REVIEW ARTICLE

Recurrence of mental disorders: Evidence from surveillance analysis

DOI: 10.29063/ajrh2024/v28i10s.41

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Abstract

Psychosis is a psychiatric disorder characterized by hallucinations and delusions and include schizophrenia spectrum disorders and mood disorders such as depression and bipolar disorders. Treatment for psychosis lasts a long time with increased likelihood of hospitalization. Surveillance is used to monitor trends in mental disorders to predict and prevent recurrence. The objective of this paper was to the benefits of surveillance to prevent recurrence of mental disorders. The method consisted of a search for Google scholar, PubMed, NIHR and Research Gate. Ten articles obtained, while six were suitable for analysis based on suitability of purpose of the study. The results showed that surveillance variables consisted of risk factors, protective factors, triggers factors, and mental health indicators. The impact included socio-economic, disability, and the risk of suicide/self-harm. It is recommended to include surveillance activities in community-based psychosocial rehabilitation programs, so that recording signs or symptoms of relapse can be carried out routinely. *(Afr J Reprod Health 2024; 28 [10s]: 386-396).*

Keywords: Surveillance, santé mentale, psychose, rechute, troubles mentaux

Résumé

La psychose est un trouble psychiatrique caractérisé par des hallucinations et des délires et comprend les troubles du spectre de la schizophrénie et les troubles de l'humeur tels que la dépression et les troubles bipolaires. Le traitement de la psychose dure longtemps et comporte un risque accru d'hospitalisation. La surveillance est utilisée pour surveiller les tendances des troubles mentaux afin de prédire et de prévenir la récidive. L'objectif de cet article était d'évaluer les bénéfices de la surveillance pour prévenir la récidive des troubles mentaux. La méthode consistait en une recherche sur Google Scholar, PubMed, NIHR et Research Gate. Dix articles ont été obtenus, tandis que six se prêtaient à une analyse basée sur la pertinence de l'objectif de l'étude. Les résultats ont montré que les variables de surveillance comprenaient des facteurs de risque, des facteurs de protection, des facteurs déclencheurs et des indicateurs de santé mentale. L'impact comprenait le socio-économique, le handicap et le risque de suicide/d'automutilation. Il est recommandé d'inclure des activités de surveillance dans les programmes communautaires de réadaptation psychosociale, afin que l'enregistrement des signes ou symptômes de rechute puisse être effectué systématiquement. *(Afr J Reprod Health 2024; 28 [10s]: 386-396).*

Mots-clés: Surveillance, mental health, psychosis, relapse, mental disorders

Introduction

Psychosis is a symptom that affects the mind, where the sufferer loses touch with reality so that he is unable to distinguish delusion and reality[1]. These events are characterized by hallucinations (seeing or hearing things that others do not), and delusions (false beliefs). Other symptoms can include incoherent or nonsensical speech, and inappropriate behavior[1]. Psychosis is a symptom of many trigariatric, neuropsychiatric, neurological, neurodevelopmental, and medical conditions especially in the incidence of schizophrenia and other psychotic disorders[2]. The prevalence of people with mental disorders in the world in 2019 was 13% or 970 million people, as many as 7 per 1 million households[3], while the prevalence of psychosis/schizophrenia was 6.7% in Indonesia based on Basic Health Research in year 2018[4]. In 2022 based on the Performance Accountability Report of the Directorate of Mental Health in Indonesia, the prevalence of anxiety disorders among adolescents (aged 10-17 years) was 3.7%, and depressive disorders was 1%. About

1.4% of teens had suicidal thoughts in the past 12 months and 0.2% had attempted suicide in the past 12 months[5].

A major concern relating to the treatment of mental disorders is the possibility of recurrence of the disease characterized by the appearance of symptoms, or signs of relapse so that the patient is readmitted to the hospital[6]. The risk of recurrence varies globally from 50% to 90%[7]. Schizophrenia is estimated to re-occur at 3.5% per month, and about 40% of patients experience relapse within one year of hospital admission[7]. In the United States, severe mental disorders including schizophrenia, bipolar disorder, schizoaffective disorder and depressive psychosis have relatively low prevalence rates of 1%-2% and are associated with the risk of relapse and increased hospitalization[7]. Relapse can be prevented by health care and communication settings, increasing understanding of sufferers, families and caregivers, improved the quality and availability of primary health care, specialist mental health service systems, and support for communities to engage in identifying early warning signs, determining stabilisation actions and monitoring patient behaviour[7,8].

