Studying the Interrelationships amongst the various Clinic Metrics for Measuring the Performance of Psychiatric Health Care Centers

Lakshay Aggarwal
Sociobuddy Technologies Private Limited
Delhi, India

Remica Aggarwal
MIT School of Education & Research,
MIT Art, Design & Technological University Pune, India

V. K. Aggarwal
Recventures Education Services Private Limited
Delhi, India

ABSTRACT
Present research focuses on exploring various performance indicators or performance measures for psychiatric or psychological health care centers . It further establishes the inter-relationship amongst them using ISM methodology .

Keywords
Psychometric Studies, ISM methodology, Psychiatry

1. INTRODUCTION
Health care is one of the fastest growing sector in India and has made substantial progress, especially in the last decade. Between 2000 and 2014, there was a 370% increase in health expenditure. Historically , health care delivery in independent India has been under the purview of government. Indian government is striving hard to provide world class and affordable health services to its citizens . On the policy side, Indian government has made a bold commitment to achieve universal health coverage through Ayushman Bharat (AB) which aims to provide affordable health care to entire population and reduce expenses on health care . To improve care for their citizens and to realize these potential efficiency gains, policymakers are looking for methods to measure and benchmark the performance of their health care systems as a precondition for evidence-based health policy reforms. Five mental disorders are among the ten leading causes of disability: depression, bipolar disorder, schizophrenia, obsessive-compulsive disorder, and alcohol abuse [1]. Variation in the routine mental health care between different regions and providers and it does not correspond to the standards that the medical profession puts itself forward [2, 3, 4].

Although there seem to exist some structural measures of health care that have been shown to influence patient outcomes with sufficient reliability and validity, the challenging problem related to assessment of treatment quality now needs to be addressed in order to decide what type of measure will be best used for which specific purpose. Therefore the metrics required to assess the psychological health care of patients could benefit due to the following :

- Due to the existing gaps between clinical practice and guideline recommendations.
- By improving the quality , medical expenditures gets significantly reduced from costly complications and unnecessary procedures thereby increasing the desire for information evaluating the health benefits of investments in mental health care.
- Health care metrics if appropriately evaluated would allow better organization and management of medical care and help the corresponding state to spend their health budget more prudently.
- Proper metrics evaluation significantly reduces the high (around 5%-6%) direct and indirect costs associated with mental disorders such as Schizophrenia [5].
- With the development of treatment guidelines, there is growing hope that the quality of care will improve by diminishing inadequate care and increasing evidence-based practices.
- In mental health care, guidelines are intended for use by all physicians investigating, diagnosing and treating patients with mental illness, especially those with severe mental illness and a supposed unfavorable natural disease course.

Present research focuses on exploring various performance indicators or performance measures for psychiatric or psychological health care centres . It further establishes the inter-relationship amongst them using ISM methodology . The research paper is organised as follows : Section 2 presents the literature review . Section 3 presents the managerial implications .

2. LITERATURE REVIEW : PSYCHOLOGICAL HEALTH CARE METRICS
Psychological health care metrics could be develop for each state separately depending upon the state's requirements , capabilities of entities to report on measures and what other reporting requirements are already in place. Measurement of health care quality is difficult regardless of the clinical conditions of interest. However, the systematic measurement of psychological health care quality is particularly complex relative to the measurement of physical health care quality [3, 6 , 7, 8, 9]. Different quality measures used by Health Plans, by Data Source, as Cited During Interviews are as follows :

2.1 Administrative Data
Administrative data are records of services provided to patients, which are generally collected for the purposes of billing or registration. The data can include records of what service was delivered, any diagnoses related to the service, and service dates. Other administrative data-based measures tracked by the health plans included readmissions, length of stay, duration between admissions, and medication possession

ratio. Amongst these medication possession ratio are usually preferred because the requisite data are available in claims and do not require collecting primary data from patients or providers.

2.2 Medical Record Reviews

Performed in ad-hoc manner , while these efforts did not yield data to construct quality measures per se, the respondents cited the medical record review as an important aspect of their efforts to assess and improve the quality of care delivered by providers in their network. This measure includes sub-measures such as Medical record reviews regarding Appropriate assessments; Medical record reviews regarding treatment plans ; Medical record reviews regarding Interdisciplinary communication .

