SPER Publications and Solutions Pvt. Ltd.

Review Article

National mental health information system: a review of data architecture in selected countries

Mahdie Shojaei Baghini[1], Reza Rabiei[2]*, Farkhonde Aasdi[2], Hamid Moghaddasi[2], Abdoreza Sabahi[3]

[1]Medical Informatics Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran. [2]Health Information and Medical Informatics Department, Paramedical School, Darband Avenue, Ghods Sq., Shariatee st., Tehran, Iran. [3] Department of Psychiatry, medical School, Kerman University of Medical Sciences, Kerman, Iran.

Correspondence: Reza Rabiei, Health Information and Medical Informatics Department, Paramedical School, Darband Avenue, Ghods Sq., Shariatee st., Tehran, Iran. Email: r.rabiei@sbmu.ac.ir

ABSTRACT

Development of mental health information system could help improving the delivery of mental health services through improving information sharing. This study was conducted to investigate organizational and information's structure of the system. In this review study, the architectural models of mental health information systems in selected countries. The databases used included ProQuest, PubMEd, CINAHL, Science Direct, Google Scholar, Scopus, and WHO portal; as well as correspondences with experts in other countries. The content of the relevant studies were analyzed and extraction forms used at this stage. The findings were then presented in comparison tables. The results showed that, all selected countries have developed mental health information systems in recent years. In each country, Ministry of Health is the owner of this system, while many other organizations collaborate with it in mental disorders management process, as well as policy making for information and technical monitoring and support of it. The selected countries have also developed mental health minimum datasets for reporting mental disorders information. Furthermore, mental disorders data are first sent to local or regional health institutions. The data is then sent to the mental health information system. In order to provide desirable mental health services, developing and deploying a mental health information system can be a valuable effort. The prerequisite to developing a mental health information system is to determine the organizational structure, data elements collected and exchanged in each database, and data flow.

Keywords: Mental health, mental health information system, data content, data flow, organizational structure

Introduction

According to World Health Organization (WHO), mental health goes beyond lack of mental disorders, being a state of welfare in which a person is able to recognize his abilities, deal with usual stresses in life, be professionally and socially constructive, and collaborate with others. [1, 2]

By the year 2020, mental disorders and drug use will overtake physical problems and become the main causes of disability around the world.[3] According to WHO, about 20% of children and adolescents in the world suffer from mental disorders. Almost 23% of Disability-Adjusted Life Year (DALY) - the number of years lost due to ill-health – is caused by mental disorders.[4, 5] Latest evidence in Iran shows that, the prevalence of mental disorders is 20%, which accounts for roughly 14% of the burden of disease in the country. [6]

According to the above, One of the most important responsibilities of Ministry of Health is planning, policy making, and investing in mental health. Obviously, prevention has a special place among different interventional programs. In preventing mental disorders, having access to accurate and comprehensive relevant information is very important. In this regard, development of a coherent mental health information system (MHIS) is a requirement. [7, 8]

WHO defines MHIS as a system that collects, processes, analyzes, and publishes mental health information.[9] The main

Access this article online	
Website: www.japer.in	**E-ISSN:** 2249-3379

How to cite this article: Mahdie Shojaei Baghini, Reza Rabiei, Farkhonde Aasdi, Hamid Moghaddasi, Abdoreza Sabahi. National mental health information system: a review of data architecture in selected countries. J Adv Pharm Edu Res 2020;10(S2):130-138.
Source of Support: Nil, Conflict of Interest: None declared.

functions of MHIS are facilitation of data collection, processing, analysis, distribution, and sharing, and thus, service improvement and development of the mental health system.[10, 11] The main objectives of MHIS development are improving performance, effectiveness and quality in mental health care, promoting evidence-based practices, and improving inter-institution collaboration, in the light of timely access to information.[9, 12, 13] In addition, MHIS is needed for planning and decision-making, monitoring, evaluation, and development of services, improving quality of care, prevention and promotion of health, reducing costs, and doing research.[14, 15] In addition, this system can serve as a planning and servicing tool, which can lead to continuous improvement of service quality by documenting and reporting services.[16]

Studies have shown that, wherever it is necessary to design a system that exceeds a certain size or complexity, or satisfies certain requirements, it is inevitable to move towards "architecture".[17-19] Architecture determines type of data that need to be collected, stored, processed, and transferred, and system components, their relationships, and the rules that govern them, i.e. organizational structure and Information's structure.[20-22] Regarding the importance of collecting, storing, processing, and sharing mental health data, and quick access of specialists to relevant information, and to provide safe, patient-oriented, coordinated, and efficient healthcare, it is necessary to employ architectural principles.[23] MHIS architecture is important since mental health organizations have extensive connections with other health and non-health sections, such as judicial institutions, criminal courts, labor unions, social services, and educational centers. [24, 25]

One of the most important basic steps in developing the architecture of national MHIS is to identify organizations whose activities and services are related to mental health. [16] For this purpose, the current status of mental health and the related organizations need to be carefully investigated with the help of all mental health stakeholders. [10, 26]

Understanding MHIS structure in the leading countries and using their experiences can help other countries to develop and improve their own MHISs. Therefore, the aim of the present study was to investigate the organizational structure, content and data flow of MHIS in the pioneering countries.

