Reducing the Misdiagnosis of Bipolar Disorder Using Social Media

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GRADE AWARDED: PASS

Research Paper based on lectures at the Medlink or Workshop Conferences at Nottingham University in December 2013

April 2014
ABSTRACT
Bipolar disorder is a psychiatric disorder defined by recurrent episodes of elevated mood and depression, with changes in activity level [1]. A significant number of people are given negative diagnosis and receive treatment for major depressive disorder, when they are actually bipolar. This paper will discuss the most effective ways to reduce this number of people, using modern technology and social media.

INTRODUCTION

Bipolar disorder is a psychiatric disorder whereby a person experiences recurrent episodes of elevated mood described as ‘mania’ or ‘hypomania’ (dependent upon severity of the case) and depression.

During a depressive episode a patient usually experiences feeling hopeless and worthless, lacking energy, loss of interest in activities including sexual intercourse, difficulty concentrating and remembering things, lack of appetite and suicidal thoughts [2]. Note these symptoms are identical to those with major depressive disorder [3] and Seasonal Affective Disorder (SAD) [4].

A person experiencing a manic episode or mania may feel very elated, happy or overjoyed, talk very quickly, feel full of energy and ‘great’ new ideas, not feel like sleeping and have impulses to do things that have bad consequences, such as spending large sums of money [2]. When diagnosing bipolar, hormone levels are tested to rule out other diseases such as hyperthyroidism due to a similar symptom of ‘hyperactivity’, although usually people with thyroid conditions experience physical symptoms such as unexplained weight loss or gain. Hypomania is a mild form of mania, featuring many of the same symptoms but less severe.

A mixed episode occurs when someone experiences symptoms of depression and mania simultaneously, for example a person may be full of energy but feel worthless at the same time.

Subtypes of Bipolar Disorder

Bipolar Disorder is diagnosed by doctors using guidelines from the Diagnostic and Statistical Manual of Mental Disorders (DSM) [5]. DSM outlines four types of bipolar:

- **Bipolar I Disorder** is diagnosed when a person displays manic or mixed episodes that last at least seven days, or by manic symptoms that require immediate hospital care. Usually they also have depressive episodes, typically lasting at least two weeks. The symptoms of mania or depression must be a major change from their normal behaviour.
- **Bipolar II Disorder** is when a person experiences patterns of depressive episodes shifting back and forth with hypomanic episodes, with no full-blown manic or mixed episodes.
Bipolar Disorder Not Otherwise Specified (BP-NOS) will be diagnosed if a person has symptoms of bipolar disorder that do not meet diagnostic criteria for bipolar I or II. This would occur if the person is experiencing symptoms out of their normal range of behaviour but the symptoms do not last the length specified or if they have too few symptoms.

Cyclothymic Disorder (or Cyclothymia) is defined by episodes of hypomania and mild depression that shift back and forward for at least two years, yet symptoms do not meet the diagnostic criteria for bipolar I or II.

Another diagnostic is rapid-cycling bipolar disorder when a person experiences four or more episodes in a year, including major depressive disorder, mania, hypomania or mixed symptoms [6].

Misdiagnosis of Bipolar Disorder

Currently, 1% of the UK population is diagnosed with bipolar disorder [7]. In a study of 48 people who had been previously diagnosed major depressive disorder, 19 of them (40%) were found to have previously undiagnosed bipolar disorder [8]. Online there are numerous blogs that indicate personal experiences of misdiagnosis. One journalist suggests patients are misdiagnosed on average for 5.7-7.5 years until bipolar disorder is diagnosed [9].

Social Media and Medicine

Social media is defined as websites and applications that enable users to create and share content or to participate in social networking [10]. The use of websites and applications has rapidly increased since the technological advances of computers and the internet. First ideas of the creation of the internet were discussed in 1962 and by the 1970s a basic area of collaborative data was developed [11].

Social media has numerous benefits for medicine, some of which are listed below.

- It makes medical advancements easier and quicker as it has allowed collaborations between doctors on websites, such as www.dropbox.com, as well as via email. Also, a project started in 2014 by the NHS has begun to increase collaborative work. It is a system designed to store the data of patients that can be easily accessed by doctors. This system can be used to conduct large scale studies to find effective treatments and highlight problems within medicine that need to be improved [12].

- Information is more readily available for people, on websites such as www.nhs.uk. People who believe they may be suffering from an illness may also use online symptom checkers to see if it is likely that they are suffering from an illness, and therefore worthwhile seeing a doctor. This is useful as it may free up general practitioners' time.
• Forums that offer support to people with certain illnesses often help the sufferer of the illness to feel better. This is especially useful for individuals with disorders such as major depressive disorder, who may feel less alone being able to communicate with others with the disorder.

