CHAPTER 2

Identification of the Population

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A common goal, in both general and psychological medicine, is to identify individuals ‘at risk’ of a particular disorder and to intervene in those ‘at risk’ to prevent the disorder from becoming manifest. For example, methods are being tested for detecting people at risk of diabetes with the aim of detecting and intervening early in the course of the disease (Barker et al., 2004), and for detecting individuals at high risk of breast cancer with the aim of providing some prophylactic treatment to prevent onset (Bouchard et al., 2004; Metcalfe, 2004; Prichard, Hill, Dijkstra, McDermott & O’Higgins, 2003). One strategy used in early detection within general medicine is genetic testing. With this technology, ‘at risk’ status can be diagnosed before any symptoms of disorder are present. This is possible even in utero or before implantation in the case of in vitro fertilisation. These techniques are possible for a range of diseases including achondroplasia, Huntington’s disease and Duchenne’s muscular dystrophy.

But what of identifying individuals ‘at risk’ of psychotic disorders such as schizophrenia? There are no genetic tests for these disorders, nor even any aetiological diagnostic investigations. How can ‘at risk’ status for psychotic disorders be recognised? What are the implications of such ‘at risk diagnoses’ for treatment and prevention of disorder? A number of attempts have been made to define certain groups as ‘at risk’ either of schizophrenia or to psychotic disorders more generally. Different strategies have been used each with different meanings of ‘at risk’, including different implications for intervention. These will be briefly summarised, followed by a detailed discussion of our own approach.

FAMILY HISTORY APPROACHES

The traditional approach to identifying individuals at risk of schizophrenia is to study family members of patients with the disorder (Asarnow, 1988; Cornblatt & Obuchowski, 1997). Thus a group with presumably an increased genetic risk is identified, and then additional risk factors, which make the transition to a frank psychotic disorder more likely, can be examined. This is known as the ‘high risk’ approach. Assessments usually begin when subjects are children, with follow-up continuing over many years. The aim is to detect the
development of psychotic disorder at some stage in the person’s life span. Researchers using the high risk family history approach acknowledge that the transition rate to a psychotic disorder is not likely to be large and results may not be generalisable beyond the genetically defined high risk group (Asarnow, 1988; Cornblatt & Obuchowski, 1997). Furthermore, intervention in these ‘at risk’ individuals is not practical or at least not ethical, as the degree of risk is low and the timing of onset of psychotic disorder not known. Indeed, these genetic high risk studies have never claimed early intervention as a goal, focusing instead on investigating causal pathways into schizophrenia and other psychotic illnesses.

Mednick, Parnas, Schulsinger and Mednick (1987) modified the genetic high risk strategy by focusing on adolescent offspring who were entering the peak age of risk (i.e. by adding age as a risk factor). This approach made the high risk paradigm more practical. However, the number developing a psychotic disorder from this cohort is still not expected to be large, and the number of false positives is too high to make any intervention practical.

Similarly, the Edinburgh high risk project (Hodges, Byrne, Grant & Johnstone, 1999; Johnstone et al., 2000; Miller, Byrne, Hodges, Lawrie & Johnstone, 2002) studies individuals with presumed high genetic liability for schizophrenia, including both first and second degree relatives of schizophrenia probands. Like the Mednick approach, this study also recruits young adults (aged 16–25) who will pass through the period of maximum risk of developing schizophrenia during the planned 10 years of the study. Recently reported data revealed that 13 out of 162 subjects (approximately 8%) have developed schizophrenia to date, six years after study commencement (Johnstone, Cosway & Lawrie, 2002). Although this rate of onset of schizophrenia is well above expected community rates, recruitment of large numbers is needed in order to clarify other risk factors for the development of schizophrenia, and to eventually identify a group for whom preventive treatment is justified.

**PSYCHOPATHOLOGICAL (SYMPTOMATIC) APPROACHES**

An alternative to the genetic high risk approach is to focus on individuals who report symptoms that are known to occur prior to the onset of a psychotic disorder; that is, symptoms found in psychotic prodromes. This is in contrast to the genetic high risk strategies which study asymptomatic individuals. There are different ways of approaching the recruitment of possibly prodromal individuals, but a first step in all approaches is to identify prodromal features of the psychotic disorders such as schizophrenia.