Methods

This study reviewed the architectural models of mental health information system in a number of selected countries, including the UK, New Zealand, and the US. Database used included ProQuest free medical journal, PubMEd, CINAHL, Science Direct, Google Scholar, and Scopus. In addition, the portals of WHO was used for further search, along with correspondences with experts in other countries. The search terms included, but not limited to, mental health information system, mental health, information system architecture, and architecture model. Publications between in 2000 and 2016 that were in English were considered in the study.

Search results showed a total of 70 relevant studies, from which 55 studies were used in reporting the findings. Resources were selected based on their relevancy to research objectives.

Results

National MHIS architecture can be discussed from organizational structure and information structure perspectives. To do this, organizational and information's structures of MHIS in the selected countries will first be examined.

Organizational structure of national MHIS in the selected countries

In *the United States of America,* many organizations are responsible for providing and monitoring mental health services under the supervision of Department of Health and Human Services. Some of the most important of these organizations are as follows: Substance use and Mental Health Services Administration (SAMHSA), National Institutes of Mental Health (NIMH), and Centers for Disease Control and Prevention (CDC).[27-29] Program Performance and Evaluation Office (PPEO) of CDC is in charge of prevention and treatment of mental diseases and promotion of mental health.[27] SAMHSA has several programs for reducing effects of substance use and mental diseases, including national program for suicide prevention in children, adolescents and youth, and substance use prevention program.[30, 31] NIMH is responsible for leading and supervising research in science and technology in the field of psychiatry and mental health. The mission of NIMH is to prevent, diagnose and treat mental diseases through applied clinical research.[32]

Regarding the wide range of entities involved in mental health in the US, efforts have been made to design, implement and update mental health information systems and systems, in order to improve communications among the involved centers. It should be mentioned, however, that the available systems are state-owned and there is no national MHIS. Nevertheless, the federal government has also tried to unify mental health data at a national level. One such attempt has been development of Common Data Elements (CDEs) and integration of statistical reports.[33-35] NIMH has provided CDEs to improve quality and facilitate data sharing, and to ensure that there is the same understanding of data.[36]

In addition to, integration of statistical reports is need. The aim is to support federal and organizational decisions, control performance and assess improvements to information. Accordingly, all ministries and government agencies collect and send their statistical reports in the form of a common set of professional and operational standards. SAMHSA, as the center for mental health statistics and quality of service and a member of the Federal Statistical Unit, collects, analyzes and distributes mental health reports. SAMHSA prioritized data and results in accordance with integrated data strategies and National Quality Improvement Framework and sends them to Federal Statistical Unit. Report integration leads to improved public awareness

and quality of mental health services, and helps to assess the effectiveness of programs. [37]

In *the UK,* the majority of mental health institutes (66%) are directly supported by the National Health Service (NHS). Mental health services are provided by mental health trusts, consisting of disabled educational services, psychiatry units, specialist nursing services, crisis and triage services, mental intensive care units, rehabilitation centers, eating disorders clinical care units, mother and baby services, home care, mental health specialist hospitals for children, adolescents and adults, forensic mental health specialist hospitals, and addiction treatment centers.[38-41]

Regarding the wide range of entities that provide mental health services, NHS has been designing a multi-disciplinary information system, in order to improve the quality of specialized communications among the involved centers.[42] One major part of this project is the Integrated Mental Health Electronic Record (IMHER) designed specifically for collecting, storing, processing, and exchanging mental health information. IMHER has promoted public metal health in the UK by connecting all involved mental health organizations and groups and distributing the required information in a timely manner. [43]

New Zealand Health Information Service (NZHIS) has been active in the Ministry of Health since 1994 upon implementation of the Health Information Security Act. In September 1997, Health Information Standards Organization (HISO) became in charge of establishing and maintaining the mental health information project, as well as alcohol and drug use services. [44] The aim of this project was to improve planning, collaboration, monitoring, and assessment of healthcare services, and consequently, the overall outcome of mental health services. After it was completed in 2000, metal health data were collected and stored in the mental health database based on the national collection of mental health information. [18, 45]

