From Telehealth to an Interactive Virtual Clinic

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Contents

Abstract

Access to mental health services is, due to current epidemiology, extremely limited. For some areas addressing the special needs of mental health clients, access to experts seems to be nearly impossible. In developed countries, typical explanations include a lack of funding and limited numbers of experts as well as their

regional distribution. Building capacity in specialist areas and developing accessibility are two challenges for the health-care system globally.

E-health based on improving web-based technologies provides more possibilities in response. Telehealth initiatives already try to support access in remote areas. High-speed Internet coverage and the development of web-based solutions allows for a new generation of approaches – virtual mental health clinics.

This innovative approach allows for increased capacity through improved communication, more effective service delivery and improves quality of care in a patient-centered treatment model. It could redefine the role of different settings and procedures between existing physical health-care systems with its dominant role, web-based expert-patient interaction, and integrated systems, e.g., addressing frequent conditions like PTSD (PTSD coach) or mood disorders (WalkAlong) with web-based platforms.

Key elements of a virtual clinic need to build on the use of mobile communication devices, mobile health (M-health), videoconferencing (V-health), and communication with patients in an integrated manner, combined with additional online tools to improve accessibility and quality of care. Other possible features and technologies are already evolving like the use of sensor technologies, virtual reality, and gaming.

Conclusion: The web and mobile technologies offer the chance for a paradigm shift in health care towards patient empowerment, early support, and sustainable care.

15.1 Introduction

With limited resources and increasing demand, the appropriate delivery of health care becomes a complex challenge. Already today developed countries invest 10 % of their GDP into health services, while catastrophes like Ebola and HIV become global disasters with global consequences. For example, the economic impact of Ebola in West Africa could reach as high as $32.6 billion by the end of 2015 – over two times the combined GDP of the three core countries [1].

Continuation of the current pattern in health policy is not an option, and for future development – a paradigm shift is necessary. For several reasons, mental health is an area of enormous challenges, with a rapidly growing burden of disease that increased by 37.6 % between 1990 and 2010, and which could benefit from new opportunities that modern technologies are offering [2]. The concept of a virtual clinic is a core concept of web-based technologies as a key response to the crisis.

This chapter will help the reader to:

1. Understand the rationale for the emergence of virtual clinics.
2. Identify their critical components and desirable features.
3. Be aware of the potential benefits of modified service delivery and how it impacts mental health patients, providers, and commissioners.

15.1.1 Background

The structural problems of the current mental health care system are substantial. A rapidly growing burden of disease makes it the largest area in medicine, but there is minimal coverage by appropriate specialized services – with only 10 % of patients ever able to see a specialist, indicative of critical dysfunction in the standard system of care [3].

The proposed concept of a virtual mental health clinic may become a key tool and cornerstone of the paradigm shift in the delivery of mental health care. The idea is to fundamentally reorganize the interaction between patients and health-care professionals, as well as between different groups of health-care professionals especially primary care and specialist care. With a dramatic increase in the use of modern communication tools, new system solutions, and a growing readiness in the population to use web and mobile communication for health care, significant momentum may allow for real change.

15.1.2 Lack of Mental Health Service Capacity

As shown by the national comorbidity survey in the USA and other epidemiological and health-care system research, only a small minority of patients are able to access expert support or even any basic professional help [3–5].

Additionally, surveys show that primary care has to carry a huge burden of mental health care without appropriate support, training, and capacity. From a family medicine perspective, mental health expertise and support is the most critical for daily practice [6]. Moreover, there remains significant stigma attached to mental health, and patients are sometimes hesitant to mention their problems to family physicians [7]. Waiting times for direct access to psychiatry or even specialized mental health services even in metropolitan areas are unacceptably long, e.g., over 6 months for psychiatry in Vancouver.

15.1.3 Problems with Quality of Care

The quality of mental health and addiction care is often unsatisfactory. Approaches are very often generic and not based on best practice, effective interventions are not available, and polypharmacy or an ineffective use of psychopharmaca is a known problem [8]. An interesting example for research in this area is the study of the Institute of Medicine (IOM), which demonstrated the very limited overlap of best practice treatment according to existing guidelines and average treatment delivered [9].

