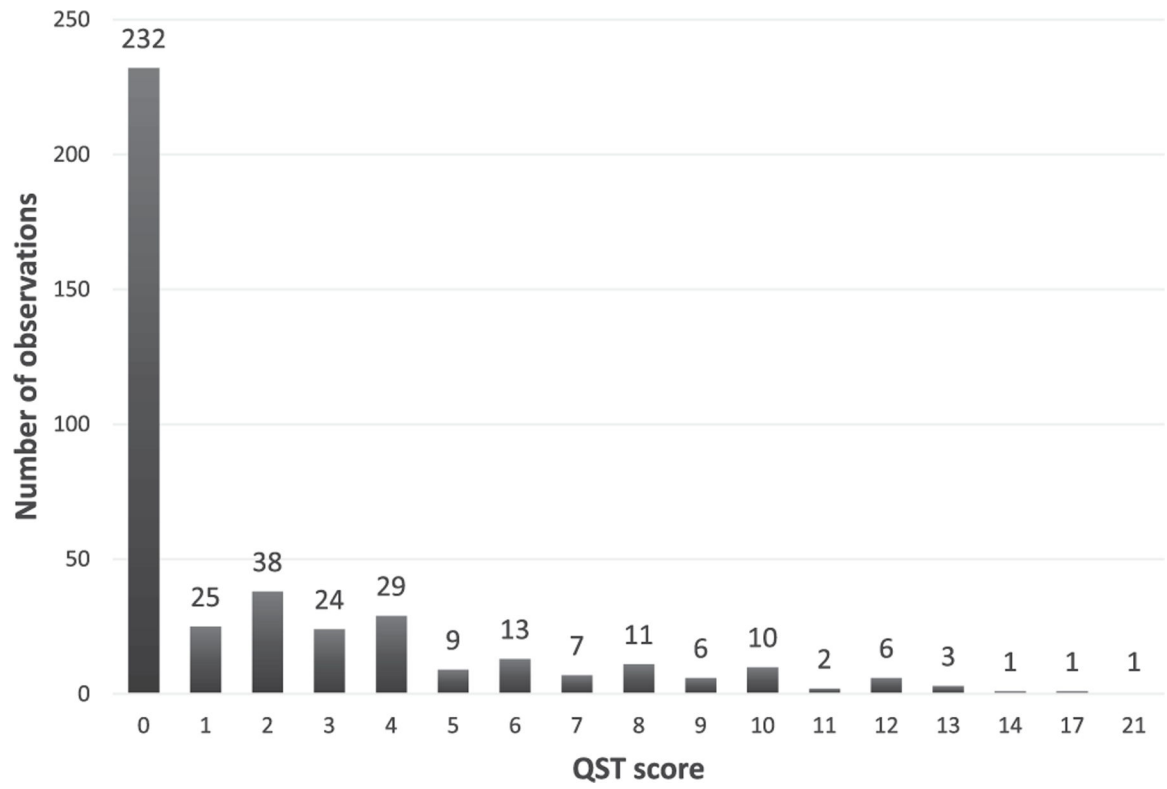
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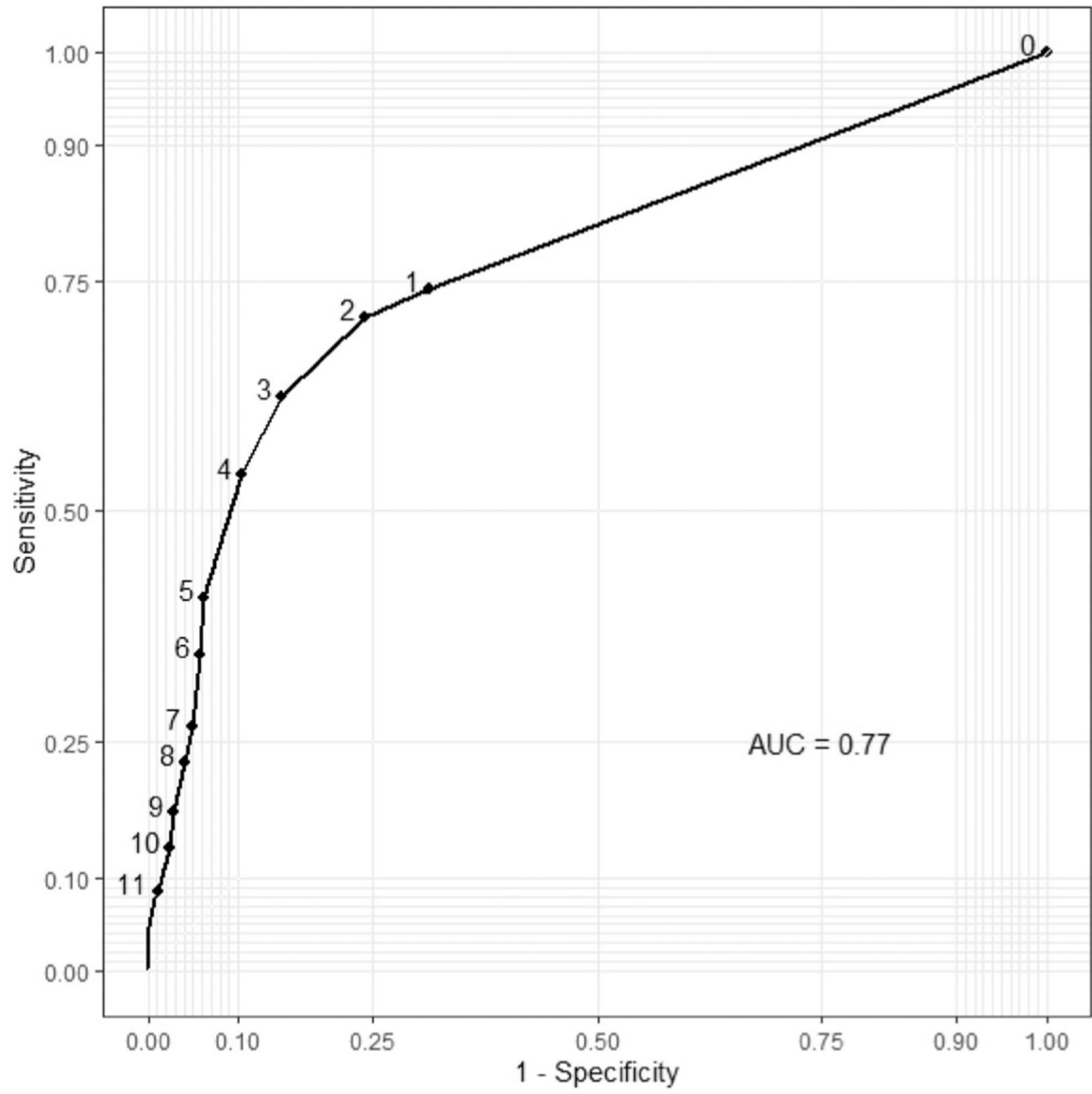