Since the beginning of July 2008, the New Zealand Health Ministry has introduced the Mental Health Information System as the Programme for the Integration of Mental Health Data (PRIMHD). According to PRIMHD, mental health data is collected from all governmental and nongovernmental organizations, summarized, and ultimately stored in the Ministry of Health's mental health data warehouse. The resulted data are used to report on the services provided, the service provider, and the results of the services provided, and serve as a basis for the proper planning of mental health services and decision-making at the local, regional and national levels. [46]

Table 1 shows the name and ownership of the MHIS database.[3, 27, 30, 31, 33-35, 37, 47-67]

Table 1. Name and ownership of the MHIS database

Country / Name and Component of the Information System	United States of America	New Zealand	United Kingdom
Mental Health Information System	State Mental Health Information System	Programme for the Integration of Mental Health Data (PRIMHD)	Integrated Mental Health Electronic Record (IMHER)
System Ownership at National Level	Department of Health & Human Services	Ministry of Health	National Health Services
Policy Makers	-Substance use and Mental Health Services Administration (SAMHSA) -National Institutes of Mental Health (NIMH) -Centers for Disease Control and Prevention (CDC)	-Chief Advisor (Mental Health) -Mental Health Review Tribunal in Accident Compensation Corporation -20 District Health Boards (DHBs)	-Mental Health Trust -Poor House -Police -- Judicial Authorities -forensic medicine -Center for Substance use Treatment
Data Sources	-Substance use and Mental Health Services Administration (SAMHSA) -National Institutes of Mental Health (NIMH) -Centers for Disease Control and Prevention (CDC)	-Chief Advisor (Mental Health) -Mental Health Review Tribunal in Accident Compensation Corporation -20 District Health Boards (DHBs)	-Mental Health Trust -Poor House -Police - Judicial Authorities -Forensic Medicine -Center for Substance use Treatment

MHIS information's structure in the selected countries

The information's structure of the above MHISs was reviewed in terms of MHIS data elements, data resources and information flow. Regarding the data content, the results of examining MHISs of the selected countries showed that:

- In all studied countries, a unique identifying number, whether National ID or Social Security Number or equivalent is used to record information in the MHIS;
- Demographic information is collected in all MHISs of the countries under study. Considering the impact of "gender", "age", "marital status", "education", "occupation and employment status" and "housing status", this information is collected from patients;
- Collecting clinical information, including information about diagnosis, visits, counseling, and interventions has been considered in all of the selected countries. This information is collected in more detail in the UK and New Zealand;

- Regarding the impact of mental diseases on the physical and mental status of patients, collecting the data element of the "legal status of the patient" is important for the judicial authorities. However, data on the patient's legal status is not collected in the United States;
- Data about the "referral" process are collected in all countries studied; however, this data element has received considerable attention in the New Zealand's MHIS, as it consists one of the main records in the system. Multiple data elements collect data about the "release clearance" process;
- One of the key issues in improving the quality of health care is evaluating the outcome of the services provided. Despite the importance of assessing the outcome of mental health services, the "outcome" data element is only collected in the New Zealand's MHIS;
- One negative effect of mental illnesses is the concern about being in society. The labeling of patients with mental disorders has always been one of the obstacles to their referring to mental health centers. Therefore, collecting information about the social relationships of patients is important. However, only the federal government of the United States has regarded the data elements of "social relations" and "disability and social status" necessary;
- Regarding the need for accurate collection of mental health information, especially for the judiciary, information about "mental health care providers" is collected in MHISs of all of the selected countries (Table 2).[53, 67-71]

Table 2. The collection of data elements in the MHIS

Country	Data Sets of Mental Health Information System
United Kingdom	Demographic Information/ Geography/ Referral Source/ Legal Status of the Patient/ Discharge/ Visit/ Counseling/ Treatments/ Evaluation of Patient's Response to Treatment/ Status of Patient Admission/ Conditions of Discharge/ Status of Homeless Patients.
New Zealand	Healthcare User/ Legal Status/ Referral Discharge/ Activity/ Classification/ Collection Occasion/ Outcome Tool/ Outcome Item.
United States of America	-SAMHSA has developed mental health specific indicators, called National Outcome Measures (NOMs). SAMHSA's indicators include reduced morbidity, employment, education, housing stability, and social connectedness, access to care, and retention in and perception of care. -The Medicare program and many private health insurers use the Healthcare Effectiveness Data and Information Set (HEDIS) to measure mental health care quality. The measures in HEDIS include medication management for anti-depressants, follow-up after hospitalization for mental illness, and utilization of mental health care services. -AHRQ produces two congressionally mandated reports on the quality of health care annually. The indicators that AHRQ uses to measure effectiveness of mental health care are suicide death rate, based on data from the HHS's National Vital Statistics System, and receipt of treatment for major depression, based on the HHS's National Survey on Drug Use and Health.