• Social networking sites such as Facebook and Twitter can be used to raise awareness of conditions.

One of the focuses of this research paper is applications available for phones that allow patients and doctors to monitor symptoms of bipolar disorder. I will discuss further in the paper how this may aid in reducing the misdiagnosis of bipolar disorder.

**Treatments for Bipolar Disorder**

There is no cure for bipolar disorder; however there are methods of reducing severity of symptoms. The two methods of reduction are medication and psychotherapy. The medication used varies depending upon the person and the symptoms they are displaying at that time. The types of medicine used are mood stabilisers, antipsychotics or antidepressants.

One of the advised methods of monitoring bipolar disorder to help treatment is keeping a chart of daily mood symptoms, treatments, sleep patterns, and life events can help the doctor track and treat the illness most effectively. This is often referred to as a daily life chart. If a person's symptoms change or if side effects become serious, the doctor may switch or add medications.

Keeping a daily life chart can be especially useful for identifying patients as having bipolar disorder as opposed to major depressive disorder. This is important because if a patient is treated with antidepressants (usually prescribed when a person is diagnosed with major depressive disorder), mania or increased rate of cycling can be induced, in some cases.

**Cause of Bipolar Disorder**

The cause of bipolar disorder is unclear. Current research suggests that there are two factors that can lead to the development of bipolar disorder; genetics and environment. Genetics has been suggested due to ‘first degree relatives of a person with bipolar disorder are 7 times more likely to develop bipolar disorder’ A study in identical twins has identified environmental and genetic cause. In identical twins 100% of each other’s DNA is shared. In a study if one twin has bipolar disorder there was an 80% concordance rate. However, in fraternal twins there was a 16% concordance rate. This supports the idea of genetics being a causal factor. In identical twins, the 20% chance of not having bipolar disorder suggests environmental factors must also result in the development in bipolar disorder. If the cause was entirely genetic, then if one identical twin had bipolar disorder, the other would (in other words, there would be a 100% concordance rate).
It is thought that these factors lead to brain abnormalities. Current research is being conducted to uncover definite changes in the brains of those suffering from bipolar disorder\textsuperscript{[15]}. Magnetic resonance imaging (MRI) scanning has suggested hyper intense (bright white) spots in bipolar disorder patients. It is suggested that people with bipolar disorder have abnormal intracellular functions, such as higher production amounts of serotonin, dopamine and norepinephrine\textsuperscript{[15]}. High production of serotonin explains the symptoms of mania, because increased serotonin levels are linked with happiness.

Recent research has indicated that bipolar disorder can be diagnosed using magnetic resonance imaging (MRI) scans. A study in 2013 found that between 72-73\% of patients were correctly distinguished between healthy people and people with bipolar disorder\textsuperscript{[16]}. Figure 1 (page 10) is a cross-sectional MRI scan, which shows the difference between two people of similar age, with no ‘significant medical or substance abuse history’\textsuperscript{[15]}. The images contrast the difference between a healthy person and a person who suffers from bipolar disorder. The person with bipolar disorder has diffuse grey matter* loss, enlargement of the ventricles and mild prefrontal volume loss\textsuperscript{[15]}. Figure 2 (page 10) compares grey matter loss in people with bipolar disorder, to those without. It shows a significant increase in grey matter loss in people with bipolar disorder than people without the disorder.

*Grey matter involves regions of the brain involved in muscle control and sensory perception, such as decision making, emotions, memory, self-control, speech, seeing and hearing\textsuperscript{[18]}. 
DISCUSSION

I shall discuss how it is possible to reduce the misdiagnosis of bipolar disorder. First, it is important to understand why there is such a high misdiagnosis rate for bipolar disorder. There are two main reasons for this. Firstly, patients are more likely to visit a GP to discuss a depressive episode, as they won’t consider their unusual levels of happiness experienced during a manic episode to be a symptom of a mental disorder. Secondly, patients may have only experienced a depressive episode at the time of their diagnosis.

Visiting the GP

People are more likely to seek help when they feel down (depressive episode) than when happy (manic). I believe the main reason to be that people recognise depression as a symptom of mental illness and therefore take action to stop it, whereas happiness is a good feeling that is sought after. One of the reasons contributing to this could be the high awareness of major depressive disorder. The main reason people are aware of major depressive disorder is how common the condition is. According to findings from the Office for National Statistics (ONS), 19% of people aged 16 or over reported symptoms of major depressive disorder.