Health Surveillance is the systematic and continuous observation of data, and information about the incidence of diseases, or health problems and conditions that affect the increase and transmission of diseases, or health problems in order to obtain and provide information to direct control, and control measures effectively and efficiently[9].

Studies on surveillance of recurrence of mental disorders of psychosis patients are not widely available, because of differences with other disease surveillance, namely the integration of mental health surveillance data, variations in interview protocols, use of behavioral measures, use of reference intervals of disease periods, including substance abuse disorders, data collection techniques, and health measurements in children[6].

This article seeks to explain the role of surveillance in recurrence prevention efforts in mental illnesses to reduce recurrence of hospital stays. The aim of this study is to provide information on surveillance methods and indicators that can be applied to prevent recurrence of mental disorders. Meanwhile, the benefits of the results of this study provide input for the development of surveillance for mental disorders, while for society it reduces the rate of disease recurrence in people with mental disorders which ultimately has an impact on improving the quality of life of people with mental disorders, reducing the burden of treatment costs and maintaining the mental health of families.

Methods

In this Literature Review, we followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and the recommendations by the Joanna Briggs Institute (JBI) Umbrella Review Methodology Working Group[10,11]. We searched the Google scholar, PubMed, NIHR and Research Gate. These keywords were used to capture several domains in the scientific literature Keywords in the search for such articles are mental health, surveillance, recurrence of mental disorders. The number of articles obtained as many as 6 articles were reviewed narratively. The number of articles obtained was 6 articles which were reviewed narratively from 10 articles found based on similar topics and objectives as listed in Table 1.

Inclusion and exclusion criteria

We included an article in this literature review if it fulfilled all the following inclusion criteria: (1) it was published in a peer-reviewed journal, (2) the language of the full-text article was English, (3) it was a review article with a clearly stated methodology of searching the literature (for example, systematic reviews, metaanalyses, systematic scoping reviews, etc.), (4) it reported any mental health-related conditions such as schizophrenia, stress, bipolar), (5) surveillance identification for the prevention of mental disorders such as early detection of recurrence of mental disorders, (6) and surveillance indicators for the recurrence of mental disorders.

Data extraction and analysis

We extracted data from the finally selected articles on the following domains: titles and objectives of the reviews, the relaps mental disorder conditions and review of surveillance measures. A narrative synthesis was conducted due to variations in

Table 1: Keywords used for searching databases

Search query	Keywords (searched within titles, abstracts, subject headings such as NIHR, and general keywords)
1	"mental health" OR "mental disorders" OR "mental illness" OR "psychiatric" OR "psychological" OR "psychosocial" OR "schizophrenia"
2	"surveillance" OR "observation" OR "inspection"
3	"recurrence" OR "relaps" OR "return" OR "intermittence"

methods, surveillance techniques, risk factors for relapse, and reviews of mental health outcomes.

Results

Characteristics of the included articles

We found 6 article from Google scholar, PubMed, NIHR, Research Gate and others source (Figure 1). These reviews were published between 2010, 2018 until 2022.

Characteristics of the study populations and surveillance indicators

The reviews used different scholarly sources, one articles analysis of survey data to assess mental health trends by age, gender, address, and family income, three articles consists of developing indicators based telephone and computer based (sreening risk factors and recurrence detection detection of relapse in bipolar patients), one articles developing determinant indicators, mental health status, health services and treatment, disease burden and participation rates, and one articles changing the policy of collaborative epidemiological surveys into behavioral and risk factor surveillance (Table 2).

Discussion

Relapse is the reappearance of symptoms of a disease in remission, while relapse refers to the return of a disease that has been treated or where the symptoms have disappeared[17]. Risk factors for recurrence include medication adherence, having a history of suicide attempts, stages of disease onset, smoking behavior, administration of antipsychotic drugs, stress due to life pressures, genetic, socioeconomic, family factors and community social support[18-20].