In all countries under study, mental health information is collected from mental health care institutions.[3, 53, 67] In New Zealand, mental health services data are collected at the second and third levels from all hospitals and governmental and nongovernmental health institutions that receive the mental health services and alcohol and drug use budget from the Ministry of Health. It should be noted that in New Zealand, some psychiatric services are classified as disability services, and the related data are not stored in the program for the consolidation of mental health information.[67, 68] The UK NHS has paid more attention to the primary sources of mental health information collection; in addition to all health care institutions involved in mental health, information about drug treatment centers, poor house, forensic medicine, police, and judicial authorities are also collected. Collecting information from other institutions involved in mental health is important because of the impact of living conditions on mental disorders and, on the other hand, the impact of mental disorders on the physical and mental state of individuals. This issue has been addressed by the British government.[3, 72] Table 3 shows the sources of information and reporting levels in the national MHIS in the selected countries.[3, 37, 49, 53, 67, 68, 70, 72-76]

Table 3. Sources of information and information flow in the MHIS

Country	Reporting Levels	Data Sources
England	National Regional The State	Inpatients/ Outpatients and Community Mental Health Care Services/ Private Mental Health Providers/ NHS Trusts/ Clinical commissioning groups/ Hospital services/ Primary Care/ Specialist services/ Public health/ Mental health services/ Mental Health Trust/ Poor House/ Police/ Judicial Authorities/ Forensic Medicine/ Drug Addiction Treatment Centers
New Zealand	National The State	Psychiatric Hospitals/ General Hospitals/ Publicly Funded Hospitals/ Non-Governmental Organisations/ Residential and Supported Accommodation Services/ Community Mental Health and Addiction Services
United States of America	National The State	In accordance with state laws, all Mental Health and Substance use Institutions.

In all countries under study, data collected from data sources are sent to higher level organization after summarization and integration. Finally, the information is summarized in the database of the responsible governmental entity – mainly Ministry of Health. [37, 49, 67, 68, 70, 72-76]

In all studied countries, the communications are two-way at lower levels and one-way at higher levels (e.g. level of Ministry of Health). Only in the UK are there also two-way communications at the NHS level.[72, 75] According to the NHS, mental health information is used locally by the following individuals/organizations: mental health and learning disabilities service providers, the delegacy, managers, analysts, financial agents, and researchers. At the national level, it is used by the following entities/organizations: NHS, Department of Health, Department for Education, Audit Commission, Quality of Care Commission, Health and Social Care Information Center, business centers, and universities.[35]

Discussion

As the findings show, the MHIS should be studied from a variety of dimensions. The first and most important point in designing a MHIS is determining the ownership of the system. In all countries under study, system ownership is the exclusive responsibility of the Ministry of Health.[3, 27, 30, 31, 33-35, 37, 47-54] Governmental ownership of the system, regarding the statutory authority mandated by the Ministry of Health, facilitates decision-making processes and enforcement of laws and policies. The findings showed that at the lower levels, the overall structure of the system (other databases) varies according to the management structure of these countries. In New Zealand, the database includes information of drug and alcohol use services as well as residential and supported accommodation Services.[46] The UK NHS has given more attention to the components of the MHIS. In addition to the database of all mental health care institutions involved in mental health, the databases of drug addiction treatment centers, poor houses, forensics, police and judicial authorities are also active in the implementation of the MHIS.[38-41] In the United States, databases of SAMHSA, NIMH, CDC, Centers for Medicare & Medicaid Services (CMS), and the Office of Public Health and Science (OPHS) collaborate in the implementation of the MHIS. [27-29]

The collection of information from other institutions involved in mental health is important because of the impact of habits of life on mental disorders the impact of mental disorders on the physical and mental state of individuals. The British government has paid more attention to this issue than other studied countries.