**Characterising the Prodrome**

The most common method for investigating prodromal features is the examination of a case series of patients with established psychotic disorders. Thus, a retrospective description of the symptoms and signs which led up to the defining first psychotic episode is gained. A particularly sound example of such research is that done by Häfner’s group in Germany (Häfner, Maurer, Loffler & Riecher, 1993; Häfner et al., 1998). Data on prodromal features were collected using a standardised structured instrument, the Interview for the Retrospective Assessment of the Onset of Schizophrenia (IRAOS) (Häfner et al., 1992). Several other researchers have also studied psychotic prodromes by retrospective case series. Much of this literature is summarised in the review paper by Yung and McGorry (1996b).
Another German group, led by Huber, also used retrospective descriptions to characterise psychotic prodromes, but approached this from a different theoretical perspective. Its emphasis has been on the importance of ‘basic symptoms’ as precursors to the onset of the psychotic phase of schizophrenia (Gross, 1989; Huber & Gross, 1989; Klosterkötter, Ebel, Schultze-Lutter & Steinnmeyer, 1996). Basic symptoms are subjectively experienced abnormalities in the realms of cognition, attention, perception and movement. They have also been described as ‘self-experienced neuropsychological deficits’ (Klosterkötter, Schultze-Lutter, Gross, Huber & Steinnmeyer, 1997b). The development of the Bonn Scale for Assessment of Basic Symptoms (BSABS) (Klosterkötter et al., 1997a) and, more recently, the Schizophrenia Prediction Instrument – Adult Version (SPI-A) (Schultze-Lutter et al., 2004) has enabled the assessment of these symptoms to be operationalised.

Aside from retrospective descriptions, a different approach is to prospectively follow up patients with already diagnosed schizophrenia and examine the prodromal features leading up to a psychotic relapse. Thus the relapse prodrome rather than the initial prodrome is the subject of investigation in these studies. In some studies of relapse prodrome, antipsychotic medication is ceased in order to observe emerging psychosis (Donlon & Blacker, 1973) and others follow a more naturalistic design (Birchwood et al., 1989; Heinrichs & Carpenter, 1985; Subotnik & Nuechterlein, 1988). Besides any ethical issues, the problem with this method is that it has not been established exactly how the signs and symptoms of a relapse prodrome in schizophrenia relate to the prodromal features of a first psychotic episode. Some symptoms may be modified by such factors as medication, the fear of relapse and hospitalisation, and the family’s changing perception of the patient (Yung & McGorry, 1996b). In fact, in one study of relapse prodrome, concern about the possibility of relapse is mentioned as an early symptom by patients who were taken off maintenance medication and were being observed (Donlon & Blacker, 1973).

Through a review of the literature of both the retrospective case series and the prospective studies of relapse prodromes (Yung & McGorry, 1996b) and a case series of consecutive referrals of patients with a first episode of psychosis (Yung & McGorry, 1996a), our group theorised that features of psychotic prodromes could be divided into eight main sub-types: (1) Neurotic symptoms, (2) Mood-related symptoms, (3) Changes in volition, (4) Cognitive changes, (5) Physical symptoms, (6) Other symptoms, (7) Behavioural changes and (8) attenuated (sub-threshold) psychotic symptoms or isolated psychotic symptoms. Typical features of each category are shown in Table 2.1.

This last category, attenuated or isolated psychotic symptoms, refers to psychotic-like experiences which differ from frank psychotic symptoms in their intensity, frequency and/or duration. An example is a persecutory idea that is held with less than delusional conviction. This has less intensity than a fully formed persecutory delusion. In contrast, if an individual fleetingly holds a persecutory belief with delusional conviction but for only one hour, this is distinguished from a threshold psychotic symptom on the basis of duration: the abnormal experience has not been present for long enough. Similarly, if someone had a hallucination only twice in a month, these may be considered to be isolated psychotic experiences, and therefore below the threshold for full-blown psychosis on the basis of frequency: they are not happening often enough.

Of course, not all symptoms will be found in all individuals or even at any one point in time in a particular individual. There is a great deal of variability between individuals and across time in the one person. In fact, the process of development of a psychotic episode has been described as a ‘moment to moment march of psychological changes’ (Docherty, Van...
Table 2.1  Prodromal features of schizophrenia – modified from Yung et al., 2004a. Treating Schizophrenia in the Prodromal Phase – London: Taylor and Francis

| (1) Neurotic symptoms | Anxiety  
|                       | Restlessness  
|                       | Anger, irritability |
| (2) Mood-related symptoms | Depression  
|                       | Anhedonia  
|                       | Guilt  
|                       | Suicidal ideas  
|                       | Mood swings |
| (3) Changes in volition | Apathy, loss of drive  
|                       | Boredom, loss of interest  
|                       | Fatigue, reduced energy |
| (4) Cognitive changes | Disturbance of attention and concentration  
|                       | Preoccupation, daydreaming  
|                       | Thought blocking  
|                       | Reduced abstraction |
| (5) Physical symptoms | Somatic complaints  
|                       | Loss of weight  
|                       | Poor appetite  
|                       | Sleep disturbance  
|                       | Suspiciousness  
|                       | Change in sense of self, others or the world |
| (6) Other symptoms | Obsessive compulsive phenomena |
|                      | Dissociative phenomena |
|                      | Increased interpersonal sensitivity |
| (7) Behavioural changes | Deterioration in role functioning  
|                       | Social withdrawal  
|                       | Impulsivity  
|                       | Odd behaviour  
|                       | Aggressive, disruptive behaviour |
| (8) Attenuated or sub-threshold versions of psychotic symptoms | Perceptual abnormalities |

