How can technology assist in improving outcomes for psychosis?

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Introduction

It has been established that pharmacotherapy alone is not sufficient to treat those with psychosis past the 'acute phase' of illness.[1] Ideally, a combination of psychosocial support and education regarding symptoms is also required to help empower individuals with psychosis and regain social and vocational functionality. While this multi-faceted approach is attractive, there are barriers to achieving this for both clinicians and service-users alike. For example, those with long-term psychosis may have cognitive dysfunction meaning medication is not taken appropriately. Similarly, those who attend outpatient clinics for psychological therapies/psychiatric appointments face long waiting lists, travel costs, inflexible appointment times and perceived stigma due to lack of anonymity in the waiting room.[1] In short, relapse rate may be high and uptake of services may be low.

Consequently, physical healthcare providers within the National Health Service (NHS) utilize information and communication technologies (ICT) to avoid such issues for physical health service-users. In fact, the UK government have encouraged the use of ICT in treating those with mental illness as it is now widely available and relatively inexpensive.[3] Specifically, technologies such as the internet and smartphones have not only changed the way in which people communicate with one another, they have also made health-related resources widely accessible. Therefore, it is logical that mental health professionals and healthcare providers view technology as an acceptable, available and potentially cost-effective method to deliver treatment for chronic illness.[4] Technology is currently used in a therapeutic context for treatment of common mental illnesses, like online CBT for depression and anxiety. However, the concept of technology-based treatment for individuals with more complex needs is still a relatively new one. This essay will attempt to discuss the ways in which technology is currently being used and the subsequent benefits, whilst also considering the disadvantages of implementation, and theorizing further uses for technology in the management and recovery of psychotic illness.

Current formats, uses and feasibility of technology

Persistent psychotic symptoms lead to psychiatric disabilities which are characterized by frequent relapse, social exclusion, and reduced independence.[5] Individuals with persistent psychotic symptoms are also vulnerable to poor physical health outcomes and psychiatric comorbidities, such as substance abuse.[6, 7] Therefore, recovery may not be facilitated by traditional measures such as early intervention with medication alone.

Figure 1 below shows service user identified needs which when fulfilled have been shown to aide personal recover from psychosis.[2]
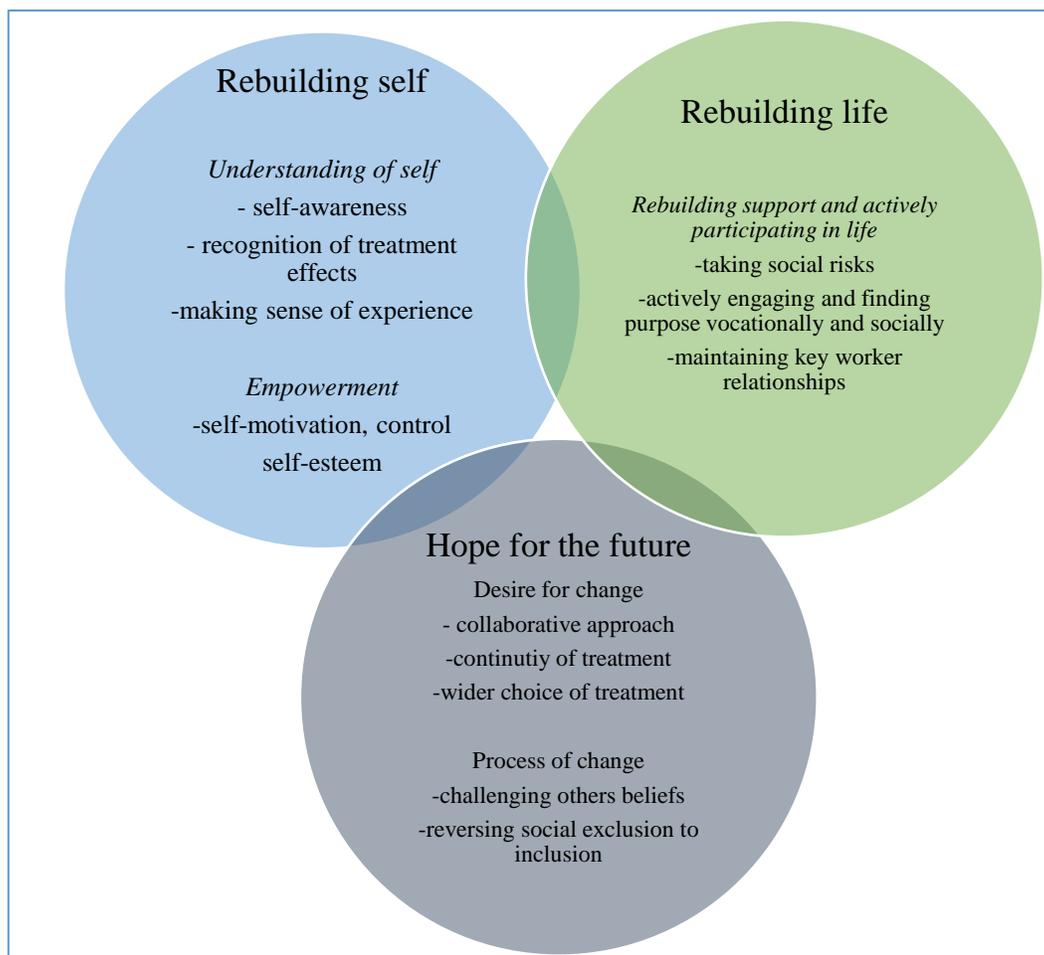