Another issue in designing a MHIS is to determine the type of data to be collected. Various opinion polls suggest that the collection of mental health data will be very difficult without standard data with similar meanings.[77] According to the WHO, the existence of a minimum dataset in MHISs is inevitable and all activities should be directed towards its preparation and formulation. Applying the minimum dataset will lead to comparability and compatibility of mental health data at national and international levels.[78-80] Therefore, it is necessary that a mental health dataset is compiled with nationally agreed definitions before designing any MHIS. It was found in the present study that, the set of required data elements and mental health indicators have been defined in the countries under study. According to the definition, in all countries under study, "national identification number" is used to record information in the MHIS.[53, 67-71] Using the national identification number will improve data security when recorded by the system software, in addition to increasing the quality of data and preventing redundancy.[81]

One of the effects of mental illnesses is the concern about being in the society. Stigma to patients with mental disorders has always been one of the obstacles to their referring to mental health centers. Therefore, it is important to collect information about the social relationships of these patients. However, only the United States has necessitated data elements of "social relations" and "disability and social status". [53]

According to the findings, another thing that is required in designing and implementing a MHIS is determining the relationship between the databases that comprise the system. One of the most important steps in developing the architecture of the national MHIS is identifying the institutions and organizations whose activities and services are related to mental health.[16] In all countries under study, data collected from data sources are sent to higher level offices after being summarized and integrated. Finally, the information is summarized in the database of the responsible governmental entity – mainly the Ministry of Health. In all studied countries, the communications are two-way at lower levels and one-way (bottom-up) at higher levels (e.g. level of Ministry of Health). [37, 49, 67, 68, 70, 72-76] Only in the UK are there also two-way communications at the NHS level.[72, 75] Two-way communications at higher levels, enables all institutions to access nation-wide comprehensive and integrated information. Consequently, different institutions can benefit from optimal planning and decision making while accessing the information they need. In addition, in case of any loss of information in a regional database, the database can be retrieved faster by requesting information from the NHS.

Conclusion

By collecting, processing, analyzing, disseminating and using mental health information, the MHIS can improve the performance, effectiveness and quality of mental health care, and lead to fair distribution of services, promotion of evidence-based practices, and improved inter-agency collaboration. Although some countries have created the MHIS at the state and national levels, and the characteristics, dimensions, challenges and importance of such systems vary from country to country. According to the findings, little attention has been paid to mental health information systems than paid to other information systems, and this requires extensive planning and serious efforts. However, using the experiences of developed

countries can pave the way for other countries to set up an effective information system to manage mental disorders.

Acknowledgment

The current study is part of the Ph.D. thesis in Shahid Beheshti University of Medical Sciences.

Disclosure

The authors report no conflicts of interest in this work.

References

1. WHO. Mental health: a state of well-being. Geneva:WHO; 2014. Online. Available at: http://www.who.int/features/factfiles/mental_health/en/
2. WHO. Mental health. Geneva:WHO; 2014. Online. Available at: http://www.who.int/topics/mental_health/en/
3. Qureshi, Al-Habeeb & Koenig. Mental Health System in Saudi Arabia: an overview. Neuropsychiatr Dis Treat. 2013;9:1121-35
4. WHO. Mental Health Alas. Geneva: WHO; 2014. Online. Available at: http://apps.who.int/iris/bitstream/10665/178879/1/9789241565011_eng.pdf?ua=1
5. WHO. 10 Facts on Mental Health. Geneva: WHO; 2014. Online. Available at: http://www.who.int/features/factfiles/mental_health/mental_health_facts/en/
6. Ministry of Health of Iran. A Comprehensive Program for Improving Mental Health of the Country, Based on the Map of Health System Development in the Islamic Republic of Iran. Iran: Ministry of Health; 2015
7. WHO. Prevention of Mental Disorders, Effective Interventions and Policy Options Summary Report. Geneva: World Health Organization, Department of Mental Health and Substance use in collaboration with the Prevention Research Centre of the Universities of Nijmegen and Maastricht; 2004
8. National Institute of Mental Health. Exploratory Clinical Trials of Novel Interventions for Mental Disorders (R61/R33). 2015. Online. Available at: http://grants.nih.gov/grants/guide/rfa-files/RFA-MH-16-406.html
9. Padshah, S. Mental Health Information System Implementation in the Rouge Valley Health System. Performed at Rouge Valley Health System. In fulfillment of the practicum requirement of the Master of Health Informatics Program. Canada: Dalhousie University; 2011
10. WHO. Mental Health Policy and Service Guidance Package, Mental Health Information Systems. Geneva:WHO; 2005
11. Williams, A. Issue Brief: Behavioral Health and Health IT. ONC, Office of Policy and Planning. 2013. Online. Available at: www.healthit.gov/sites/default/files/bhandhit_issue_brief.pdf.
12. Trafton JA & et al. VHA mental health information system: applying health information technology to monitor and facilitate implementation of VHA Uniform Mental Health Services Handbook requirements. Med Care. 2013 (3 Suppl 1):S29-36
13. Minas H. The Centre for International Mental Health Approach to Mental Health System Development. Harv Rev Psychiatry. 2012 Jan-Feb; 20(1): 37–46.
14. Ministry of Health. National Mental Health Information Strategy 2005–2010. New Zealand: Ministry of Health; 2005. Online. Available at: http://www.moh.govt.nz
15. Lavikainen, J. Fryers, T. & Lehtinen, V. Improving Mental Health Information in Europe, Proposal of the MINDFUL project. Finland: STAKES; 2012
16. WHO. Mental Health Information Systems, WHO mental health policy and service guidance package - module 12. Geneva:WHO; 2005
17. Zachman A. (1999) IBM A framework for information systems architecture,Systems Journal 1999; 38(2&3)
18. Locatelli, P. & et al. Health Care Information Systems: architectural Models and Governance- Italy: Politecnico di Milano, Fondazione Politecnico di Milano and IHCO; 2010
19. Rodrigues, J. Health Information Systems: Concepts, Methodologies Tools, and Applications, Washington DC: Hershey (PA); 2010
20. Chen, L. & et al. An Architecture Model for Multiple Disease Management Information Systems J Med Syst 2013; 37(9931)
21. Power, DJ. Information System Architecture. 2015 Online. Available at: http://dssresources.com/glossary/116.php
22. Vasconcelos, A. Sousa, P. & Tribolet, J. Information System Architectures: Representation, Planning and Evaluation. Systemics, Cybernetics and Informatics 2003; 1 (6)
23. Stansfield & et al. The Case for a National Health Information System Architecture; a Missing Link to Guiding National Development and Implementation. Geneva: WHO; 2008.Online. Available at: http://www.hrhresourcecenter.org/node/2600
24. Health Policy Ohio. The National Health Information Infrastructure and Population Health. 2007. Online. Available at: http://www.healthpolicyohio.org/
25. WHO. WHO assessment instrument for mental health systems (AIMS) Version 2.1. Geneva: WHO; 2005