2.3 Member Feedback

All the health plans reported collecting patient feedback in the form of consumer complaints and/or patient experience surveys.

2.4 Patient-Reported Outcomes

This measure includes sub- measures such as Patient reported outcomes regarding changes in general health ; Patient reported outcomes regarding changes in psychological health symptoms; Patient reported outcomes regarding changes in drug and alcohol abuse

2.5 Additional quality measures

2.5.1 Standardized mortality rate for persons with particular psychiatric disorders : Individuals with schizophrenia and other severe mental illnesses have higher age and sex-adjusted mortality rates than members of the general population [10,11]. Such relative mortality rates, which are frequently used in cancer epidemiology studies, are well-accepted and plausible measures to indicate and evaluate the excess mortality in subgroups with certain diseases.

2.5.4 Adherence indicators : Adherence indicators can be constructed from pharmacy data, which may be easily useful to identify patients who need assistance with medication adherence [12]. At the same time, there is no consistent evidence that adherence to antidepressant medication dosages and other guideline recommendations are sufficient to improve patient outcomes.

*2.5.3 Hospital readmission rates : U*sing hospital re-admission rates as a proxy for the quality of discharge planning assumes that hospital admissions are an unintended outcome. This builds on the ethics of a mental health care system that offers the least restrictive care which is effective [13, 9].

2.5.4 Hospital readmission rates for psychiatric patients : A further quality indicator is the hospital readmission rate for psychiatric patients measured by the quota of the total number of readmissions to psychiatric inpatient care that occurred within (a) 7 days or (b) 30 days, divided by the total number of discharges from psychiatric inpatient care during a 12-month reporting period. Hospital readmission rates are widely used as proxies for relapse or complications following an inpatient stay for psychiatric and substance use disorders [14]. Table 1 below shows the compilation of various behavioral health care , quality based and administrative data based measures .

Table 1 : Some of the basic behavioural health measures , quality measures and administrative data based measures

A.	**Behavioral Health Measures [15,16,17,18]**
1	Follow-up after hospitalization for mental illness (7-30 days)
2)	Follow up after emergency department visit for mental illness
3)	Annual monitoring for patients on persistent medication
4)	Adherence to antipsychotic medications for individuals with Schizophrenia
5)	Unhealthy alcohol use screening and follow-up
6)	Inpatient utilization per 1000 members
7)	Inpatient services exceeding a certain min. amount
8)	Community tenure (not less than a certain period)
9)	Integrated services and support (at least a certain fixed % of expenditures used for integrated services)
B.	**Selective Quality Measures**
10)	Process measures assessing the receipt of care for treatment of drug dependence & depression
11)	Process measures assessing the receipt of care following mental health hospitalizations
12)	Medical record reviews regarding Appropriate assessments
13)	Medical record reviews regarding treatment plans
14)	Medical record reviews regarding Interdisciplinary communication
15)	Member feedback regarding consumer complaints
16)	Member feedback regarding Patient experience such as patient complaints
17)	Patient reported outcomes regarding changes in general health
18)	Patient reported outcomes regarding changes in psychological health symptoms
C.	**Administrative data based measures**
19)	Duration between admissions
20)	Medication possession ratio
21)	Average length of stay in psychiatric hospital
22)	Hospital Re-admission rate in general as well as for psychiatric patients
D.	**Additional measures**
23)	Standardized mortality rate for persons with particular psychiatric disorders.
24)	Randomised clinical trials / adherence indicators

3. INTERPRETIVE STRUCTURAL MODELLING METHODOLOGY (ISM)

Proposed by Warfield [19] , ISM methodology is a technique for establishing inter-relationships amongst the criteria of interest. The process begins with the identification of relevant elements and thereafter establishing contextual relationship amongst them . After that the structural self – interaction matrix is created using the VAXO concept which is then followed by the creation of initial reachability matrix . Final reachability matrix is then created after correcting the initial reachability matrix for any possibility of transitivity . From the reachability matrix, the reachability set and antecedent set for each criterion is found [19]. Then the intersection of these sets is derived for all elements. The element for which the reachability and intersection sets are the same is the top-level element. Then the reachability matrix is converted into the canonical matrix format by arranging the elements according to their levels. Based on the relative driving power and dependence power , factors are classified in various categories like autonomous, dependent, driver and linkage. Finally a diagraph is constructed from the canonical matrix .