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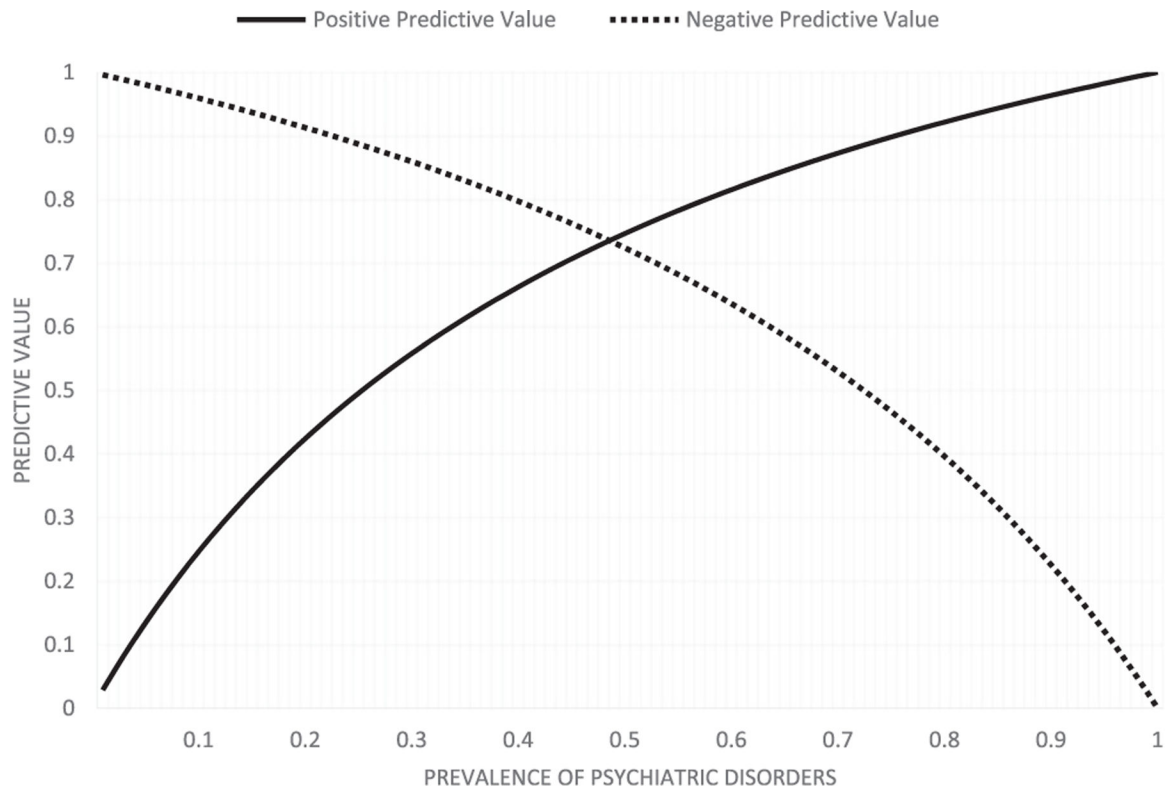