Generally, relapse in people with mental disorders is generally characterized by increased readmission and rehospitalization (risk of hospitalization), resulting in decreased welfare of patients related to direct costs and indirect costs[3]. Recurrence of mental disorders depends on 3 (three) factors, namely risk factors, protective factors and trigger factors. Risk factors for recurrence, according to Wei-Feng Mi (2020) consist of 9 (nine) factors, namely: Adherence to treatment consists of adherence to taking medication and adherence to control, recurrence is more common in patients who do not comply with treatment on time, employment status is more risky in people who do not work, poor interpersonal relationships in social relations in society, lack of ability to live daily life such as adaptation and positive behavior in the face of the demands and challenges of daily life, low household income, therapeutic effects when returning home from treatment, more risk of improved effects than those who recover, Payment of medical expenses, which are covered by insurance rather than self-contained, poor family communication, and low or incomplete health care facilities or hospitals, are more at risk of increasing the incidence of relapse in sufferers[21]. Protective factors to prevent recurrence are: Patient self-recognition exercises are exercises to increase the patient's ability to identify signs of relapse as early as possible so as to increase the speed of treatment. Good social network between patients and medical personnel (doctors and nurses)[22]. And positive social support from the environment that can improve the ability to survive not to relapse[23].

Triggering factors, which increase recurrence are the presence of life events that affect the feelings and emotions of sufferers such as the death of family members, comorbid diseases, and lack of knowledge of treatment[24,3].

Impact of recurrence

The recurrence of mental disorders has the greatest impact on socioeconomic, disability and suicide incidence.