Figure 1 Service-user identified factors aiding recovery (adapted from Pitt, Kilbride, Nothard, Welford, and Morrison(²))

To help improve the recovery process, clinicians should aim to restore service-users to a community-setting wherever possible to allow them to achieve the outcomes listed in Figure 1. Technological interventions, particularly mobile phones, can facilitate this shift as they enable step-down care which is both low-intensity and user-led. What is more, these options are reliant on service-users' resources, rather than incentre facilities, reducing overall costs.[8, 9] This shift to self-management promotes independence and subsequent empowerment of service-users. Equally, as eHealth is available in several forms, there is greater choice of management options making recovery more personalized. Importantly, evidence suggests that those with chronic psychosis use the internet as frequently as people without mental illness.[10] Ownership of smartphones is also growing amongst those with psychotic illnesses, and usage again resembles that of the general population.[11] It has been further proven that this group is also more likely to use the internet in order to access health information.[10, 12] The use of accessible and familiar technologies such as mobile phones may help to normalize mental illness, and reduce the stigma of psychosis as these devices are so widely used. ICT is a widely available resource for service-users which can be employed for symptom monitoring, relapse prevention, psychoeducation, and for health promotion.[13, 14] Current eHealth interventions that demonstrate these are described below.

Mobile based

Telepsychiatry

Like traditional outpatient psychiatric appointments, a mental health professional phones weekly or daily depending on service-users' needs to advise on coping strategies, medication issues and assess mental state.[15, 16] This minimizes unnecessary travel costs, the stigma of the 'waiting room', and is a more flexible and time-saving intervention compared to traditional outpatient appointments.[8] Additionally, those with an acute deterioration in their health can be readily contacted and reached for immediate intervention.

SMS based interventions

SMS, or text message based intervention systems encourage service-users to self-report symptom frequency, severity and intensity.[17] These responses are analyzed by a computer algorithm and in turn send reply text manages that suggest self-management techniques, or notify a clinician when high risk responses are sent.[18] Additionally, as symptoms are reported in 'real-time' relapses can be identified earlier allowing intervention to be delivered sooner. This medium can also send 'reminders' for service-users with reduced concentration to take medication as appropriate.[19] Qualitative data from a study in the UK examining SMS symptoms self-report predominately highlighted that the format was acceptable due to familiarity of device and perceived informality of the intervention.[17] Additionally, some participants felt that the intervention was useful as it could detect acute changes in mental state.

Smartphone Apps

Unlike earlier mobile phone models, smartphones are capable of both accessing the internet and displaying audiovisual content. Several applications, or 'Apps' have been developed nationally, such as 'My Journey' and 'Silver Linings'.[8, 20, 21] They use service-users' clinical data alongside self-report scales to deliver interactive, educational, and advisory low intensity care. This form of intervention is multifaceted, as it has the potential to simultaneously monitor symptom progression, provide coping strategies and inform clinicians about risk of relapse. Moreover, the content is accessible at all times, promoting service-user autonomy as Apps can be accessed at a time appropriate for the individual. This may also be more acceptable for service-users with low levels of motivation and poor concentration who find strategies learned in traditional therapy sessions difficult to remember.[8] Two American studies tested Apps in Schizophrenia populations with positive results.[22, 23] 'WellWave' prompts service-users to exercise, which is known to improve mental health, and regularly self-asses' mood. 70% of participants increased their physical activity and reported in qualitative interviews that the App helped to structure daily routine and motivate service-users to improve their physical and mental health.[22] Similarly, 'FOCUS', collected service-user data from numerous self-reported domains and offered appropriate advice on each.[23] This included help with improving sleep hygiene, anger management, cognitive behavioral therapy, etc. This App was found to be efficacious and