15.1.4 Difficulties with Access and Long Waiting Times

The current health-care system use is a reflection of limited or nonexistent capacities in community mental health care. If waiting times are too long, patients – who

may otherwise be able to manage their mental challenges in the community – end up in emergency rooms and acute care, at much higher cost. Such patients are also typically provided with less effective interventions. In particular, patients in remote areas with no access to mental health care may especially suffer negative consequences of this system gap. This also contributes to non-health-care-related costs in society related to absence from work and loss of productivity, police and jurisdiction, etc.

15.1.5 Technologies and New Strategies of Response

The three objectives can be identified as follows:

1. Telehealth and web-based technologies are currently being used to support services in remote areas and populations with special need. The number of apps addressing specific health issues has grown substantially and now numbers around 100,000 in total, with around 100 being specific to mental health [10].
2. Growing availability of the web and readiness to use E-health services is also documented in a recent survey by Price Waterhouse Coopers (PWC) on mobile health. This major consulting company sees web-based technologies as critical for the future development of health care [11].
3. Comparing the possibilities of emerging technologies to the level of implementation and the contribution of E-health to the current provision of health care demonstrates a significant gap that is possible to address with the concept of the virtual mental health clinic.

15.1.6 Position of a Virtual Clinic in Future Health-Care Delivery

The interplay between the following four key elements will be an important consideration for future health-care delivery.

- The existing physical health-care system, providing face-to-face services, accounts for about 90 % of current health care.
- Existing digital support services in direct connection to the physical health-care system, such as Electronic Medical Records (EMR), planning and documentation tools, financial systems, billing, etc.
- Virtual clinics are nearly nonexistent. These are web-based services catering for both professionals and patients, covered through normal health-care funding.
- Integrated web systems for disease management and knowledge exchange, providing a range of resources to clients and professionals.

The possible overlap between the current system and technology is illustrated in Fig. 15.1.

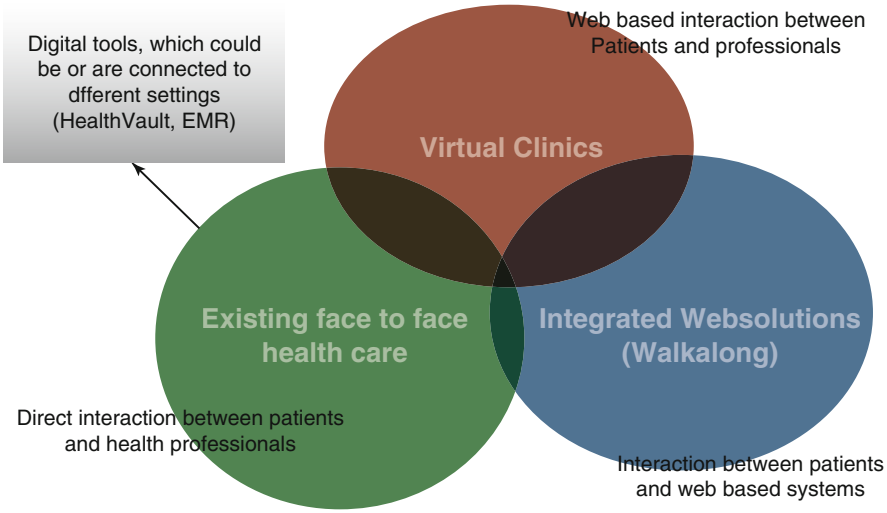

Fig. 15.1 Key components of future health care

15.2 Vision of a Virtual Clinic (VC)

The virtual clinic is an effective way of providing high-quality care, based on the needs of patients in an accessible, transparent, and dynamic manner, using existing and emerging new technologies.

The core objectives of this development are based on an overall different approach to health-care delivery: to make health-care delivery more patient centered, to empower users, and to provide an interactive and integrated framework for sustainable support across the continuum of needs.

15.2.1 Building Capacity for Mental Health Services

With very limited expertise and big problems in terms of accessibility of services, this aims to:

- Help mental health experts and physicians to focus on interaction and patient-focused activities instead of spending too much time with administrative tasks such as documentation and billing.
- Increase the flexibility of interaction through intensive use of mobile technologies and communication.
- Reducing the burden of necessary infrastructure, allowing therapeutic interaction outside of clinics and offices, more convenient for patients.
- Make it possible for mental health experts in administrative or research functions to take on a limited burden of care to address needs.