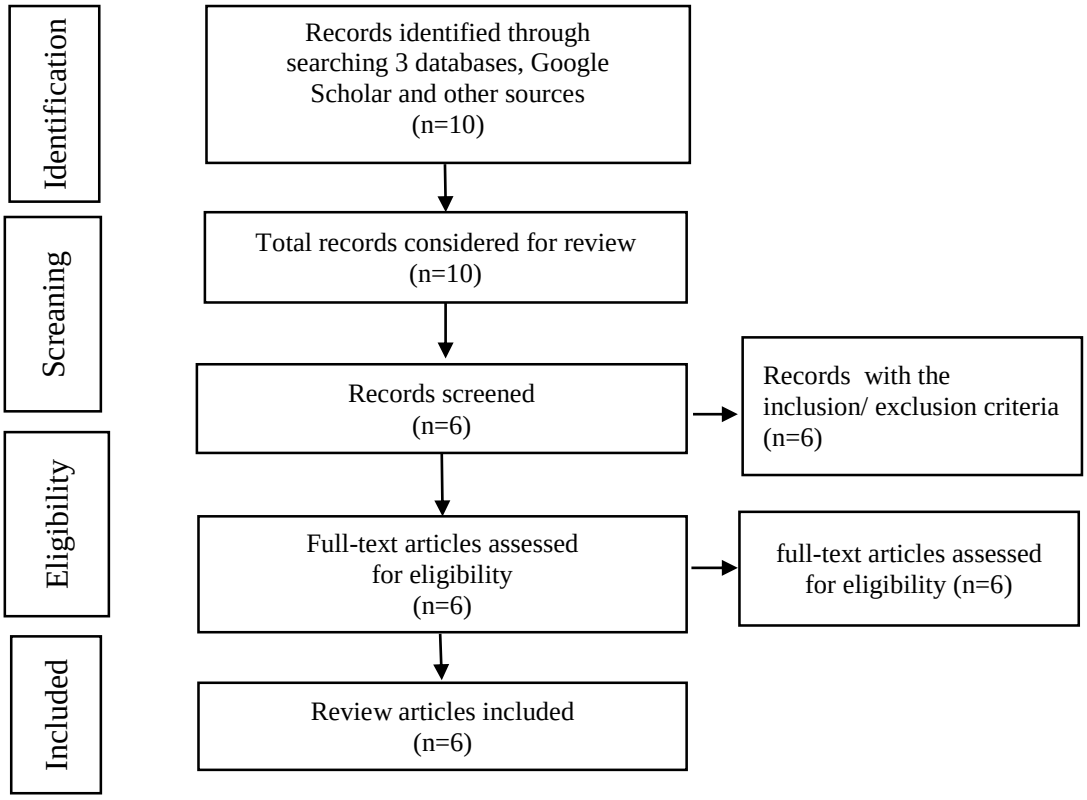

Figure 1: Flow diagram of the literature search process

Socio-economic

The economic burden of relapse based on American research shows a higher cost and more than 50% compared to non-relapse[25,26], which occurs due to the decline in the social relationship of sufferers with their environment due to the emergence of problematic behaviors such as changes in temperament, emotions, and decreased motivation[23]. Stigma and discrimination are sociocultural barriers, in accessing mental health services and prevent nursing access[27]. Decreased productivity results in loss of employment opportunities, and weakening family income which has an impact on family economic fulfillment[17]. The existence of direct costs i.e. individual treatment, and indirect costs associated with reduced economic productivity, high unemployment rates have a significant impact on the country. The most cost-per-person mental health condition globally is found in people with schizophrenia, due to repeated treatment[3].

Disability

Disability according to WHO is the inability to carry out activities, failure of interaction between individuals and their environment, cannot access transportation and public buildings, and limited social support[28]. Persons with disabilities include: persons with physical disabilities; persons with intellectual disabilities; persons with mental disabilities; and/or persons with sensory disabilities[29]. Mental health disabilities are more likely to be caused by mental disorders, substance use, and neurological conditions[3]. Global impact is influenced by 4 categories, namely structural factors (socioeconomic and political due to social stratification), social determinants (born, growing, living, working and aging), risk factors (non-communicable diseases, including tobacco use, diet, alcohol consumption and amount of exercise, environmental factors such as air pollution), health system factors (such as: service delivery, health and care personnel, health information systems,

Table 2: Characteristics of the articles included in this review

No	Author, Yea|r, and Title	Purpose	Method	Sample	Result
1	Joanne Enticott Shrinkhala Dawadi1,2, Frances Shawyer1, *et al*, 2022, Mental Health in Australia: Psychological Distress Reported in Six Consecutive Cross-Sectional National Surveys From 2001 to 2018[12].	Identify and analyze trends in psychological distress in Australia| based on age, gender, location and household income.	Analysis of secondary data| derived from 6 health surveys on the health population (18 to 64 years old). From 2001 to 2017/18. Prevalence of psychological distress was measured based on definitions by the Kessler Psychological Distress Scale (K10) score of 30 or more) and combined high/very high levels (K10 score of 22 or more). Associated with mental health problems that met the diagnostic threshold in the past year.	Large population measured n=78,204 , and 20-64 years old.	Levels of psychological distress increased significantly from 2001 to 2017/18. from 3.8 to 5.1% and high / very high combined rates from 13.2 to 14.8%. Women aged 55-64 from 3.5 to 7.2% and high/very high pressure from 12.4 to 18.7%. In men aged 25-34, it increased from 2.1 to 4.0% and high/very high from 10.6 to 11.5%.
2	Julia Thom 1*, Elvira Mazuz 1*, Diana Peitz , *et al*, 2021, Establishing a Mental Health Surveillance in Germany: Development of a| framework concept and indicator set[13].	Development of mental health surveillance in Germany.	Design surveillance indicators: Define the team Selecting the concept Determining the scope of indicators Listening to expert opinion Opinions of mental health authorities Evaluation of indicators Review and refinement of indicators Evaluation of indicators that have been refined Indicator determination Evaluation of the decision Dissemination of indicator use by national health authorities. Evaluation and design of draft indicators with criteria|: High Relevant Relevant Not Relevant	Identify 181 relevant indicators from the extraction results of 1505 indicators. Then Delphi round 1 started with 173 indicators and 11 characteristics of stratification.	The final approved surveillance indicators are 60 indicators representing: 1.Determinants 16 indicators 2. Mental health status 14 indicators 3. Mental health care and treatment 20 indicators. 4. Reduce disease burden and strengthen participation or support 10 indicators.