acceptable, 87.5% reported a reduction in symptoms on the Positive and Negative Syndrome scale, and 93.7% felt it was acceptable to use.[23] Arguably, these results emphasize that technology helps with service-users understanding of illness and recovery, as they reinforce the positive effects of multifaceted treatment. It has also been illustrated that this form of technology assists service-users in rebuilding their daily lives (see Fig 1) as WellWave helped participants to exercise and structured their days.[22]

Internet and computer based

IT based psychoeducation

This provides service-users with information regarding psychotic illnesses and symptoms. Some formats also provide information regarding treatment options (specifically medication management), relapse prevention and local facilities which may aid recovery following discharge from an acute setting, such as employment and housing services.[13, 24] This intervention is typically delivered in an acute setting with nurse-led guidance. This format enables service-users to acquire information flexibly at their own pace in combination to professional guidance. In general, computer/internet-based psychoeducation could allow for a greater consistency of care, as the modality in which psychoeducation is delivered remains consistent and is not affected by changes in staffing.[24]

Social media and peer discussion forums

Social media utilizes the internet's ability to connect numerous service-users in different locations. Social media and peer support forums encourage service-users to share experiences of psychosis and management options which aided their own personal recovery.[12] This in turn may help those who were previously socially isolated (a risk factor for psychosis) gain confidence in their social skills by interacting with peers in an informal environment.[12] The opportunity to practice and refine interpersonal skills in a 'safe space' may also make socializing in 'real-life' less daunting.[25] These discussions can be clinician led to maximize their efficacy by

maintaining focus of the intended discussion topic. Social media also offers an alternative option to face-to-face support groups which can cause feelings of embarrassment and intimidation. A systematic review explored how social media was used by people with psychotic illnesses, and predominately people used them to build friendships, give advice to others, and share experiences.[25] Notably, advice given and received did not just pertain to seeking treatment, but also housing and financial issues.[25, 26] A study by Bauer et al.[27] found that service-users disclosed experiences of illness as self-help mechanism.[27] The concept of belonging to larger group also incited feelings of support and empathy. This evidences that online relationships like these allow service-users to rebuild their perceptions of themselves and make sense of their illness experiences. Inclusion in a social network online can help with reducing felt stigma of psychosis, and empower individuals to form relationships offline.[12]

Novel ICT

Virtual Reality; Avatar therapy

'Avatar' therapy allows service-users to interact with computerized personifications of persecutory, auditory hallucinations.[28] The interactions the service-user has with the Avatar are guided by a mental health professional that encourages users to challenge negative voices, and subsequently control them to become positive. The overall process of this therapy allows patients to become less fearful of intimidating hallucinations. This can induce several positive effects; service-users gain a greater sense of control over their symptoms, increasing feelings of self-control which may empower service-users to actively engage in society, where they may have been too anxious to do so previously. An Avatar study based in the UK illustrated that the intensity and frequency of abusive auditory hallucinations significantly decreased for some service-users, as measured by the Psychotic Symptom Rating Scale.[29] Moreover, some service-users also had a reduction in suicidal ideation.[29]

Serious simulation games

As with Avatar therapy, serious simulation games make use of augmented reality to recreate social and functional situations digitally.[8] These games resemble standard occupational therapy

tasks which are frequently criticized as being too 'boring'.[30] However, augmented reality games are perceived to have a higher acceptability due to added audiovisual stimulation, therefore making standardized tasks more interesting. Naturally this increases service-users' motivation to engage with interventional approaches and acquire new, useful skills which can be used to carry out daily tasks and navigate social situations.[8] Some games even help vulnerable service-users with valuable skills such as assertiveness.[30] As with Avatar therapy, this treatment approach is relatively recent. More research is needed to ascertain how effective novel therapy is in the long-term and whether or not there are any ill-effects of eHealth. This is further discussed below.

Barriers to implementation

As discussed above, technology is available in several interventional formats, giving service-users with a psychotic illness a wider choice of management options. Whilst in theory this should empower service-users to self-manage illness there are challenges associated with 'eHealth' implementation that need to be highlighted.