15.2.2 Quality of Care

Improvement in quality of care is a long-term, ongoing, dynamic process. The (web-based) system needs to support professional efforts in quality assurance through the following mechanisms:

- Improving the quality of assessment and screening by the provision of standardized psychometric tools and reporting mechanisms on an ongoing basis.
- Providing online resources extending the professional tool kit, as well as self-help tools.
- Providing integrated information and knowledge exchange on best practice.
- Supporting ongoing communication between doctors and patients through the use of modern communication tools and mobile devices.

15.2.3 Improving Access

Access to mental health care is one of the most critical bottlenecks in the current system. In addition to long waiting times, psychiatry and special expertise are often only available in metropolitan areas. These issues will be addressed using the following strategies:

- Web-based communication and interaction with mental health professionals, allowing patients to contact the system, and for professionals to respond in an asymmetric (asynchronous) manner whenever suitable.
- Supporting easy, ongoing communication and other services such as assessment, prescription refill, or information, without having to visit the clinic.
- Supporting direct patient-doctor interaction through videoconferencing.
- Providing effective online treatment tools at any given time.

15.2.4 Providing Online Resources

Frontline clinicians may often not be aware of existing online *resources* and consequently not recommending them to their clients. It is also complex to oversee existing solutions and new developments. An important goal of the virtual clinic is to support access to proven and effective online solutions, including:

- Online training and information.
- Online psychotherapy, which is a well-tested area with some effective solutions especially in the treatment of depression and anxiety.
- Integrated web solutions for specific populations such as WalkAlong (WalkAlong.ca) for youth with mood challenges and PTSD Coach (http://www.ptsd.va.gov/public/materials/apps/PTSDCoach.asp) for individuals with trauma experience [12, 13].

15.2.5 Doctor-Patient Interaction and Sustainability of Care

Due to workload, funding, and organization, typical physician-patient interaction is only limited to a few minutes. The virtual clinic model shall support interaction between professionals and patients over the long-term using several mechanisms:

- Long-term screening and assessment of symptoms, including feedback loops to the client.
- Questions and reminders automatically produced through the system.
- Short consultations (by email) about ongoing treatment and possible questions.

15.2.6 Feedback and Evaluation

To improve the quality of care, and adapt services to the needs of the patient, ongoing feedback loops and systematic evaluation are essential. A virtual clinic system could allow patients to rate experiences and professionals to systematically evaluate use and outcomes of their interventions, like it is already standard in other online service areas like travel.

15.2.7 Better Interaction Between Primary Care and Specialist Services

In essence any system of support needs to cover the essential domains of recovery. Primary care plays a special role, often being the main or only source of support. Its quality relies on functioning secondary and tertiary care.

Improved communication, reporting, and other mechanisms provide additional tools and support a more intense and timely collaboration between primary care and psychiatry – an especially relevant GP specialty given the enormous burden of disease in their daily practice.

With patient permission, the exchange and interpretation of assessments and information could redefine the role of experts and allow for higher quality of primary care for the mentally ill.

15.2.8 Principles of Health-Care Delivery in the Virtual Clinic

The potential strengths of the virtual clinic concept can be stated in Table 15.1, which could also be used as quality criteria.

Health-care paradigms, innovations, allocation of resources, and structural decisions appear different based on the party involved. An interesting and powerful reason to seriously consider the proposed virtual clinic approach is that it has significant advantages for the system, patients, and treatment providers.

Table 15.1 Strengths and quality criteria for the VC concept

Dimension	Function
Accessibility	Patients should be able to use mental health services without barriers. The system should be possible to use in an uncomplicated and direct manner. It should provide access and support for patients from remote areas or from marginalized populations
Increased capacity	The VC should add capacity to the existing mental health and addiction system; improving efficacy, integrating additional professionals, and using tools to optimize the diagnostic and therapeutic process, including documentation and reporting
Sustainability	The system should support mental health professionals to continuously stay in contact and monitor health outcomes, through reminders, screening and assessment, and mobile communication. Through integration with primary care and other support systems, it would be easier to create clinical pathways
Contact and communication	Through the intense use of modern mobile communication, videoconferencing, and system flexibility, the VC will be able to improve contact and enable or intensify interaction if necessary
Quality of care	It will support diagnosis and treatment according to best practice through the ongoing provision of information and links to literature and research. The integration of gold standard tools into the system will improve the quality of diagnostics and reporting to the client. The integration of online therapy and resources will increase the range of interventions
Evaluation and transparency	Ongoing feedback loops, ranking and rating, as well as quality assurance mechanisms will be part of the system to allow users and health-care providers control of the quality of care and health outcomes
Empowerment	Most of the time patients and families have to deal with problems, coping, and therapy management on their own. The professional system needs to empower and encourage them to do that in the best possible way. This includes respect for their decisions, transparency in support of informed decision-making, and acknowledgment of needs
Peer and family involvement	Family members and peers are very often the main resource for patients with mental challenges. If they want to involve them, the VC should support communication and interaction with them, including joint visits or discussions
Flexibility and adaptability	Care needs to understand and adapt to different populations and user profiles to be effective. The VC should be a learning system, providing care in the most effective way
Informed decision-making	All participants in the process should have access to necessary information, research evidence, and clinical options, as well as risks to be able to make the best possible decisions for themselves