26. Garfield, RG. & et al. The Impact of National Health Care Reform on Adults with Severe Mental Disorders." American Journal of Psychiatry 2011; 168(5): P.486–494.
27. Centers for Disease Control and Prevention. Program Performance and Evaluation Office. United States: CDCs; 2011. Online. Available at: http://www.cdc.gov/mentalhealth/about-us.htm
28. MHA. Mental Health America. United States: MHA; 2007. Online. Available at: http://homeless.samhsa.gov/resource/Mental-Health-America-167.aspx
29. National Suicide Prevention Lifeline. SAMHSA. United States: samhsa; 2015. Online. Available at: http://www.suicidepreventionlifeline.org/about/overview.aspx
30. Centers for Medicare and Medicaid Services. Increasing Interoperability in Health Information Systems: for Medicaid, Mental Health, and Substance Abuse Treatment. 2007. Online. Available at: http://csat.samhsa.gov/IDBSE/idb/modules/FINAL-CMS_SAMHSA_InteroperabilityConfPapers.pdf
31. National Suicide Prevention Lifeline. SAMHSA. United States: samhsa; 2015. Online. Available at: http://www.suicidepreventionlifeline.org/about/overview.aspx
32. National Institute of Mental Health. Exploratory Clinical Trials of Novel Interventions for Mental Disorders (R61/R33). 2015. Online. Available at: http://grants.nih.gov/grants/guide/rfa-files/RFA-MH-16-406.html
33. Congleton, MW. Glogower, FD. Ramsey-Klee, DM. Roberts, AS. Navy Mental Health Information System(NAMHIS):A Psychiatric Application of COSTAR. 2009. Online. Available at: cchealth.org/mentalhealth/mhsa/pdf/cfit_state_funded_it_projects.pdf
34. Brown Edmund GJR., Dooley, DS. Douglas, T. Mental Health Services Act Expenditure Report 2013-2014. 2013.Online. Available at: www.cibhs.org
35. Sacramento County MHSA. Mental Health Services Act. Draft – Fiscal Year 2013 – 2014, Annual Update to the Three-Year, Program and Expenditure Plan. 2013
36. National Institute of Mental Health (NIMH). Use of Common Data Elements in NIH-funded Research. National Institutes of Health (NIH), DHSS. United States: DHSS; 2015. Online. Available at: http://grants.nih.gov/grants/guide/rfa-files/RFA-MH-16-406.html#sthash.wiFmuh6K.dpuf
37. SAMHSA. SAMHSA's Data Integrity Statement. United States: SAMHSA; 2014. Online. Available at: http://www.samhsa.gov/data/data-integrity-statement
38. NHS. A guide to mental health services in England, Glossary of mental health services, teams and care pathways. England:NHS; 2014. Online. Available at: http://www.nhs.uk/NHSEngland/AboutNHSservices/mental-health-services-explained/Pages/services-explained.aspx
39. NHS. A guide to mental health services in England, Child and adolescent mental health services (CAMHS). England: NHs; 2015.Online. Available at: http://www.nhs.uk/NHSEngland/AboutNHSservices/mental-health-services-explained/Pages/camhs-information-for-children-and-young-people.aspx
40. NHS. A guide to mental health services in England, What is the Mental Capacity Act? How 'mental capacity' is determined. England: NHs; 2015. http://www.nhs.uk/Conditions/social-care-and-support-guide/Pages/mental-capacity.aspx
41. NHS. NHS Friends and Family test, Draft Guidance for Mental Health Providers for engagement. England: NHs; 2015. Online. Available at: https://www.england.nhs.uk/wp-content/uploads/2014/04/fft-guid-mh-eng.pdf
42. WHO. WHO assessment instrument for mental health systems (AIMS) Version 2.1. Geneva: WHO; 2005
43. NHS. Collaborative Development of an Integrated IT Strategy. England: NHs; 2011. Online. Available at: www.ehealth.scot.nhs.uk
44. Harding, E. Privacy Impact Assessment and Commentary on the Mental Health Information Project for New Zealand Health Information Service. 1999. Online. Available at: http://www.nzhis.govt.nz/documentation/MHISc/ak983340.pdf
45. Ministry of Health . New Zealand: Ministry of Health; 2015. Online. Available at: http://healthitboard.health.govt.nz/health-it-groups/health-information-standards-organisation-hiso/hiso-100232015-project-integration
46. Ministry of Health. PRIMHD – mental health data. New Zealand: Ministry of Health; 2015. Online. Available at: http://www.health.govt.nz/nz-health-statistics/national-collections-and-surveys/collections/primhd-mental-health-data
47. HSCIC. Mental Health Services Data Set v1.1, Change Specification. HSCIC. 2016. Online. Available at: nationalarchives.gov.uk/doc/open-government-licence
48. Ministry of Health. New Zealand health system. New Zealand; 2016. Online. Available at: https://www.health.govt.nz/new-zealand-health-system
49. Barch M. Deanna, Gotlib H. Ian, Bilder M. Robert, Pine S. Daniel, Smoller W. Jordan, Brown C. Hendricks, Huggins Wayne, Hamilton Carol, Haim Adam, Farber K. Gregory. Common Measures for National Institute of Mental Health Funded Research. June 15, 2016, Volume 79, Issue 12, Pages e91–e96