Kammen, Siris & Marder, 1978, p. 420). Typically, non-specific ‘neurotic’ type symptoms seem to be followed by symptoms which are attenuated or sub-threshold forms of full-blown psychotic symptoms just prior to the development of the frank psychotic disorder (Yung & McGorry, 1996b). Because of the degree of variability between patients, it is useful to try to discern some commonly occurring prodromal features which seem to occur in most individuals. These are shown in Table 2.2.

**Identifying the ‘Prodrome’ Prospectively**

Having characterised the prodrome of a first psychotic episode, the next challenge is to identify psychotic prodromes prospectively, thus enabling intervention and research into
this important phase. Just knowing which symptoms typically occur in a psychotic prodrome does not provide any information about the degree of risk conferred by particular prodromal features or syndromes. As can be seen in Table 2.2, the most frequently occurring prodromal features are non-specific and could be the result of a number of conditions, such as major depression, substance abuse, and physical illness, as well as a psychotic prodrome or even a frank psychotic disorder itself. Even attenuated or isolated psychotic symptoms may not necessarily progress to a frank psychotic disorder. It is becoming increasingly clear from large scale population studies that attenuated and frank psychotic symptoms are quite common in the community. For example, van Os, Hanssen, Bijl and Vollebergh (2001) found a lifetime prevalence of 17.5% for ‘psychotic experiences’ in the general population (n = 7076). The majority reporting such symptoms were not distressed by them and did not seek help. Similar rates of psychotic-like experiences have been found in other epidemiological studies (Eaton, Romanoski, Anthony & Nestadt, 1991; Tien, 1991).

This problem of lack of specificity and its implications for using prodromal features as indicators of risk for onset of psychotic disorder is an important one. Focusing on individuals with apparently prodromal symptoms and signs and identifying them as those likely to develop a psychotic disorder will lead to the problem of a large number of false positives: most people with these features would not make the transition to a full-blown psychotic disorder. Thus, the syndrome which seems like, or could be, a prodrome should be thought of, not as a disease entity, but as a state risk factor for a full-blown psychotic disorder. That is, the presence of the syndrome implies that the affected person is at that time more likely to develop psychosis in the near future than someone without the syndrome. Instead of being labelled as ‘prodromal’ the person should be thought of as having an ‘at risk mental state’ (Yung et al., 2003). This terminology highlights the risk factor approach, suggesting that the syndrome is a risk factor for incipient onset of full-blown psychosis in the near future (Yung, Phillips, Yuen & McGorry, 2004b; Yung et al., 1998a, 1998b, 2003). The term ‘near future’, of course, needs clarification. Research on the duration of prodromes in psychotic disorders suggests that this time period could be thought of as about two years (Loebel et al., 1992), although this needs investigation, and would depend on the course of the apparently ‘prodromal’ syndrome, or at risk mental state, over this time.

Three broad methods have used the symptomatic approach to identify at risk individuals: the ‘psychosis proneness’ method of Chapman and Chapman et al. (Allen, Chapman,

Psychosis Proneness

Chapman and Chapman and colleagues (Allen et al., 1987; Chapman & Chapman, 1987; Chapman et al., 1994) attempted to identify individuals at risk of psychosis, or what they called ‘hypothetically psychosis-prone’, by focusing on attenuated and isolated psychotic symptoms. They hypothesised that these symptoms confer a predisposition or diathesis to psychotic disorder. In addition to these ‘positive’ psychotic phenomena, they also theorised that people who displayed physical and social anhedonia and impulsive non-conformity were also at risk. They developed questionnaires to measure these psychopathological symptoms (Chapman & Chapman, 1980; Chapman, Edell & Chapman, 1980).