**Figure 1.** Distribution of the quick screening tool score in the study population (n = 418).



**Figure 2.** Receiver operating characteristic curve for the quick screening tool (score ranging from 0 to 22, n = 418). AUC, area under the curve.



**Figure 3.** Predictive values of the quick screening tool according to the prevalence of psychiatric disorders in the target population (major depressive episode, psychotic disorder or suicide risk) (n = 418).

**Table 1.**

Participants characteristics (n = 418)

| Characteristic   |              |
|--|--------------|
| Age, mean (SD)   | 40.26 (8.69) |
| Sex, = male (%)  | 397 (95.0)   |
| Living in a couple (%)   | 168 (40.2)   |
| Having ID card (%)   | 313 (74.9)   |
| Having a health insurance (%)  | 169 (40.4)   |
| Having a sexual partner in the last 6 months (%)                             | 253 (60.5)   |
| Current major depressive episode (%)   | 88 (21.1)    |
| Current suicide risk (%)   | 33 (7.9)     |
| Ever made a suicide attempt in lifetime (%)                                  | 26 (6.2)     |
| Current psychotic disorder (%)   | 73 (17.5)    |
| One disorder or more <sup>a</sup> (%)  | 128 (30.6)   |
| Positive result QST (score $\geq 2$ ) (%)                                    | 161 (38.5)   |
| <i>Regular polysubstance use<sup>b</sup> (%)</i>                             |              |
| 0  | 66 (15.8)    |
| 1  | 233 (55.7)   |
| 2  | 102 (24.4)   |
| 3  | 17 (4.1)     |
| Ice use in the last 30 days (%)  | 184 (44.0)   |
| Regular ice use ( $\geq 4$ times during last 30 days) (%)                    | 95 (22.7)    |
| Positive urine test for ice (%)  | 163 (39.0)   |
| Heroin use every day (%)   | 282 (67.5)   |
| Currently receiving methadone maintenance treatment (%)                      | 132 (31.6)   |
| <i>Duration heroin use (%)</i>   |              |
| Less than 5 years  | 67 (16.0)    |
| 5 to 10 years  | 119 (28.5)   |
| 10 to 15 years   | 99 (23.7)    |
| 15 years or more   | 133 (31.8)   |
| Cannabis use (%)   | 49 (11.7)    |
| Ketamine use (%)   | 26 (6.2)     |
| Street methadone use (%)   | 112 (26.8)   |
| Hazardous drinking (AUDIT-C score $\geq 3$ in women and $\geq 4$ in men) (%) | 111 (26.6)   |
| Positive HIV serostatus (%)  | 71 (17.0)    |

<sup>a</sup>One disorder or more among the following: major depressive episode, psychotic disorder, suicide risk.

<sup>b</sup>Among heroin, methamphetamine and alcohol.

AUDIT-C, Alcohol Use Disorders Identification Test; QST, quick screening tool.

**Table 2.**

First five quick screening tool score cut-offs and corresponding sensitivity and specificity (n = 418)

| Cut-off | Sensitivity | Specificity |
|---------|-------------|-------------|
| 5       | 0.406       | 0.938       |
| 4       | 0.539       | 0.897       |
| 3       | 0.625       | 0.852       |
| 2       | 0.711       | 0.759       |
| 1       | 0.742       | 0.686       |

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