15.2.9 Advantages of a Virtual Clinic Concept from a System Perspective

The health-care system is driven by cost. While the governance and funding structures may be different, e.g., comparing the USA, Canada, or Europe, the guiding principles and values are similar. All systems face a critical increase in costs and also growing need, based-for example-on demographic development or the growing burden of disease through mental health challenges [2]. Table 15.2 highlights several key advantages for the virtual clinic.

15.3 A Comparison Between Virtual and Psychiatric Clinics

The differences between virtual and physical psychiatric clinics are explored in Table *15.3*, using multiple dimensions of comparison.

15.3.1 Functionalities for Different Groups of Participants in the Model

The VC will be used by different parties with different needs and for different functionalities as illustrated in Fig. 15.2. Ideally it should have advantages for all users in the process.

15.3.2 Functionality from the Patient Perspective

The virtual clinic concept can provide an easy-to-use and ergonomic user interface. The system is constructed to be accessible at all times, 24 h a day. Some features may be used by patients with no direct interaction with professionals through integrated web platforms, which is preferred by certain patient populations such as young people [17]. It also allows for increased peer connectivity [18–20] and may also increase health literacy [10].

Why would a patient use it?

1. Accessibility

   An important advantage of web-based communication. In a VC, patients will be able to book appointments directly, pose questions, and access therapeutic or diagnostic resources, which otherwise would take a long time. In remote areas, patients often have no direct access to services because they are nonexistent.
2. Patient preference

   Patient preference may be especially important for younger demographics, or patients who do not want to leave their jobs to sit in a waiting room. It is easier to avoid unpleasant and stigmatized communication with access to appropriate support.

Table 15.2 Potential advantages for a virtual clinic model

Dimension	Advantage
Cost-effectiveness	The VC concept is an effective way to address overhead costs, travel times related to health care, and waiting times while improving quality of care and better health outcomes. A study from an Australian virtual clinic estimated the cost savings to be around 77 % compared to traditional treatment, without loss of efficacy. Due to the scalability of the virtual clinic model, these savings are likely to be higher in the future [14]
Avoiding ineffective use of health resources	The current approach is focused on crisis intervention and acute care. Providing mental health support online, early, and in the community could prevent the ineffective use of emergency rooms. Instead of investing in the treatment of complications and long-term consequences due to inaccessibility of care, online health platforms and virtual clinics can contribute to a more effective use of the system
Prevention and early intervention	One of the biggest problems in mental health care is the long period between first serious symptoms and a systematic/professional response. In addiction, for example, it is around 10 years [15], and this appears to be similar for most public mental illnesses [16]. Integrated web platforms and VCs can support the integration of lifestyle management, targeted prevention, and treatment in a new quality
Integration of clinical pathways along needs	The virtual clinic concept aims to connect different providers through better communication, easy referral, timely assessment, and recommendations. Access to the system is easy and encourages patients to use online treatment tools, ongoing monitoring, and other resources that go into the direction of early detection and intervention and beyond just crisis intervention
Integration with different areas of health care	The concept could function as a platform, which facilitates and integrates service provision in a transparent and collaborative way. The effectiveness of that approach depends on the readiness of different professions to change practice. Given the important role of primary care in mental health and the different professional areas involved, this may be especially important
Access to specialist	The availability and access to mental health specialists is one of the biggest problems in current service delivery. The VC concept is able to increase capacity, improve efficacy, and support timely interventions. Indeed, specialists can use Internet tools to monitor patient outcomes in order to proactively support them before a crisis develops [7]
International and transcultural options	In a virtual clinic, it may be much easier to provide services for users from different cultural backgrounds who may speak different languages. From a global health perspective, clinics may be a tool to provide health care in countries or areas with little or no infrastructure. Counseling and support can be, for instance, provided in conflict zones with international expert support for local clinicians. The potential for such a development is extremely promising
Use of resources for patients and families	The support of families and peers is critical given their role in ongoing care and crisis management for individuals with mental challenges. It is well proven that inclusion of family members into treatment is an effective psychosocial intervention, and highly underutilized