Chapman and Chapman et al. (Allen et al., 1987; Chapman & Chapman, 1987; Chapman et al., 1994) also noted the need to focus on people at or near the age of greatest risk for schizophrenia, that is late adolescence and early adulthood, so they studied college students. One sample of college students with high levels of self-reported ‘psychotic-like’ symptoms were followed longitudinally over time and compared with a group of controls. At 10- to 15-year follow-up, students who scored highly on scales of perceptual abnormalities and magical thinking were more likely to have developed a psychotic disorder than comparison subjects. Social anhedonia, physical anhedonia and impulsive non-conformity were not predictive of psychotic disorder at follow-up, although high scores on the Social Anhedonia scale correlated with high levels of psychotic-like experiences at follow-up. However, the actual numbers of students who developed a psychotic disorder after 10- to 15-year follow-up was low: 11 out of 375, or 2.9%. This was not significantly higher than in the control group (2 out of 159, or 1.3%). However, there was a trend for those in the group with high scores on the Perceptual Aberration and Magical Ideation scales to differ significantly from controls, with 10 subjects out of 193 making the transition (5.2%) (p = 0.06) (Chapman et al., 1994). That is, those students with sub-threshold forms of delusions and hallucinations seemed to be more at risk of subsequent full-blown psychotic disorder than those without these symptoms.

However, many students with high levels of magical ideation and perceptual abnormalities did not develop a psychotic disorder. This finding is perhaps to be expected, given the seemingly large number of people in the general population who report psychotic-like experiences, as noted previously (van Os et al., 2001). The implications are similar for a longitudinal epidemiological study from New Zealand (Poulton et al., 2000). This study found that children at age 11 with psychotic-like experiences had an increased risk of schizophreniform disorder at age 26 compared to children who did not have such experiences. However, most of the children with psychotic-like experiences did not develop a psychotic disorder.

To date, because of the low numbers developing a psychotic disorder, the high number of false positives and the long time frame of the follow-up, the psychosis-proneness research has not been able to be used as the basis for any preventive intervention.
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Table 2.3  High risk criteria based on basic symptoms

At least two out of nine of the following basic symptoms:
Inability to divide attention
Thought interference
Thought pressure
Thought blockages
Disturbance of receptive speech
Disturbance of expressive speech
Disturbances of abstract thinking (‘concretism’)
Unstable ideas of reference (‘subject-centrism’)
Captivation of attention by details of the visual field


Basic Symptoms as Predictors

A study by the Bonn group in Germany examined the predictive capacity of the basic symptoms in a cohort of non-psychotic patients attending a tertiary referral psychiatric setting. Presenting diagnoses were mainly mood, anxiety, somatoform and personality disorders (Klosterkötter et al., 1997b, 2001). Thus this research represents a major shift in focus from the work by Chapman and Chapman as the population studied is a clinical one. Subjects were followed up on average eight years after initial assessment, and over this period over 50% of them had developed schizophrenia. Certain basic symptoms – disturbances of receptive speech, blocking of thoughts, visual perceptual disturbances, olfactory, gustatory and other sensory disturbances – were found significantly more often in the group which developed schizophrenia compared to the group which did not, suggesting that these symptoms may be predictors of schizophrenia.

This study used an enriched sample of tertiary referred patients, most of whom had high levels of basic symptoms. The study’s authors regarded them as being ‘susceptible to schizophrenia’ on the basis of their psychopathology. Thus it is difficult to translate the findings from this study cohort to the wider population. This is particularly so since there are no studies reporting the prevalence and stability of basic symptoms in non-psychotic psychiatric disorders.

From this study, the authors developed a check-list of nine symptoms suggestive of a schizophrenia prodrome (see Table 2.3), as measured by the BSABS (Klosterkötter et al., 1997a). High risk criteria were then developed requiring the presence of at least two of these symptoms. The predictive validity of these criteria are currently being examined in a multi-site European study.

The Ultra High Risk Approach

As has been found with the Chapman and Chapman research, there are problems with using prodromal symptoms and signs alone to identify people thought to be at incipient risk of onset of psychotic disorder, even psychotic-like experiences. Particularly in a non-clinical sample, the false positive rate would be far too high and any intervention provided may be done so unnecessarily. One possible solution to this problem of false positives
is a sequential screening approach or ‘close-in strategy’ (Bell, 1992). This involves putting in place a number of different screening measures to concentrate the level of risk in the selected sample to create an enriched cohort. In other words, an individual must meet a number of conditions to be included in the high risk sample. Thus to identify people at high risk of onset of psychotic disorder in the near future, symptoms and signs are combined with other risk factors. One risk factor is age. It is known that the age of highest incidence of psychotic disorder is adolescence and young adulthood (Häfner et al., 1993). As noted previously, this risk factor has been used in the Mednick approach (Mednick et al., 1987), the Edinburgh High Risk study (Johnstone et al., 2002) and the psychosis-proneness research (Chapman et al., 1994). Other risk factors which could be added are family history of psychotic disorder, schizotypal personality disorder, deterioration in psychosocial functioning and distress or a perceived need for psychiatric help by the person or people close to him or her.