No	Author, Yea|r, and Title	Purpose	Method	Sample	Result
3	Nasser F BinDhim1,2,3, PhD; Nora A Althumiri1, MSc; Magda H Basyouni1,4 , *et al*, 2020, A Mental Health Surveillance System for the General Population During the COVID-19 Pandemic: Protocol for a| Multivalve Cross-sectional Survey Study[14].	Developed a protocol aimed at identifying, tracking, and monitoring trends in major depressive and anxiety disorders during the COVID-19 pandemic in the population in Saudi Arabia.	Design a sustainable mental health screening model using telephone and computer equipment. Measurements include the use of: 1.Sociodemographic variables and potential risk factors, 2.Patient Health Questionnaire-9 (PHQ-9) to measure depressive symptoms and General Anxiety Disorder-7 (GAD-7) to measure anxiety. Study design: Cross sectional, with interview randomized sampling technique using proportional quota.	Sample size 4056 participants. Across 13 administrative regions of Saudi Arabia. Arabia adults, aged ≥18 years old. average 36 years old Taken in between May and August 2020. led to a quota of 52 strata that helped increase sample diversity a|nd reduce the risk of nonprobability sampling bias.	Study recruitment began in May 2020. Data aanlysis was completed in October 2020, and the final report is expected to be published by the end of December 2020. Data collection took approximately 2 weeks for each wave. Data analysis was completed in October 2020, and the final report is expected to be published by the end of December 2020.
4	Abigail Ortiz1,2* , Arend Hintze3, Rachael Burnett2 , *et al*, 2022, Identifying Rachael behaviors to understand illness trajectories and predict relapses in bipolar disorder using passive sensing and deep anomaly detection: protocol for a contactless cohort study[15].	Extracting/filtering, and interpreting individual diseases with Trajectories and patterns suggestive of relapse using anomaly detection. Develop individual clinical predictions for Forecasting disease episodes of bipolar disorder (BD), a mood disorder with high rates of relapse, disability, and suicide. Using passive sensing, nonlinear techniques, and deep anomaly detection.	Study design: Noncontact cohort. Al research procedures will be conducted over the phone or virtually. Participants have completed baseline treatment and are followed and monitored for 2 years with the wearable Oura ring (Oura Health Oy, Generation 2, Oulu, Finland) a|nd will fill out questionnaires regularly. The device is to collect multimodal physiological (heart rate variability) and objective (sleep, activity) data. Participants will complete (I) a comprehensive baseline assessment; (ii) weekly assessments; (iii) daily assessments using electronic rating scales. Data will be analysed using nonlinear techniques and deep anomaly detection to forecast disease episodes.	200 participants who were diagnosed with BD (Bipolar Disorder) I or BD II.	The data variables collected for analysis consist of: Sociodemographic Disease diagnosis Clinical data Cardiovascular screening Chronotype Pharmacotherapy Combining Pharmacotherapy, multimodal physiological (HRV), objective (sleep, activity), and subjective. Data using passive sensing and erecting scales (self-acting's and physician rating scales). Modelling on data containing different signals. These data, while following a sinus rhythm with low noise (red, green, a|nd blue lines), experienced high noise at the end of the series (solid black line for noise and dashed lines identifying outlier periods).