Awareness is heightened by social media networking sites including Twitter, Tumblr and Facebook. For example, Tumblr has many popular pictures glamorising major depressive disorder, although conversely there is also help available to young people with major depressive disorder including posts and blogs providing support\textsuperscript{19} as well as a support page that appears when you search for key words including ‘depression’ (shown Figure 3 (page 10)). On the other hand if you search ‘bipolar’ on Tumblr no support page is displayed and images are primarily linked to depressive episodes.

What I propose is using social media sites to increase awareness of bipolar disorder. This would be useful for addressing the misconception that certain symptoms of mania like high energy and happiness levels do not indicate mental illness. Some social media posts raising awareness already exist; see Figure 4 (page 11). I believe this will lead to more people visiting the GP when feeling manic as well as people mentioning their experiences of previous manic or hypomanic episodes to assist diagnosis. Awareness could also be increased through education at school and even television campaigns.

People Who Have Only Experienced a Depressive Episode

Sometimes patients have only experienced a depressive episode, so will be diagnosed with major depressive disorder and prescribed antidepressants. This can sometimes be effective in treating patients with bipolar, however it is important to closely monitor patients and their symptoms in case the medication induces mania. One way of identifying mania would be asking patients who experience major depressive disorder to keep a daily life chart. This would also be beneficial for monitoring the progress of
patients with major depressive disorder and to identify if antidepressants are working. Sometimes this can also be an indication of bipolar disorder as patients usually respond better to mood stabilisers \(^{[22]}\).

**Using social media to keep a daily life chart**

**Websites**

There are currently websites and applications (apps) that are available to people to help them monitor their moods. Websites include [www.bipolarmoodcharts.com](http://www.bipolarmoodcharts.com), which allows people to record their mood using a scoring system, write notes about how they feel and create a mood graph over time, and [www.moodtracker.com](http://www.moodtracker.com) which also creates a mood graph, but has additional features including medication reminders. These mood graphs can be sent to caregivers, including doctors. The websites may aid the processes of diagnosing and treating bipolar disorder.

**Applications** (abbreviated as apps)

There are an increasingly large number of people, especially amongst the younger generation, who possess a phone that can use apps, such as an iPhone. Some examples of free apps include:

- **Moodometer** \(^{[23]}\) is an app produced by the NHS Foundation Trust. The user selects their current mood from a range of 6 moods and can write a brief note of what the trigger was, or any other important information. Over time this creates a graph such as Figure 5 (page 11).
- **Moodlytics** \(^{[25]}\) is an app that provides the user with a wide variety of moods to record, allows them record what influences their moods, and write notes. One of the unique features of this app is that the user can set goals to encourage better moods. This creates a bar graph of moods per week as well as pie charts of proportions of moods experienced as shown in Figure 6 (page 11).
- **Bipol-App** \(^{[26]}\) is an app specifically directed at people who suffer from bipolar disorder. It is designed to record sleep patterns, energy levels, overall mood and anxiety daily. It then creates a graph of each as shown in Figure 7 (page 12).

In summary, these apps allow patients to record their moods, which can assist doctors to make a more accurate diagnosis.
MRI Scanning

Using MRI scans to screen people diagnosed with major depressive disorder could be a way to reduce the misdiagnosis of bipolar disorder. Figure 9 (page 12) indicates the differences seen in MRI scans between patients with bipolar disorder and major depressive disorder. However there are disadvantages of using MRI. There is a 28% rate of misdiagnosis, so it should only be used as an indication, alongside psychiatric evaluation. It is expensive to carry out an MRI scan, costing the NHS around £1000 per MRI scan[28]. Additionally it takes 15 to 90 minutes to complete the procedure[29].

Sometimes other psychiatric disorders, such as borderline personality disorder, coexist with bipolar disorder, as well as substance abuse[30]. Substance abuse can also be prevalent in people who suffer from major depressive disorder. Substance abuse could alter the MRI scan results. Figure 8 (page 12) indicates the difference between a healthy patient and a patient who regularly takes cocaine. Therefore, before an MRI scan is considered, it is important to know whether the patient uses drugs such as cocaine, as this may affect the results.

If MRI scans were more frequently used to assist diagnosing bipolar disorder, the disorder may be less frequently misdiagnosed. The recently initiated sharing of the data of patients within the NHS may increase doctors’ knowledge, perhaps through the findings of studies, of how to distinguish bipolar disorder from major depressive disorder using MRI scans.
CONCLUSION

Raising awareness of the symptoms, encouraging patients to keep a daily life chart using an app and, in select cases, using MRI scans would reduce the misdiagnosis of bipolar disorder. Reducing the misdiagnosis of bipolar disorder would mean that patients would receive treatment earlier and prevent symptoms worsening, which can lead to suicide in some cases. Overall, this would reduce the years taken for correct diagnosis from the current average of 5.7-7.5 years.