(continued)

Table 15.2 (continued)

Dimension	Advantage
Systematic evaluation	Users will be asked for informed consent on a regular basis. The system should document data on use, population, and outcomes and create performance reports whenever needed. Agglomerated data should be also possible to use for embedded trials
Development of an integrated feedback, rating, and evaluation system	Users of the clinic could be given the opportunity to rate and compare their experiences, provide suggestions for improvement, and contribute to the transparency of the process

Table 15.3 Comparison between virtual and psychiatric clinics

Function	Psychiatric clinic	Virtual clinic	Remark
Waiting times for an appointment	In Vancouver, about 6 months	Under 2 weeks	Varies across a particular region
Waiting times in the clinic	Yes	None	
Travel time	Yes	None	In some regions, long travel time with high additional cost
Standard assessments	Exception	Rule	
Mode of interaction	Face to face	Email, videoconference, chat, etc.	
Reporting	Depends	Immediately	
Regular automated follow-ups and reminders	No	Yes	
Psychotherapies	Exception	Online CBT, self-help	
Medication	Direct prescription, pharmacy waiting time, pick up	Direct prescription, medication management support	
Cost for the system		Immediate care, less loss of productivity	
Cost for the patients		No travel cost or waiting cost	
Cost for the psychiatrist	Overhead cost	License cost, no overheads	

3. Easy to navigate and user-friendly

   Good solutions are built on user expectations and are easy to navigate. Recent apps focusing on lifestyle monitoring (Nike, Apple, etc.) are fun to use, reinforcing, and engaging.
4. Availability of expertise

   Expertise is often limited. A broader network or VC helps to access specialist or people with lived experiences.
5. Additional features

   Integrated web platforms or virtual clinics provide a wealth of features which add to the expert interaction and advise from self-assessment and ongoing

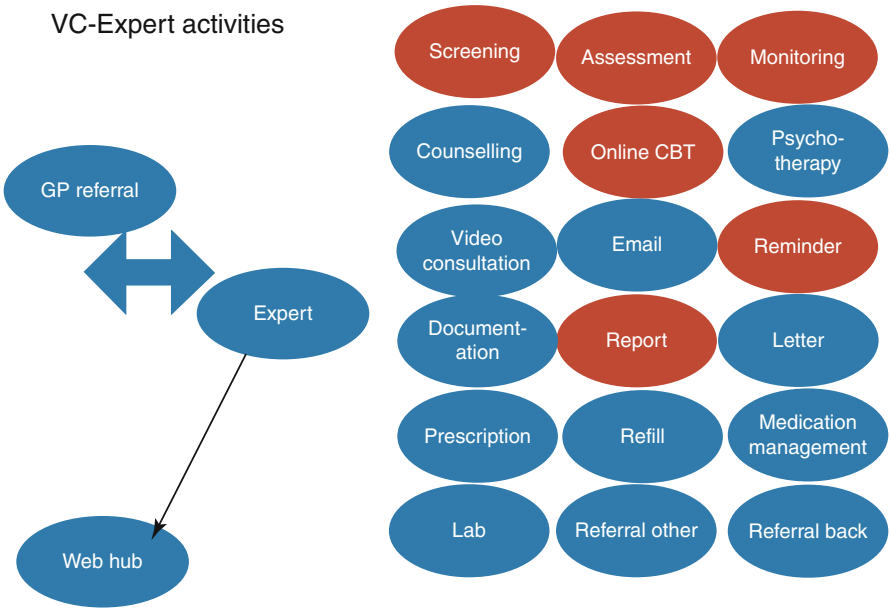

Fig. 15.2 Highlighting the various functionalities of a virtual clinic

monitoring to online therapies; easy-to-use tools expand the options for people in need.