No	Author, Yea|r, and Title	Purpose	Method	Sample	Result
5	Alexander S Young, 2022, ; Passive Mobile Self-searching of Mental Health by Veterans With Serious Mental Illness: Protocol for a User Centered Design and Prospective Cohort Study[16].	Developing analyses that use passive data to predict changes in behavior and symptoms in Serious Mental Illnesses (SMI) patients on treatment. in behavior and symptoms in Serious mental illnesses (SMI) patients on treatment.	An observational study design, consisting of a user-centered design phase and a mobile sensing phase. Design phase, focus groups, interviews, and app usability testing. Mobile sensing for participants engaged in weekly assessments over 9 months. Three- and nine-month interview studies for perceptions of passive mobile sensing and ease of use of the app.	The study was conducted starting in October 2021. The sample size consisted of 125 patients for the mobile tracking phase. Usability trials, and physician interviews included 17 veterans, 8 veterans, and 16 physicians, respectively. veterans, and 16 physicians, respectively.	Focus groups, usability testing, and pre-intervention doctor interviews. Passive mobile phone use sensing can be a clinical tool for patients with SMI, allowing access to activity, sociability and sleep dashboards which can be used as a tool to monitor symptoms and behavior. Adoption of this app may be feasible and its integration into clinical care may further improve clinical outcomes for clinical SMI.
6	Elsie J. Freeman, MD, MPH, *et al*;, 2010; Public Health Surveillance for Mental Health[6].	Public Health Surveillance System policy changes that added and integrated mental health into chronic diseases in the Collaborative Psychiatric Epidemiology Survey for behavioral and risk factor surveillance.	Create and develop data collection protocols, interview techniques, use of measures, reference interval periods and approach techniques.	National Health Interview Survey (NHIS), National Health and Nutrition Examination Survey (NHANES), dawn Behavioral Risk Factor Surveillance System (BRFSS) Healthcare Research and Quality's Medical Expenditure Panel Survey; the Substance Abuse and Mental Health Services Administration's (SAMHSA's) National Survey on Drug Use and Health (NSDUH) Data availability in 2006 was 41 states, from 16 states in 2008 and from 37 states in 2007.	Other health issues have shown significant associations between mental illness and health risk behaviors (egg, smoking, obesity, physical inactivity), chronic diseases (e.g., arthritis, diabetes, cardiovascular disease, asthma), and lower levels of preventive care. BRFSS is one of the first care surveillance system that allows state and local mental and physical health estimates. The data have been used to track the prevalence of mental health conditions.

health systems, medical products and technology, financing, and leadership)[30]. Socialization ability in people with mental disorders, influenced by the level of disability, namely the ability of a person to interact with others, acquire skills and behave[31]. Disability has a demoralizing and passive effect on economic behavior due to a culture of disability benefits and lack of employment opportunities[32].

Suicide

Suicide is one of the leading deaths worldwide, caused by multifactorial factors including: socio-cultural, economic, psychological, biological, and environmental factors, such as financial loss, interpersonal conflict, loneliness, chronic illness, mental health problems, substance abuse, discrimination, and difficulty accessing health services[33]. Research from Lay San Too (2019) explains there is a relationship between mental disorders and suicide risk[34,35]. The highest risk of suicide in people with poor mental health occurs at low levels of contact with primary health care, meaning that the less often they go to primary mental health care the higher the risk of suicide. The risk of suicide is also seen from a person's age, a young age is at higher risk than the age over 50 years, because the older a person is, comorbid factors cause a person to have more frequent contact with health services while supporting his mental health[36].

Surveillance

The definition of surveillance according to WHO, is "the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health"[37]. Implementation of Health Surveillance of mental disorders is included in non-communicable disease (NCD) surveillance[9]. Surveillance in mental disorders is included in the non-communicable disease surveillance group[38], play a role in universal promotion and prevention activities, by shifting the risk profile of entire populations and improving overall well-being[3], Track mental health prevalence and calculate lifetime health costs in people with mental disorders[6]. *Collaborative Psychiatric Epidemiology Surveys (CPES*) surveillance, consists of data on distribution, correlation with social and cultural, and data on risk factors for mental disorders in the general population and in minority groups[6], collection of relapse data, predictive analysis for early detection of relapse, support, use of mental health care facilities and timeliness of treatment[7,39,40,13]. Surveillance data from health facilities is generally easy to obtain but often in severe cases, while early detection screening data is difficult to find in health facilities. This is because of the stigma and discrimination of society so there is a tendency for mild cases to seek more self-treatment[41].

Surveillance in health care facilities

surveillance of mental disorders in emergencies is called Triage surveillance. The goal is to identify the patient or child/adolescent if they need mental health treatment or not, The method used is first look, first ask, first feel which should be applied to triage. First look at the patient's appearance, first ask for identification, and first feel to look for organic causes[42].