Future Developments

Awareness

It is often difficult to raise awareness, because attracting attention using social media can be difficult. To avoid this, an online campaign could be funded which would include advertisements on popular websites such as Facebook. The funding could be obtained from fundraising events such as the bipolar runs and donations to the Bipolar UK charity [31].
Daily Life Charts Using Apps

Each app has individual useful features, but they also have flaws. I will outline the benefits and flaws of each.

**Moodometer** is useful as users can enter a rough outline of how they feel on a day-to-day basis and create a graph. However, there are two main flaws; it averages their mood per day instead of a continuous graph of mood per hour (in case of rapid cycling), and it doesn’t record any other symptoms related to bipolar.

**Moodlytics** allows the user to define their moods specifically, for example defining their mood as ‘irritable’ rather than generalised as ‘depressed’. It can also provide positive results for the user as they can be encouraged to avoid things which may trigger a mood change. However, the app does not graph these moods so it is difficult to compare moods on a day-to-day basis. Also, users do not have the ability to record symptoms other than moods, such as sleep patterns.

**Bipol-App** graphs different symptoms of bipolar disorder, but, similar to Moodometer, doesn’t produce a graph of mood per hour.

A flaw of all these apps is that they don’t allow you to map past symptoms and mood patterns, except for Moodlytics; however, Moodlytics currently has a glitch which prevents users from doing so. This demonstrates another flaw; apps can encounter glitches which can create difficulties for users.

I believe combining the positives of all three of these apps would create an app ideal for monitoring the moods of patients. This app would consist of graphs demonstrating more symptoms of bipolar disorder, having the ability to specify in more detail the mood of the person, an ability to produce a graph that would give the breakdown of mood per minute (important for people who experience rapid cycling), the ability to record past symptoms (in case patients forget), an area that offers support for people and a way of sending the information such as the graph to their psychiatrist.

The apps could be recommended to patients to use and bring to appointments with psychiatrists. This would help to distinguish bipolar disorder from major depressive disorder. In addition, it will highlight progress and monitor the effectiveness of the treatment they receive.

**MRI Scans**

Using MRI scanning would reduce misdiagnosis as some patients will be identified as having bipolar disorder, as opposed to major depressive disorder. However, MRI scans have disadvantages. They are expensive, cannot detect bipolar disorder with 100% certainty, take a significant amount of time and the results may be affected if the patient is a substance abuser.
Because of the costliness of the MRI scans, the NHS is reluctant to use them to aid the process of diagnosing bipolar disorder. Therefore, it would be beneficial if research was conducted with the objective of reducing the cost of MRI scans, for example through a cheaper process to chill the magnetic coils that the machine uses. The result of this could be an increase in the number of MRI scans used to diagnose bipolar disorder, which would therefore aid in decreasing the misdiagnosis of the disorder.

The MRI scans have a 28% rate of misdiagnosis. This could be reduced by collaborations between doctors using the NHS collaborated data to increase the range of scans viewed by doctors, resulting in more information being collected to distinguish between patients with and without bipolar disorder. It is also important that doctors know whether the patient is using substances that would affect the MRI scan results so that they can decide whether an MRI scan is suitable.

To conclude, the misdiagnosis of bipolar disorder is an important issue which needs addressing. I believe that the suggestions discussed in this paper should be looked into by health organisations such as the NHS. Hopefully this would help to reduce the misdiagnosis of bipolar disorder.
**Everything okay?**

If you or someone you know are experiencing any type of crisis, please know there are people who care about you and are here to help. Consider chatting confidentially with a volunteer trained in crisis intervention at `makea.org` or anonymously with a trained active listener from `7 Cups of Tea`.

It might also be nice to fill your dash with inspirational and supportive posts from `TYLOA Hotline, the Lifeline, and Love Is Respected`.

**Figure 4** [21]

My mind moves faster than my fingers can type and my thoughts form faster than the words can escape my mouth. People ask me why I can’t drink coffee and I can’t explain to them that I really have no need for it. I stutter on my thoughts and see people’s sympathetic looks when they try to understand me. Some days my day starts at 1 a.m. and other days, my day doesn’t even start at all because I can’t leave my bed. People tell me they’re there for me if I need to talk, but I want them to understand that I don’t really have much to talk about. It’s just this switch in my mind that’s constantly flipping between hypomania and depression without any explanation and some days.

**Figure 5** [24]
Figure 6 [25]

Figure 7 [26]
Figure 8 [27]

Figure 9 [32]
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