6. Personal health record (e.g., Microsoft HealthVault https://www.healthvault.com/de/en [21])

   Only a personal health record gives users control of their records and data.

7. Privacy

Integrated Internet platforms and virtual clinics provide the option to stay anonymous and more protected.

15.3.3 Functionality from the Expert Perspective

For professionals, no office space or significant infrastructure is needed. Time-consuming processes are automated, and documentation and billing are supported. The system also improves time autonomy and flexibility in client care.

Why would an expert use it?

1. Small overheads

   Working in a VC model doesn't require administrative assistance, special rooms, or other resources.

2. Working from home, at night or in between other activities

   Given that specialists are often involved in special settings and academic environments, flexibility is crucial. The VC approach will improve flexibility of the workflow, removing the need to work specific business hours. That may also serve some patient populations better.

3. Integration of billing and documentation
   The bureaucratic burden would be reduced, so that even time-limited clinical work would be possible and useful.
4. Best range of expertise, best clinical concept
   A VC would make it easier to improve the collaboration between different levels of expertise and appropriate clinical pathways.
5. Use of agglomerated data to answer evaluation questions

Systematic data collection could answer upcoming service-related questions and improve health outcomes and quality of care.

15.3.4 Functionality for Primary Care

For referring physicians, standardized reporting and quick communication with experts, including a range of tools on mental health care, support primary care efforts and quality of care in general.

Why would a primary care physician use it?

1. Easy accessibility and communication with experts
   For primary care or emergency physicians, providing access to specialists is complicated and time-consuming. The possibilities of asynchronous communication or booked consultations could revolutionize interaction between primary care and secondary or even tertiary experts.
2. Supporting tools
   The options of an integrated web platform with assessment, monitoring, informed decision-making, etc., are useful tools already in existing practice serving the mentally ill.
3. Working from home, at night or in between other activities
   The VC approach improves flexibility of the workflow, removing the need to work specific business hours. That may also serve some patient populations better.
4. Integration of billing and documentation
   A VC system would support different aspects of medical work that are not a direct part of patient interaction, but consume enormous amount of time.
5. Effectiveness
   It would be possible to serve more patients better in a given period of time.
6. Sustainability and monitoring of clients

Automated reminders and monitoring functions allow for follow-up with necessity to intervene only in case of deterioration. Critical developments could be detected much earlier, which would support the early intervention approach.

15.3.5 Functionality for Health Authorities and Treatment Providers

The VC improves documentation, transparency of process and patient flow, and ongoing evaluation and reporting to allocate resources and improve client care.

Through integration of different components, it could help to establish and support more clinical pathways and sustainable health-care delivery beyond crisis.

Why would a health authority, treatment provider or institution use it?

1. Flexible tool with Electronic Medical Records (EMR)

   EMR systems are huge databases with limited flexibility. As part of their business model, they do not like to easily share information, and their integration into complex environments is expensive and complicated. A VC system with defined data exchange protocols can function as an interface, which remains under the control of the provider and improves functionality. The protocols are defined standards and ready to use. In the future, VC systems may also become an alternative to existing and often dysfunctional EMR systems. VC systems also reduce the dependence on certain solutions and companies and allow for choosing better solutions without loss of data and control.
2. Cost-effectiveness

   Small, flexible, organizational, and technical solutions are more functional and less expensive. Health care is a dynamic process and needs permanent development and adaptation to changing environments. The ability to change functionalities with little investment marks the superiority of this approach.
3. Quality improvement

   Quality assurance and improvement are a key domain of functional health-care systems. As already mentioned, standard assessment, monitoring of key indicators, and online resources are already available as part of integrated web platforms and apps such as WalkAlong and Mindcheck [22], for example.
4. Clinical pathways

Patients are often served by several treatment providers or institutions. Information exchange and communication is a critical component even in health authorities. VC could be tailored to specific needs, and interfaces could be created to make ongoing care more effective.

15.4 Key Components and Functionalities of a Virtual Clinic (VC)

15.4.1 Patient Registration

To use the clinic, users must register in order to benefit. After a guided tour and video explanation of the available functions, patients are asked for informed consent and other information to establish an appropriate legal framework. A picture (or avatar) should also be included to make sure that in case of a videoconference, the right person participates.

15.4.2 Booking of Appointments

The booking system should allow clients to choose their own appointments and how they interact with the system. The physician has to confirm their appointment. The

booking procedures should also allow for crisis appointments in case of emergency, and participating physicians should provide a limited number of crisis consultations.