Our research group used combinations of these risk factors to describe three samples considered to be at ‘ultra high risk’ (UHR) of psychotic disorder. The addition of the qualifier ‘ultra’ is to distinguish these individuals from subjects in traditional high risk studies who are identified on the basis of genetic risk alone. These studies use one measure of risk and the period of risk is considered to be a lifetime. The UHR approach attempts to identify individuals at risk for a brief period (one to two years). That is, they are considered to be potentially in a state of incipient psychotic disorder or possibly prodromal. The other main difference is that the UHR group is symptomatic and presenting for clinical care, in contrast to the asymptomatic but genetically liable individuals included in the other genetic high risk studies. Similarly, the UHR approach also contrasts with that of Chapman and Chapman (Allen et al., 1987; Chapman & Chapman, 1987; Chapman et al., 1994) by its use of a clinical population. The UHR criteria are applied to young people being referred to a psychiatric service for help. Thus a two-stage screening procedure is applied: recognition of need for care, then recognition of UHR criteria within the help-seeker. This method reduces the chance that a well person who happens to have psychotic-like experiences but who is otherwise functioning adequately will be identified as UHR.

Three UHR sub-samples have been defined. These are: (1) presence of attenuated (sub-threshold) psychotic symptoms, (2) history of brief self-limited psychotic symptoms and (3) positive family history of psychosis, plus persistent low functioning (Yung et al., 2003). For example, individuals in Group One have sub-threshold psychotic symptoms in terms of the intensity or frequency of their experiences. Group Two subjects have a history of frank psychotic symptoms that spontaneously resolve within seven days. Finally, Group Three includes young people with a presumed genetic vulnerability to psychosis who have had a recent and marked deterioration in functioning. The genetic vulnerability includes those with either a schizotypal personality disorder (as defined by the Diagnostic and Statistical Manual of Mental Disorders, DSM IV) (American Psychiatric Association, 1994) or a first degree relative with a history of any psychotic disorder.

The criteria for each of the UHR groups were originally operationalised using the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1962) and the Comprehensive Assessment of Symptoms and History (CASH) (Andreasen, 1987), which could be used to specify the intensity of a psychotic symptom. Additionally, criteria specifying the frequency and duration of the experiences were needed, as this degree of fine detail in relation to sub-threshold symptoms is missing from the BPRS and CASH. Prospectively, the recency of these symptoms also needed to be assessed as degree of risk may fluctuate depending on current or recent symptomatology. That is, after a self-limited episode of sub-threshold
psychotic symptoms (perhaps stress induced), how long should the individual be considered to be at UHR for frank psychotic disorder?

In addition to the UHR criteria being operationalised, a clear definition of frank psychosis was required as the outcome point in assessing the predictive validity of the criteria. This was based on the presence of clear-cut threshold level psychotic symptoms (delusions, hallucinations and formal thought disorder) occurring several times per week for at least one week. This threshold is essentially that at which neuroleptic medication would probably be commenced in common clinical practice. This definition of onset of threshold psychosis is, of course, somewhat arbitrary, but does at least have clear treatment implications and applies equally well to substance-related symptoms, symptoms that have a mood component – either depression or mania – and schizophrenia spectrum disorders.

Testing the UHR Criteria

Having defined the UHR criteria, the next step was to test their ability to identify individuals likely to develop a psychotic disorder within a brief follow-up period. A study was conducted from 1995–1996 to test the criteria in this manner (Yung et al., 2003). In order to do this, a specially designed clinical research centre, the Personal Assessment and Crisis Evaluation (PACE) Clinic, was established (Yung et al., 1996). The aims of the PACE Clinic were to assess, manage, and follow up putatively UHR (‘prodromal’) subjects. PACE was located at a community adolescent service for general medical as well as psychological problems. Its location was intended to promote access and avoid stigma. PACE attendees received supportive counselling and case management in addition to treatment of target symptoms, such as depression. They may have received antidepressant or anxiolytic medication but no neuroleptic medication was used (Yung et al., 2003).

This study also aimed to investigate which if any other demographic or symptomatic measures were predictive of onset of a psychotic disorder within the UHR group. Participants in the study were assessed at baseline with the following measures: the Psychotic Disorders section of the Structured Clinical Interview for DSM IV (SCID) (First, Spitzer, Gibbon & Williams, 1997) to establish that none was psychotic at study entry, the Family Interview for Genetic Studies (FIGS) (Maxwell, 1992) to determine if there was any family history of psychotic disorder, the Quality of Life Scale (QLS) (Heinrichs, Hanlon & Carpenter, 1984) and Global Assessment of Functioning (GAF) (American Psychiatric Association, 1994) to assess functioning and disability. A structured interview was performed to assess the duration of symptoms and decline in functioning.