50. Goodman A. Richard, Posner F. Samuel, Huang S. Elbert, Parekh K. Anand & Howard K. Koh. Defining and Measuring Chronic Conditions: Imperatives for Research, Policy, Program, and Practice. Preventing Chronic Disease. Volume 10 — April 25, 2013. Pp. 1-16
51. NHS. Our structure and people. 2016. Online. Available at: http://www.derbyhospitals.nhs.uk/about/our-structure-people/
52. NHS. NHS Organizational Structures (Organizational Chart). 2016. Online. Available at: https://www.bfwh.nhs.uk/about-our-trust/trust-structure/
53. Sundararaman Ramya. The U.S. Mental Health Delivery System Infrastructure: A Primer. United States: Congressional Research Services. 2009
54. Ministry of Health of New Zealand. New Zealand health system. 2017. Online. Available at: http://www.health.govt.nz/new-zealand-health-system
55. Ministry of Health of New Zealand. Mental health organisations and initiatives.2010 . Online. Available at: http://www.health.govt.nz/our-work/mental-health-and-addictions/mental-health/mental-health-organisations-and-initiatives
56. Mental Health Foundation of New Zealand. Mental Health Foundation. 2017. Online. Available at: https://www.mentalhealth.org.nz/
57. Ministry of Health of New Zealand. Ministerial health committees. 2016. Online. Available at: http://www.health.govt.nz/new-zealand-health-system/key-health-sector-organisations-and-people/ministerial-health-committees
58. Ministry of Health of New Zealand. About us Ministry of Health NZ. 2009. Online. Available at: http://www.health.govt.nz/about-ministry/ministry-business-units/national-health-board/sector-services/about-us
59. Ministry of Health of New Zealand. Chief advisors. 2017. Online. Available at: http://www.health.govt.nz/about-ministry/leadership-ministry/chief-advisorsMinistry of Health of New Zealand. District health boards. 2017. Online. Available at: http://www.health.govt.nz/new-zealand-health-system/key-health-sector-organisations-and-people/district-health-boards?mega=NZ%20health%20system&title=District%20health%20boards
60. Ministry of Health of New Zealand. About the Mental Health Review Tribunal. 2016. Online. Available at: http://www.health.govt.nz/new-zealand-health-system/key-health-sector-organisations-and-people/mental-health-review-tribunal/about-mental-health-review-tribunal
61. United States Department of Health & Human Services search. HHS Organizational Chart. 2016. Online. Available at: https://www.hhs.gov/about/agencies/orgchart/index.html?language=es
62. Centers for Disease Control and Prevention. CDC Organization Chart. 2017. Online. Available at: https://www.cdc.gov/about/pdf/organization/cdc-photo-org-chart.pdf
63. Centers for Disease Control and Prevention. Mental Health. 2015. Online. Available at: https://www.cdc.gov/mentalhealth/about-us.htm
64. SAMHSA. SAMHSA Offices and Centers. 2014. Online. Available at: https://www.samhsa.gov/about-us/who-we-are/offices-centers
65. United States Department of Health & Human Services search. US Department of Health and Human Services Organization Chart – Text Version. 2017. Online. Available at: https://www.hhs.gov/about/agencies/orgchart/text/index.html
66. National Institute of Mental Health. Online. Available at: https://www.nimh.nih.gov/about/budget/cj2015_146762.pdf
67. Ministry of Health. PRIMHD Data Process Standard. HISO 10023.1:2015. Version 2.2.2. New Zealand: Ministry of Health; 2015. Online. Available at: http://www.ithealthboard.health.nz/who-we-work/hiso/standards/approved-standards
68. Ministry of Health. National Mental Health Information Strategy 2005–2010. New Zealand: Ministry of Health; 2005
69. Ministry of Health. PRIMHD Data Mart, Data Mart - Data Dictionary. Version 4. New Zealand: Ministry of Health; 2010
70. Harding Elisabeth. Privacy Impact Assessment and Commentary on the Mental Health Information Project for New Zealand Health Information Service. New Zealand: Ministry of Health; 2015. Online. Available at: http://www.nzhis.govt.nz/documentation/MHISc/ak983340.pdf
71. HSCIC. Mental Health Services Data Set (MHSDS) v1.1 User Guidance. HSCIC. 2016. Online. Available at: http://content.digital.nhs.uk/media/20108/0011682015change-spec/pdf/0011682015change-spec.pdf
72. HSCIC.Mental Health Services Data Set (MHSDS) v1.1, Implementation Guidance. HSCIC. 2016. Online. Available at: http://www.hscic.gov.uk/statistics-and-data-collections/data-collections/information-supporting-our-data-collections