4. DEVELOPMENT OF ISM MODEL : CASE EXAMPLE

In this section we will develop the ISM model for the various metrics related to performance of psychiatric clinics. Out of the total variables, we consider the 15 important metrics viz. Follow-up after hospitalization for mental illness (7-30 days) [FUAH]; Follow up after emergency department visit for mental illness[FUADV] ; Frequency in Inpatient services [FIS]; Positive Integrated services and support [PISS]; Process measures assessing the receipt of care for treatment of drug dependence & depression[PMDD]; Process measures assessing the receipt of care following mental health hospitalizations [PMMHH] ; Member feedback regarding Patient experience [MFPE] ; Patient reported outcomes regarding changes in psychological health symptoms [PRPHS] ; Duration between admissions [DBA]; Medication possession ratio [MPR]; Average length of stay in psychiatric hospital [ALS] ; Hospital Re-admission rate in general [HRAR] ; Hospital readmission rate for psychiatric disorder patients [HRAPD] . Decrease in standardized mortality rate for persons with particular psychiatric disorders [DSMR]; Positive performance by adherence indicators [PAI] .

Explanation :

Positive patient reported outcomes regarding changes in psychological health symptoms [PPRPHS] could lead to positive integrated services and support [PISS]and vice versa. Positive PMDD and PMMHH could lead to positive integrated services and support [PISS] as well as better follow up after hospitalization for mental illness [PFUAH] and vice versa. This means PFUAH , PFUADV , PISS and PMDD , PMMHH and MFPE are inter-related. Shorter length of stay in psychiatric hospital could mean shorter duration between admissions but this may lead to higher re-admission rate [HHRAPD] for psychiatric patient and patient in general . Higher hospital re-admission rate may or may not cure the disease although there are higher chances for decrease in mortality rate. PFUADV could be the sub field of PFUAH . i.e. PFUADV could lead to PFUAH. Frequency or higher in patient services [PIS] could lead to positive integrated services and support [PISS] i.e. FIS could lead to PISS. PMDD could be a part of PMMHH i.e. process measures assessing the receipt of care for treatment of drug dependence and depression [PMDD] could lead to process measures assessing the receipt of care following mental health hospitalization [PMMHH] . Member feedback regarding patient experience [This may include the feedback from the accompanying or family member as well as patient himself] so MFPE could determine average length of stay as positive feedback could means favorable length of stay as well as hospital re admission rate in general [HRAR] as well as adherence indicators [AI] . Decrease in standardized mortality rate for persons with psychiatric disorders [DSMR] could be related to hospital readmission rate for patient with psychiatric disorder [HRAPD] . Very high hospital readmission rate means that the person are suffering seriously from psychiatric disorder. This could also lead to higher length of stay at psychiatric hospital. Successful treatment could decrease the mortality rate of persons with psychiatric disorder [DSMR]. Adherence indicators are the performance metrics for identifying patients who need assistance with medication adherence. Further, this could not guarantee that the patient's conditions would improve . But still better performance indication by adherence indicators[AI] i.e. positive AI [PAI]could lead to positive feedback regarding patient experience as well as PMDD and PMMHH. Positive reply by adherence indicators could signify decrease in standardized mortality rate . So our behavioral measure would be decrease in standardized mortality rate [DSMR]. Positive outcome means patient have given favorable outcome of favorable or higher length of stay at psychiatric medi-care. Positive performance by adherence indicators [PAI] shall lead to PRPHS , MFPE, MPR, ALS, HRAPD, DSMR, FUAH, FUADV, PMDD,PMMHH and vice versa .

4.1 Construction of Structural Self - Interaction Matrix (SSIM)

This matrix gives the pair-wise relationship between two variables i.e. i and j based on VAXO. SSIM has been presented below in Fig 1.

