
Relapse Prevention: Personal Informatics for Clinical Mental Health

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Abstract

Recent years has seen an increase in the development of tools to support reflection and increase self-awareness. However, despite the apparent relevance of these technologies to helping people with serious mental health problems in clinical settings, there has been little work to date. Bipolar Disorder is a serious clinical mental disorder typified by a cycle between highs and lows. It requires life-long management involving careful monitoring of personal symptoms and activities. Signal events, warning signs that a relapse is about to occur, if reported can help prevent relapse. Typically, this information is not reported. The goal of this project is to develop a tool to help individuals, their families and therapists identify life patterns that can lead to relapse in order to prevent it. This tool will involve 3 main sources of information: self-recorded data, sensor information and soft-sensors and data from the person's social group. There is considerable potential for the well considered application of existing monitoring technologies to provide effective and relatively low-cost supports to individuals with serious mental health disorders.

Keywords

Behavioural Analytics, Mental Health, Bipolar disorder, Ubicom

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ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

"Mental health is a most important, maybe the most important, public health issue, which even the poorest society must afford to promote, to protect and to invest in." [5] Mental illness is a leading cause of disability and premature mortality in the western world, yet relatively little research has been conducted into the use of technology to support the management and treatment of mental health problems. Personal Informatics offers great potential to more effective management of clinical mental health problems.

Bipolar Disorder

Bipolar disorder (**BD**) is a common illness affecting between 1-3 % of the world's population, both male and female, across socio-economic groups and in both developing and industrialized countries [4]. A further 5-10% are estimated to suffer from bipolar symptoms. Approximately 1/3 of bipolar patients attempt suicide [3]. BD is characterized by a cycle of manias, where the individual experiences high self-esteem, irritability and sleeplessness, and deep depressions. It affects a person's cognition, mood and energy levels.

Quality of life for individuals with bipolar disorder is extremely poor; possible effects include relationship problems, divorce and loss of productivity [1]. It has significant impact on family, friends and carers of individuals with the disorder. There are considerable costs to society including treatment costs, loss of productivity and crime.

Treatment

Although there is no cure for BD, individuals can lead productive lives with careful management of their disorder. Above all, the goal in treatment is to avoid relapse. Almost half of patients first diagnosed with bipolar disorder relapse within a year of recovery. Recommended self-management strategies for BD include 1) connecting with others (family members and friends), 2) regular sleep, diet and exercise, 3) monitoring symptoms, 4) identifying personal triggers, 5) understanding and learning about bipolar disorder and 6) putting a plan in place.

A key goal in treating BD is detecting prodromes, early warning signs, of a relapse. An individual with bipolar disorder typically experiences *signal events* which indicate a risk of relapse: "*the return of mild irritability, agitation, or insomnia may be the harbinger of a manic episode...Similarly the return of interest in hobbies such as gardening, music, or sports, previously enjoyed by the patient may be a "signal" that the depressive episode is in remission.*" Such events typically go unreported. Life patterns can also be detected through symptoms such as mood and energy.

Position

Although there are several existing systems for monitoring mental health symptoms such as *Optimism*, they tend to rely on individuals inputting data themselves. This can be problematic for people with BP who may be unaware of dangerous patterns at times of greatest risk. Blum et al. have developed a prototype system which combines worn sensors and self-monitoring [2]. This project will involve a combination of sensors, social circle feedback and personal

recording to provide a broad picture of a person's mental state.

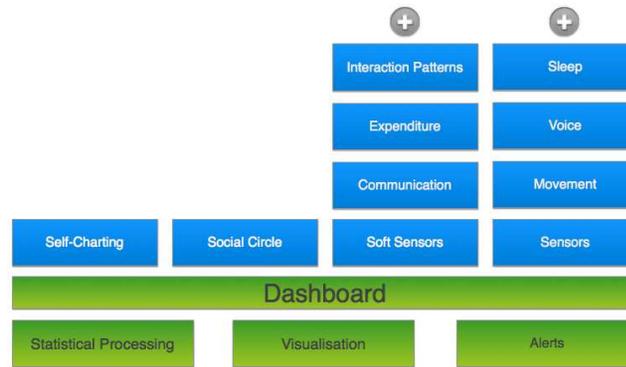


Figure 1 System Overview

1. Sensors: Existing systems already allow people to track many variables important for the management of BD including movement (*everymove*), expenditure (*mint*), sleep (*wakemate*) and communication (*graphyourinbox*). This system will combine actual sensors and a new layer of soft-sensors which sit on top of all interactions with technologies like web browsers, computers and mobile phones. For example, by simply monitoring when, how frequently and with whom a person is communicating it may be possible to identify behavioural trends.

2. Social Circle: Family, friends and loved ones are often key in treatment. One person with BD commented that his wife can tell his mood simply by the "sound of his footsteps". It may be possible to triangulate personal data by allowing loved ones to contribute information. It may also be possible to use the social circle as a safety net. For example, in a

manic state it may be unhelpful to alert an individual themselves about negative patterns. In such cases it could be useful to support the sending of alerts to family, friends and therapists.

3. Self-Recording: Initial evidence suggests that bipolar individuals are receptive to using technology to monitor their symptoms. Providing convenient methods to record personal data might help to provide a richer picture of trends in the patient's life, and support the management and treatment of their condition.

Challenges

There are a range of significant challenges with the development of the proposed system. Because there is little room for error, it will be important to develop in stages. The first will involve simply capturing and displaying personal information to the user and his therapist. The second will involve automatic analysis of captured data in order to retrospectively identify patterns of behaviour. The final stage would involve proactively identifying warning signs based on incoming information. Some of the most challenging aspects of this project include:

Visualisation of Large Amount of Information: It will be important to establish how much information to display so that it can lead to personal insights. A dashboard screen could also serve as a starting point for clinical discussions with a therapist. It might only be important to receive certain focused information, the challenge is to work out which information. A technical challenge will be using background statistical processing to run tests on a range of inputs.

Maintain Use over Time: Although the system could theoretically be used for an entire lifetime, in practice it may be used at certain points of treatment.

Nevertheless it will be important to consider how to maintain system use of long periods of time. The use of sensors is one way of addressing this, but it may be necessary to consider other approaches such as how to maintain the effectiveness of reminder messages which can lose their impact over time.

How to Support Varied Use: Because personal triggers vary across individuals, we will have to identify ways to support varied use. One way could be to combine flexibility of input sensors with personalised alerts. Users could be able to set up rule-based alerts like – “if I check my email more than 5 times in 5 minutes, send John an alert email.”

Design & Evaluation of systems for clinical use in mental health can take a very long time. It will be essential to have input from individuals with BP, their social network, practitioners and experts in bipolar research. Because of the seriousness of BP, careful consideration will have to be given to privacy and legal

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issues. Automatic tracking of system use might also provide light-touch feedback on interaction issues.

Conclusion

Mental health problems are predicted to increase. This will lead to an increased need for technologies to help individuals engage in proactive mental health management. Despite the relevance of many existing personal informatics projects to the treatment of clinical mental health problems, there is little research in this area. The challenge is to fuse existing approaches to personal data capture into treatment tools that may improve the lives of individuals with clinical mental health problems like bipolar disorder. Beyond this, such an approach may have relevance for other mental health disorders such as schizophrenia, obsessive compulsive disorder and major depression, now the leading cause of disability globally. It may lead to innovations that have applications for milder problems such as stress management or even for encouraging balanced productive lifestyles. The use of personal informatics in mental health opens up many distinct areas for multi-disciplinary research.

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