Although research suggests that smartphone and internet ownership in people with psychotic illnesses resembles that of the general population, it is unknown how effectively these mediums are utilized.[31] Similarly, although these technologies are now inexpensive and more accessible than ever before, some of those with chronic psychotic illnesses still have limited access to technology and find the prospect of using it daunting.[13, 25, 31] Those diagnosed with severe mental illness often occupy the lowest income brackets and are statistically more likely to be homeless.[32, 33] Diminished financial means create a further barrier to treatment as unless technological devices and their maintenance costs are funded by healthcare authorities, they would be unavailable to many.[34] There is also a risk of exacerbating an existing health care inequality by making technology the mainstay of treatment, further alienating those who do not have access to ICT.[8] Moreover, a number of studies have shown that older service users who had lower levels of functioning, or a longer history of illness were less likely to complete technology based trials or engage with them at all.[13, 17, 19, 24, 35] For example, some service-users trialing automated SMS self-report systems in the UK found them to be repetitive, irritating and

somewhat restrictive to daily routine due to the required frequency of self-reporting.[17] Similarly, participants in a computer-based psychoeducation study found the intervention ineffective as it was lengthy and inappropriate for those with more severe psychotic symptoms.[24] With these concerns in mind the central question becomes, is technology as widely applicable and clinically effective in 'real life' as initially anticipated?

As previously noted, a central aspect of recovery from psychosis is self-management in a community setting, and whilst studies performed in inpatient settings have shown promising reactions to eHealth solutions, these results have not been replicated in any long-term community settings, or without onsite aid for intervention use.[8, 11, 13] This may suggest that the recovery process within the community may be stunted due to a lack of technical support and face-to-face guidance, a separate essential component of recovery.[2, 5] Naturally, this could cause a greater reliance on personal meetings with mental health professionals, increasing time demands for service-users and clinicians alike whilst largely obfuscating the use of technological treatment solutions.[34]

Lastly, mental health professionals themselves may struggle with eHealth strategies. Although the use of ICT for imaging and electronic health records is familiar to most clinical staff, the successful navigation of certain Apps and novel interventions may require further training. Naturally, this indicates that dedicated training and funding should be provided to healthcare professionals providing e-interventions, in addition to technology set-up and maintenance costs.[8, 34] This cost will likely need to cover required precautions to safeguard and protect highly sensitive service-user information for eHealth interventions. This is particularly the case for any strategies which require the use of mobile devices, as there is a potential for 'hacking' of personal information by insurance policymakers on smartphones.[34] Failure to adequately protect this new source of personal data may cause a loss of service-user confidence in mental health management strategies.

Further directions and conclusion

Broadly, ICT interventions have been deemed effective, acceptable and feasible to use on a daily basis by clinicians and service-users.[4, 13] Certainly, there are some issues in the provision of eHealth which also exist currently exist in the delivery of traditional mental health management, for example, homelessness and low perceived need for intervention.[34] However, there are also new issues that are unique to this recent format of treatment, questioning the practicality of technological treatment. However, as eHealth is mostly in its early stages it is possible that it can become a widespread and individualized form of treatment provided time and resources are invested in its clinical evolution. Specifically, heavy collaboration between healthcare providers and service-users will be required to restructure and improve current ICT measures.[17] Already feedback has been given regarding text-based intervention, namely the repetitiveness of self-reporting.[17] Others have reported they felt Apps drew negative attention.[35] Perhaps to cater to these individuals' needs subtler forms of technological interventions can be used. For example, wearable technologies which can detect changes in mental states by increases in heart rate, changes in physical signs due to sleeping patterns, drug misuse. Alternatively, relapse risk could be calculated by technologies that monitor changes in voice patterns. Data such as this can be tracked over time and actively monitored by clinicians. This allows for those who are vulnerable to relapse to be reached in a timely manner. Although this facet bears a similarity to existing technologies it is a less invasive mechanism of calculating risk.

Whilst the nature of technology allows for constant improvement and new ways of management implementation, it should be recognized that ICT is not a substitute for multidisciplinary support but rather a useful auxiliary tool to be used in combination with traditional treatment methods. Technology is capable of promoting independence and autonomy as its integrates both individual preference and self-led management. However, it is clear that service-users with more complex needs should use technology alongside professional guidance and support. This multi-faceted plan of care would not only encourage personal rebuilding and recovery, but also ensure that progress is monitored and maintained.

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