Monthly interviews were also conducted to monitor mental state. The following instruments were used: the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1962), the Scale for the Assessment of Negative Symptoms (SANS) (Andreasen, 1983), the Hamilton Rating Scale for Depression (HRSD) (Hamilton, 1960), the Hamilton Rating Scale for Anxiety (HRSA) (Hamilton, 1959), and the Young Mania Rating Scale (YMRS) (Young, Biggs, Ziegler & Myer, 1978), as well as the new instrument, the Comprehensive Assessment of At Risk Mental States (CAARMS) (Yung et al., in press). A full SCID was administered to subjects after the development of psychosis to determine the DSM IV diagnosis.

As hypothesised, meeting the UHR criteria was associated with a high rate of onset of psychotic disorder (Kaplan-Meier estimate of 0.41 with 95% confidence interval of 0.25–0.53 within 12 months) (Yung et al., 2003), a rate several hundred-fold above that expected in the general population. Belonging to both the genetic high risk group and the
attenuated symptoms group, long duration of symptoms, poor functioning, poor attention as assessed by the SANS and depression significantly increased the risk of development of psychosis in the UHR sample (Yung et al., 2003, 2004b).

THE CAARMS: ASSESSING UHR STATUS AND THE AT RISK MENTAL STATE

As well as developing the UHR criteria, our group also developed an instrument for assessing them which could incorporate all of the relevant dimensions. The CAARMS (Yung et al., in press) is a semi-structured interview which includes scales for assessing in detail threshold and sub-threshold psychotic phenomena and other symptoms and signs which occur in the psychotic prodrome, including negative, dissociative and ‘basic’ symptoms (Klosterkötter et al., 1996).

Rationale for a New Instrument

There were three main reasons for developing a new instrument:

1. To enable UHR criteria to be applied using the one instrument
   As noted above, prior to the development of the CAARMS, assessing UHR status required the application of two separate instruments, the BPRS and the CASH, as well as a separate assessment of the recency of symptoms. The CAARMS measures all these aspects and includes its own operationalised criteria for UHR status. CAARMS cut-offs for UHR status and frank psychotic disorder were developed based on the previous criteria, see Table 2.4.

2. Rating the subjective experience
   It is thought that changes in subjective experience, such as the basic symptoms, may precede overt and objectively perceived phenomena such as delusions, hallucinations, thought disorder and blunted affect (Chapman, 1966; Gross, 1989; Huber, Gross, Schuttler & Linz, 1980). Hence another focus of the CAARMS is to assess subjectively experienced phenomena, which may be present in the absence of any behavioural abnormalities. For example, the subject may complain of the feeling of having no feelings or altered emotions, but present with an intact affect with no evidence of blunting. These subjective experiences can be rated on the CAARMS. Similarly, the CAARMS includes items exploring the subjective experience of conceptual disorganisation and concentration difficulties.

3. Recording sequence of events, including fluctuations
   Documenting the first ever change from premorbid state and the evolution of symptoms over time is another aim of the CAARMS. It has an introductory overview section which records this ‘graphically’ on a time line and documents first noted symptoms with their dates of onset. The CAARMS also measures fluctuations in symptoms, recording onset and offset dates of symptoms and whether or not the phenomena have been present continuously since last assessed. This detail of rating has been included as we have found, from our experience working with UHR young people, that the intensity and frequency of abnormal experiences fluctuate and the transition to psychosis from premorbid state, through the prodromal phase,
Table 2.4  CAARMS defined Ultra High Risk and Psychotic Disorder Threshold Criteria (reproduced with permission of Taylor and Francis publishing)

Group 1: Attenuated Psychosis Group  This criterion identifies young people at risk of psychosis due to a sub-threshold psychotic syndrome. That is, they have symptoms which do not reach threshold levels for psychosis due to sub-threshold intensity (the symptoms are not severe enough) or they have psychotic symptoms but at a sub-threshold frequency (the symptoms do not occur often enough).

1(a) Sub-threshold intensity:

- **Severity Scale Score of 3–5** on Disorders of Thought Content subscale, **3–4** on Perceptual Abnormalities subscale and/or **4–5** on Disorganised Speech subscales of the CAARMS

PLUS

- **Frequency Scale Score of 3–6** on Disorders of Thought Content, Perceptual Abnormalities and/or Disorganised Speech subscales of the CAARMS for at least a week
- OR **Frequency Scale Score of 2** on Disorders of Thought Content, Perceptual Abnormalities and Disorganised Speech subscales of the CAARMS on more than two occasions

1(b) Sub-threshold frequency:

- **Severity Scale Score of 6** on Disorders of Thought Content subscale, **5–6** on Perceptual Abnormalities subscale and/or **6** on Disorganised Speech subscales of the CAARMS

PLUS

- **Frequency Scale Score of 3** on Disorders of Thought Content, Perceptual Abnormalities and/or Disorganised Speech subscales of the CAARMS

PLUS (for both categories)

- Symptoms present in past year and for not longer than five years

Group 2: BLIPS Group  This criterion identifies young people at risk of psychosis due to a recent history of frank psychotic symptoms which resolved spontaneously (without antipsychotic medication) within one week.