Explanation : Teaching load affects teacher's competence and vice versa . Less competent teacher may have inappropriate or small class size. Lack of appropriate facilities affects teacher's competence . More teaching load may lead to less practical lessons . Too much content may also lead to less practical lessons . Too much content affects teachers' competence as well as teaching load and vice versa. less number of class size affects the content to be covered . Sometimes it could motivate the teacher as they have to handle less number of student . Sometimes it could be a demotivating factor . A teacher with too much teaching load may not take the practical sessions with that interest.

4.2 Construction of Initial Reachability Matrix and final reachability matrix

The SSIM has been converted in to a binary matrix called the initial reachability matrix shown in fig. 2 by substituting V, A, X, O by 1 or 0 as per the case. After incorporating the transitivity, the final reachability matrix is shown below in the Fig 3.

Fig 1: SSIM matrix for pair wise relationship amongst barriers

		1	2	3	4	5	6	7	8	9j	10	11	12	13	14	15
		PFUAH	PFUADV	PIS	PISS	PMDD	PMMHH	MFPE	PPRPHS	SDBA	MPR	HALS	HHRAR	HRAPD	DSMR	PAI
1	PFUAH		X	X	X	X	X	X	X	V	X	X	V	A	V	X
2	PFUADV			X	X	X	X	X	X	V	X	X	V	A	V	X
3	PIS				X	X	X	X	X	V	X	X	V	A	V	A
4	PISS					X	X	X	X	V	X	X	V	A	V	A
5	PMDD						X	X	X	V	X	X	V	A	V	X
6	PMMHH							X	X	V	X	X	V	A	V	X
7	MFPE								X	V	X	X	V	A	V	X
8	PPRPHS									V	X	X	V	A	V	X
9	SDBA										X	X	V	A	V	A
10	MPR											X	V	A	V	X
11	ALS												V	A	V	X
12	HHRAR													X	V	A
13	HRAPD														V	X
14	DSMR															X
15	PAI															

Fig 2: Initial reachability matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		PFUAH	PFUADV	PIS	PISS	PMDD	PMMHH	MFPE	PPRPHS	SDBA	MPR	HALS	HHRAR	HRAPD	DSMR	PAI
1	PFUAH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	PFUADV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	PIS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
4	PISS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
5	PMDD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	PMMHH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	MFPE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	PPRPHS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	SDBA	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0
10	MPR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	ALS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	HHRAR	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
13	HRAPD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	DSMR	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
15	PAI	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1

Fig 3 : Final reachability matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	D.P
		PFUAH	PFUADV	PIS	PISS	PMDD	PMMHH	MFPE	PPRPHS	SDBA	MPR	HALS	HHRAR	HRAPD	DSMR	PAI	
1	PFUAH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
2	PFUADV	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
3	PIS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
4	PISS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
5	PMDD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
6	PMMHH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
7	MFPE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
8	PPRPHS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
9	SDBA	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	7
10	MPR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
11	ALS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
12	HHRAR	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	4
13	HRAPD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
14	DSMR	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
15	PAI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
	De. P	12	12	12	12	12	12	12	12	13	13	13	14	14	15	15	

D.P : Driving power ; De.P : dependence power

4.3 Level Partition

From the final reachability matrix, reachability and final antecedent set for each factor are found. The element for which the reachability and intersection sets are same are the top-level element in the ISM hierarchy. After the identification of top level element, it is separated out from the other elements and the process continues for next level of elements. Reachability set, antecedent set, intersection set along with different level for elements have been shown below in table I to table IV.

Table 1 : Iteration I

S.No.	**Reachability set**	**Antecedent set**	**Intersection set**	**Iteration/ Levels**
1	**14,15**	**1,2,3,4,5,6,7,8,9,10,11,12,13,14,15**	**14,15**	**I**
2	12,13,14,15	1,2,3,4,5,6,7,8,9,10,11,12,13,15	12,13,15	
3	9,10,11,12,13,14,15	1,2,3,4,5,6,7,8,9,10,11,13,15	9,10,11,13,15	
4	1,2,3,4,5,6,7,8.9,10,11,12,13,14,15	1,2,3,4,5,6,7,8,10,11,13, 15	1,2,3,4,5,6,7,8,10,11,13,15	