15.4.3 Introduction/Engagement

An introduction and a guided tour are critical for engagement. The whole design and atmosphere/tone of the clinic needs to support engagement. It should be warm, welcoming, and personal. A help function could support orientation.

15.4.4 Assessment Tools

The VC platform should allow for easy and flexible integration of assessments. The display and the reporting should support the use of assessments, scoring, interpretation, and ongoing long-term monitoring.

15.4.5 Videoconferencing

Videoconferencing is an important communication tool. It should allow high-quality, secure communication between doctor and patient, among professionals, between several professionals like primary care physician and expert and patient, and physician, patient, and family. High-definition video would be ideal. With two-time encryption, it is already allowed in other parts of British Columbia.

15.4.6 Prescription and Medication Management

Prescription, medication monitoring, documentation, compliance monitoring, and interpretation of side effects are key parts of the doctor-patient interaction. The clinic should support the professional side as well as the patient's side as effectively as possible. The goal is to provide high-quality information at the general and individual level, to professionals as well as patients, to make the best possible informed decisions. If this component functions well, it could contribute to better care and a reduction of polypharmacy, side effects, and noncompliance. Collaboration with pharmacies and other health professionals such as nurses, emergency settings, and acute care could also support the management of emergencies. This system should allow for an actual printed overview and history that the patient could choose to share with their support network.

15.4.7 Online Treatment and Resources

Mental health will be, and already is, the medical area with the best online treatment options. The platform should allow for integration of existing online CBT

and support the interface and development of new approaches. It should provide recommendations for the use of online tools and rate them based on scientific evidence. This is an evolving area with some interventions that are well tested, like online CBT for depression and anxiety, smoking cessation, and PTSD coach, and some very good new concepts that still need evaluation. It would be invaluable if the system could contribute to the research on use and quality of online resources. Appropriate designs and evaluation strategies need to be developed.

15.4.8 Disease-Related Modules

To improve adherence to guidelines and scientific evidence in the treatment of mental illness but also physical conditions, it could be very helpful to prepare disease-related modules that could be used and recommended by experts. For example, it could contain a depression module, anxiety module, substance use module, a PTSD module, and some physical health modules like obesity, metabolic syndrome, hypertension, and sleeping disorders. These could be improved and developed over time and should include screening recommendations and tools, gold standard assessments, online resources, key facts for self-management, and online treatments and tools.

15.4.9 Documentation and Reporting

Documentation, letters, and reporting are the most time-consuming and critical areas of medicine. The support of quality documentation and reporting would be an important reason for professionals to use this system. Other than in the existing EMR systems, it needs to support patient needs and better communication between health professionals around treatment. The reporting should integrate different information sources, clinical notes, assessments, information about treatment, and medication into understandable and useful documents.

15.4.10 Communication with Patients

The support of communication between patients and therapist and patient and peers should be possible in different ways, based on the principles of easy access. It should be effective in terms of time and transparently regulated to make sure that it is used appropriately. It may also help to explore different levels of communication such as exploration and counseling in the planned session, follow-up reminders and questions, emergency advice, or questions and answers to get advice on a specific topic or general advice. In case of high volume, a moderator or administrator could help to direct users to appropriate sources. In general, it is important to discuss how communication should be organized and optimized.

15.4.11 Communication Between Professionals

Typically several professionals are involved in the treatment of complex conditions, and communication between the primary care physician and the mental health experts is especially important. Information, feedback, or advice should be shared in a defined time frame. Reports should be well structured and short. Emergency advice should be possible in a defined procedure.

15.4.12 Evaluation Section, Research Section

The evaluation section could be a separate added component, which will not be part of the basic package. It may be interesting to consider a basic and advanced version that could include a cross-sectional overview of clinic users and clinic performance (e.g., access or response times), and satisfaction levels amongst different user groups. The research tool could help set up embedded trials and evaluate specific questions like who is using what. If done in a sophisticated way, such a tool could be very helpful for timely clinical research and evaluation.

15.4.13 Knowledge Exchange: Informed Decision-Making

The availability of helpful and supporting information, links to research and evidence, and user-based input are critical and need to be updated on a regular basis. Specific links to quality Websites and a select choice of key papers, summaries, and information should be part of the different modules. The selection, presentation, and quality of content are critical in times where there is an overwhelming amount of publications.