Mental health surveillance in the community

Consists of medication adherence data, admission data, hospitalization data, socio-demographic data (age, gender, patient origin, occupation, income, education), community social support data, family communication, mental health care facilities, drug side effects, individual susceptibility, coping skills (patient's ability to see early symptoms of relapse)[6,7,14]. The data accommodated all risk factors, protective factors and trigger factors including genetic factors, family and community factors as well as structural factors[43], the use of information technology such as telephones in the implementation of passive surveillance, to predict changes in behavior and symptoms in patients Serious mental illnesses (SMI) in treatment[16], face-to-face methods and literature review or record review for surveillance implementation[44], measurement on parameters of disease prevalence and impact, as well as prevention of records and suicide[3], as well as measuring the relationship of community participation in local activities, ease of access to care facilities and smooth transportation[3]. Reports submitted to policy makers and the community to make strategies for mental disorder prevention intervention approaches in 3 (three) domains, namely; Social, economic, and

environmental policy interventions made by Governments, Public health practice interventions implemented by the public health field, and Health care system interventions implemented by hospital and health care system leaders[45].

Mental health surveillance indicators

Arranged based on: Determinants (psychological resources, social resources, individual risk, social risk, literacy or ability to manage mental health), Mental Health Status (consisting of positive Mental Health, clinical symptoms, mental disorders, comorbid, self-harm/suicide attempts), Mental health services (consisting of supply and utilization, quality of care, patient center including access to services, cost of care), burden of disease and strength of participation, including surveillance indicators for alcohol and substance dependence, mental disorders, and experiences of stigma and discrimination, participation, and mortality[13].

Use of surveillance and tracking techniques in mental health prevention, by adding behavioral risk factors and depression to chronic disease survey measures[6]. The development of mental health indicators in Germany, includes 60 indicators for promotion, prevention, cure and recovery, including child and adolescent age and substance and alcohol dependence factors[13]. Indicators for recurrence prediction, by understanding disease trajectories using passive sensing and phone-assisted or virtual deep anomaly detection on contactless studies of patients to include physiological (heart rate variability) and objective (sleep, activity) data[15].

Patients or participants who have completed the treatment phase will be monitored for two years to complete baseline assessment questionnaires, weekly assessments and daily assessments using an electronic rating scale[15]. Early detection, by screening for depression in the adult population, can be applied for suicide prevention, as a cost-effective strategy[46]. Screening of pregnant women and mothers giving birth is also important for early detection to prevent postpartum depression which, if not treated immediately, can have a significant impact on the entire family. It is associated with abnormal development, cognitive impairment, and psychopathology in children[47].

Community monitoring, involving sociocultural factors in psychosocial rehabilitation to improve functioning and reduce disability of people with mental disorders, complement specialist services and improve access, equity and acceptance of interventions[3]. Psychosocial intervention through a family approach by means of family psychoeducation, for patients with long-term treatments such as schizophrenia is beneficial in reducing relapse[48]. The most important approach process is for the patient and family, or loved ones to understand the risk factors for relapse in the early phase of psychosis, recognize the common early warning signs of relapse, and the patient's and family's perspective on relapse behavior change[49].

Conclusions

Recurrence surveillance indicators based on risk factors, protective factors and provoking factors during the period of long-term treatment, with the help of information technologies such as telephones. The development of indicators by involving the community, recording and monitoring daily activities is useful for predicting the time of relapse so that the speed of obtaining psychiatric help is not hampered. It is recommended to incorporate surveillance activities into community-based psychosocial rehabilitation programs, so that recording signs or symptoms of relapse can be routinely carried out.

Authors' contributions

RF as principal investigator initiated, designed, organized, and aboring drafting of the manuscript, as well as critical revision for intellectual content. CUW, ACH, FAR, and YUL participated in the study's design, manuscript drafting and revision. All authors agree to be accountable for all aspects of the work and have approved the final version of the manuscript to be published.

Acknowledgment

All the authors have revised the paper and have approved the final manuscript. We would like to thank the Department of Epidemiology at Airlangga University's School of Public Health for all the nonfinancial assistance it provided to complete the study.

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