Table 2 : Iteration II

S.No.	Reachability set	Antecedent set	Intersection set	Iteration
2	12,13	1,2,3,4,5,6,7,8,9,10,11,12,13	12,13	II
3	9,10,11,12,13	1,2,3,4,5,6,7,8,9,10,11,13	9,10,11,13	
4	1,2,3,4,5,6,7,8.9,10,11,12,13,14	1,2,3,4,5,6,7,8,10,11,13	1,2,3,4,5,6,7,8,10, 11,13	

Table 3 : Iteration III

Sr. No.	Reachability set	Antecedent set	Intersection set	Iteration
3	9,10,11	1,2,3,4,5,6,7,8,9,10,11	9,10,11	III
4	1,2,3,4,5,6,7,8.9,10,11	1,2,3,4,5,6,7,8,10,11	1,2,3,4,5,6,7,8,10,11	

Table 4 : Iteration IV

Sr. No.	Reachability set	Antecedent set	Intersection set	Iteration
4	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	IV

4.5 Classification of factors

The critical success factors described earlier are classified in to four clusters viz. autonomous factor, dependent factors, linkage factors and independent factors (mentioned in Table XIII below). As it can be seen that CLC is an autonomous criteria. Criteria DTC, DOC , LTR , EC , MO , MS are drivers . Criteria such as REL, LTQP , IOIVE , LALC , ABB , LTP are dependent criteria. Criteria TE and BRS are linkage criteria. Fig. 4 below shows the driving power and dominance diagram

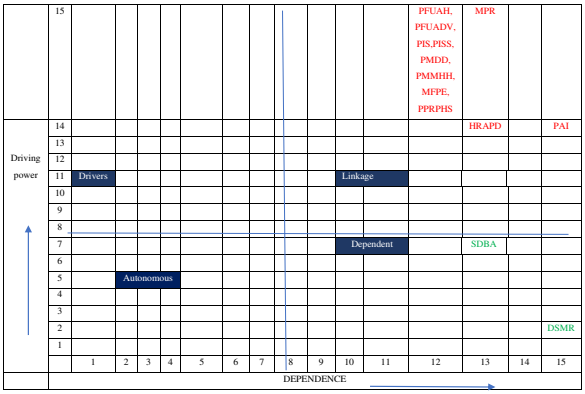

Fig . 4: Driving power and dependence diagram

4.4 ISM model

An ISM model is developed (as shown in fig. 5 below) after arranging the elements as per their interaction or dependence relationships.

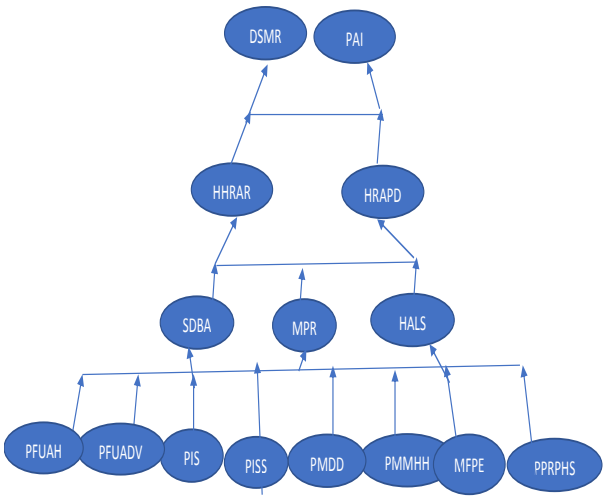

Fig 5 : ISM Model

5. RESEARCH IMPLICATIONS

- Quality indicators are only one method to measure treatment quality. They have the advantage of being databased and enabling scientific analyses. However, most indicators in mental health care are not empirically validated themselves, but are rather based on recommendations for interventions that have been evaluated in efficacy studies. Further research may broaden the validation base for single quality indicators.
- Other quality indicators have to consider the regional mental healthcare system and need case-mix adjustment to avoid unfair comparisons. In general, quality indicators have to be meaningful, feasible and actionable and address different dimensions of the mental health care system. Many indicators rely on psychiatric guideline recommendations.
- In some cases, health plans may be using quality and value measures to systematically monitor care delivered by the providers in their networks and to inform and monitor quality improvement and cost reduction efforts.

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