- **Severity Scale Score of 6** on Disorders of Thought Content subscale, **5 or 6** on Perceptual Abnormalities subscale and/or **6** on Disorganised Speech subscales of the CAARMS

PLUS

- **Frequency Scale Score of 4–6** on Disorders of Thought Content, Perceptual Abnormalities and/or Disorganised Speech subscales

PLUS

- Each episode of symptoms is present for less than one week and symptoms spontaneously remit on every occasion

PLUS

- Symptoms occurred during the last year and for not longer than five years  

(Continued)
Table 2.4 (Continued)

**Group 3: Vulnerability Group** This criterion identifies young people at risk of psychosis due to the combination of a trait risk factor and a significant deterioration in mental state and/or functioning.

- **Family history of psychosis** in first degree relative or **Schizotypal Personality Disorder** in identified patient

**PLUS**
- **30% drop in GAF score** from premorbid level, sustained for a month

**PLUS**
- **Change in functioning** occurred within last year and maintained for at least a month

**Psychotic Disorder threshold**

- **Severity Scale Score of 6** on Disorders of Thought Content subscale, **5 or 6** on Perceptual Abnormalities subscale and/or **6** on Disorganised Speech subscales of the CAARMS

**PLUS**
- **Frequency Scale Score of greater than or equal to 4** on Disorders of Thought Content, Perceptual Abnormalities and/or Disorganised Speech subscales

**PLUS**
- Psychotic symptoms present for **longer than one week**


seems not to be a smooth or relentlessly progressive one. Fluctuations may be related to person’s coping resources, life circumstances, stress level, substance use and non-specific interventions such as counselling.

**Scoring and Structure of the CAARMS**

The CAARMS is a semi-structured interview schedule designed for use by mental health professionals who are already able to assess and evaluate subjects’ information. It requires the interviewer to make judgements about what interviewees say and to follow up and explore possible symptoms, if necessary. Objective assessment of certain mental state features is also required, such as of blunting of affect and formal thought disorder. Ratings are documented on the CAARMS Score Sheet, which accompanies the interview schedule.

The CAARMS includes the following subscales: Disorders of Thought Content (assessing obsessions, delusional mood, over-valued ideas and delusions), Perceptual Abnormalities (assessing distortions, illusions and hallucinations), Conceptual Disorganisation (assessing subjectively experienced difficulties with forming thoughts as well as objectively assessing degrees of formal thought disorder), Motor Changes (assessing subjectively experienced difficulties with movement as well as objective signs of catatonia), Concentration and Attention (again assessing both the subjective experience and objective rating), Disorders
of Emotion and Affect (assessing subjective sense of change in emotions and objective rating of blunting of affect), Subjectively Impaired Energy (a basic symptom) and Impaired Tolerance to Normal Stress (a basic symptom). An intensity and frequency rating for each of these subscales is recorded separately.

The CAARMS has two functions: (1) to provide a comprehensive assessment of psychopathology thought to indicate imminent development of a first episode psychotic disorder and (2) to determine if an individual meets UHR status or has crossed the threshold for a psychotic disorder based on criteria derived from the CAARMS assessment.

Testing the CAARMS

Inter-rater Reliability

Inter-rater reliability of the CAARMS was assessed by joint interviews of 34 UHR subjects at baseline (Yung et al., in press). Both researchers were in the room with the subject, one as interviewer and one as observer. There were four pairs of raters, with the role of interviewer rotating between them. Raters were either psychiatrists or trained clinical research psychologists. Table 2.5 shows the intra-class correlation coefficients (ICC) of each of the eight main domains. As can be seen, good to excellent agreement was found with all scales, with only the Energy domain displaying an ICC lower than 0.7. The overall agreement (total CAARMS score) was 0.85.