15.4.14 Interface to Integrated Web Solutions (e.g., WalkAlong)

The virtual clinic should encourage and facilitate the use of integrated web solutions as another important setting for future health care. If possible, links should be integrated into modules but also as short recommendations in a separate spot.

15.4.15 Interface to Providers (e.g., Capacity Check, Waiting Times, etc.)

With interested providers or authorities, an interface could be defined which would allow patients to check real-time capacities, waiting times information, as well as description of services and contacts.

15.4.16 Integrated Evaluation

1. Population monitoring
   The purpose is to better understand potential users of the virtual clinic, to improve performance and adapt to the specific needs of changing populations. Data collection, based on informed consent, would happen automatically, especially using social demographic information.
2. Health outcomes
   The purpose of monitoring outcomes is to understand whether patients are improving or not using the interventions. For general monitoring, broader screening tools can be used.
3. System use and performance
   This dimension should reflect the way the VC is used by patients. Besides assessing time variables and frequencies, users should be interviewed about their experiences.
4. User satisfaction

Satisfaction is critical for efficacy and performance. Both experts and patients should be consulted with short questionnaires as well as in detailed interviews on a regular basis.

15.5 Discussion

E-Mental Health is in its early stages of development. The number of isolated health apps is increasing every week. The big technology players such as Google, Microsoft, and Apple are working on interfaces and solutions, or even their own products [23]. Big EMR companies are dominating and expanding markets in hospitals worth billions without any evidence of the positive impact they have promised for the past 25 years. The contradiction between growing possibilities, upcoming technologies as momentum, and the slow progress in addressing significant system problems in health care is becoming obvious.

In particular, two things are missing: common principles in the development of health care based on patient needs and values which guide the use of resources, structures, and decision-making. Without these, the added value to the current system is difficult to prove. The different components need to play together and interact to make a difference.

To build something significant, you need development and research capacity. Universities and private business need to take on their responsibilities. Systematic bold funding opportunities are needed to create a new sector of E-health, one that is not limited or led by EMR companies. To translate face-to-face interaction and procedures into digital formats needs expertise and capacity at universities and in development labs.

The use of a VC is flexible and provides different options in how it can be used: whether as a substitute or an addition to face-to-face interventions. The next few years will see several different models before there will be something like a mainstream approach. Some possible principles are described for consideration.

15.5.1 Limitations

The experience with the virtual clinic concept is very limited. The different, necessary components - funding models, technology, resources, professional acceptance and skills - need to be aligned, developed and implemented.

The ratio of virtual to face-to-face care is still something to explore. Virtual clinics are not a replacement for existing structures and institutions, but more of a complement which allows for capacity building in different areas of health care and makes better use of physical structures and face-to-face interactions (see Fig. 15.1). The best functionality is something which needs to be explored and may be a dynamic component based on patient needs.

The quality of existing solutions can be improved, particularly around specific engagement for target populations. User interfaces for young people may need to look different than for the elderly, for example, and navigation, media use, and platform should reflect general preferences in the use of technology.

Beyond that, the potential use of specific technologies such as virtual reality, simulation, and gaming has not been fully explored, and may well be an important direction to explore in future.

Additional costs of online resources are limited but are a factor. The involvement of private business may create a separate health market, which could contribute to developments like the Apple App Store.

Last but not least, acceptance of users is a main prerequisite for changing habits and the uptake of opportunities. The implementation of any innovation or change is a widely underestimated challenge. Even if good alternative solutions exist, it can take years until they may take over as a standard. In regard to E-Mental Health, web-based solutions need to be adapted to specific needs of a population served and to existing physical solutions and clinical pathways.

Change needs investment. Although compared to other health services E-Mental Health is inexpensive, without the support of this innovative sector nothing will happen.

Who are the change agents?

Everyone who is aware of the significant pitfalls of the current approach and its consequences. We need a coalition for a paradigm shift.

Conclusions

The web and upcoming mobile technologies are more than just gadgets: they are critical tools to change paradigms in the mental health-care system. Patient empowerment needs to be front and center to turn the development on its feet. The virtual clinic model and integrated web platforms are important web-based systems, proving it is possible that patients can control their data, have access to

care, and make informed decisions. At the same time, they have the potential to improve quality, build capacity, and make treatment more effective.

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