73. Ministry of Health. HISO 10023:2015 Project for the Integration of Mental Health Data (PRIMHD). New Zealand: Ministry of Health; 2015. Online. Available at: http://www.health.govt.nz/nz-health-statistics/national-collections-and-surveys/collections/primhd-mental-health-data/primhd-standards
74. HSCIC. Mental Health Services Data Set: Key messages. HSCIC. 2016. Online. Available at: http://www.hscic.gov.uk/media/18640/The-MHSDS-key-messages/pdf/Final_MHSDS_messages_for_website__PDF_.pdf
75. HSCIC. Data sets. HSCIC. 2016. Online. Available at: http://www.hscic.gov.uk/datasets
76. SAMHSA. SAMHSA's Data Integrity Statement. United States: SAMHSA; 2014. Online. Available at: http://www.samhsa.gov/data/data-integrity-statement
77. Aspden P, Corrigan JM, Wolcott J, Erickson ShM, editor. Patient Safety: Achieving a New Standard for Care. Washington, DC: Institute of Medicine, 2004.
78. Glover G. The minimum dataset: At last-information. Psychiatric Bulletin 2000; 24: 163-4.
79. NHS Health and Social Care Information Centre. The Integrated Mental Health Electronic Record. Online. Available at: http://www.icservices.nhs.uk/mentalhealth/mh-is/pages/bulletins/page4.asp.
80. Glover GR. A Comprehensive Clinical Database for mental health care in England. Soc Psychiatry Epidemiol 2000; 35(11): 523-29.
81. Health and Social Care Information Centre. Mental Health Minimum Dataset. Version 2.2. 2004, p. 1-43. Online. Available at: http://www.nhsia.nhs.uk/mentalhealth/dataset/pages/default.