The predictive validity of the CAARMS was assessed by examining the predictive power of the CAARMS domains scores and overall score for psychosis onset within the follow-up period in the sample of 49 UHR young people. This was done by comparing scores in the group which became psychotic with scores in the group which did not. High CAARMS overall score was significantly associated with development of psychotic disorder. CAARMS measures of disorders of Concentration and Attention (CA), Emotion and Affect (EA), Impaired Energy (E) and Impaired Tolerance to Stress (S) were highly predictive of psychotic disorder. Disorders of Thought Content (TC), Perceptual Abnormalities (PA), Conceptual Disorganisation (CD) and Motor Changes (M) were not predictive. Dividing the subscales

<table>
<thead>
<tr>
<th>CAARMS subscale</th>
<th>All raters*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disorders of Thought Content</td>
<td>0.79</td>
</tr>
<tr>
<td>Perceptual Abnormalities</td>
<td>0.83</td>
</tr>
<tr>
<td>Conceptual Disorganisation</td>
<td>0.89</td>
</tr>
<tr>
<td>Motor Changes</td>
<td>0.93</td>
</tr>
<tr>
<td>Concentration and Attention</td>
<td>0.72</td>
</tr>
<tr>
<td>Disorders of Emotion and Affect</td>
<td>0.83</td>
</tr>
<tr>
<td>Energy</td>
<td>0.62</td>
</tr>
<tr>
<td>Impaired Tolerance to Normal Stress</td>
<td>0.82</td>
</tr>
<tr>
<td>Overall</td>
<td>0.85</td>
</tr>
<tr>
<td>n</td>
<td>34</td>
</tr>
</tbody>
</table>

* There were four pairs of raters.
Table 2.6  Cox regression results examining associations between CAARMS measures and risk of psychosis

<table>
<thead>
<tr>
<th>Measure</th>
<th>p-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thought Content</td>
<td>0.088</td>
</tr>
<tr>
<td>Perceptual Abnormalities</td>
<td>0.260</td>
</tr>
<tr>
<td>Conceptual Disorganisation</td>
<td>0.600</td>
</tr>
<tr>
<td>Motor Changes</td>
<td>0.370</td>
</tr>
<tr>
<td>Concentration and Attention</td>
<td>0.004</td>
</tr>
<tr>
<td>Emotion and Affect</td>
<td>0.038</td>
</tr>
<tr>
<td>Impaired Energy</td>
<td>0.031</td>
</tr>
<tr>
<td>Impaired Tolerance to Stress</td>
<td>0.034</td>
</tr>
<tr>
<td>Positive Symptoms</td>
<td>0.380</td>
</tr>
<tr>
<td>Negative Symptoms</td>
<td>0.001</td>
</tr>
<tr>
<td>Overall Score</td>
<td>0.007</td>
</tr>
</tbody>
</table>

into Positive (TC, PA, CD, M) and Negative (CA, EA, E and S) symptoms showed the Negative symptoms to be highly and consistently predictive of psychotic disorder, whereas the Positive symptoms were not predictive (Yung et al., in press), see Table 2.6.

OTHER SCALES FOR IDENTIFYING UHR INDIVIDUALS

Another interview and scale, similar to the CAARMS, has been developed by the PRIME group in North America. The Structured Interview for Prodromal Symptoms (SIPS) and the Scale of Prodromal Symptoms (SOPS) (Miller et al., 2003) provide question probes, rating scales and anchor points which allow the rater to make a decision about whether the criteria for ‘prodrome’ are met. The SPI-A (Schultze-Lutter et al., 2004), noted previously, assesses basic symptoms and is used to determine whether the basic symptom criteria for inclusion are met. It is beyond the scope of this chapter to go into detail about these other scales, but readers are referred to the paper by Addington (2004) in which these instruments are compared.

CONCLUSIONS

Several methods of identifying groups of people at risk for psychotic disorders have been discussed. Some of these suffer from high rates of false positives and low predictive power, making their application to the field of preventive treatment unsuitable. The UHR approach has been successful to date in identifying a cohort with a high rate of transition to frank psychosis. Thus intervening in this group in an attempt to prevent onset of full-blown psychotic disorder may be justifiable. However, the decision to treat, and with what, depends on the individual’s presentation and circumstances. Issues of stigma and labelling, as well as unnecessary intervention, must be taken into account. An added caveat is that the risk of transition in someone meeting UHR criteria depends on the population from which they are drawn. Thus the UHR criteria cannot and should not be applied to a healthy population.
as a screening measure, as the expected rate of transition within this population would be much lower than in a clinical group presenting for help. Nonetheless, the development of reliable and valid criteria for identifying the UHR population has laid the groundwork from which preventive treatment can develop. Obviously research needs to continue into further increasing our ability to predict who will develop psychotic disorder, even from within the UHR group. With such research underway in a number of centres throughout the world, the exciting possibility of delaying, reducing the severity, or even preventing the onset of a first psychotic episode arises.

REFERENCES


IDENTIFICATION OF THE POPULATION


