Online Supplement

Details of materials searched for meta-analysis and meta-analysis procedure

Articles through 2013 were considered if they combined the terms Markov and one or more of the following: serious, severe or chronic mental illness, schizophrenia (or related diagnoses e.g., schizoaffective), bipolar disorder and personality disorder. Articles were also hand-searched for additional studies. Those presenting symmetrically specified tables of transitions or TPs between discrete states for service systems for persons 18 years of age or older were analyzed with no exclusions. If tables of transitions or TPs were indicated available in supplementary material, these were sought. Studies could be randomized clinical trials or quasi-experimental evaluations comparing two or more systems or monitoring studies that observed single cohorts over time, in some cases prior to and after an intervention. In the latter case, results for the same cohort pre- and post-intervention were considered different systems. Studies could also be meta-analyses. No particular time period between transitions which varied from weeks to years was required,

1. To extract data the first author implemented a procedure which when followed by two independent raters in a previous study was found to have high levels of inter-rater reliability (2). Each step in the procedure was thoroughly reviewed by the second author. Following coding a number of logic checks were performed by the first and second authors, TPs varying from patterns observed in previous studies were re-reviewed, and coding of systems as B, M and R was checked against excerpted source materials. Any findings that failed logic tests or violated expectations were discussed until resolved.

2. States described in a material were cross-walked to a common FL framework employed to align different states, the Resource Associated Functional Level Scale (RAFLS) described below.

3. The transitions between states, whether in the form of distributions of persons or probabilities were represented for each system as a TP matrix with originating FL states in the rows and immediately ensuing destination states in the columns. If time periods were other than one month, we converted TPs into monthly by assuming clients exit from current states at an exponential rate – a standard assumption when analyzing transitions from a Markov perspective (23-25). From the observed TPs we can determine these exponential rates for the time period; we then obtain the monthly TPs by applying this exponential rate over a month time period.

4. All study-level systems were coded as B, M or R. Variables were extracted for studies (e.g., publication date), originating FL states (e.g., numbers observations) and populations (e.g., percent with schizophrenia).

5. TPs for the same system types, originating FLs and destination FLs were then synthesized. Comprehensive Meta-analysis' random effects option was used (30, 31), which considers both within-study estimation error and between studies variances, an approach particularly relevant to synthesis when data are extracted from diverse studies (32, 33).

6. Since studies had different states, TPs for cells were synthesized separately with synthesized TPs not necessarily summing to 1.00. Synthesized TPs were adjusted to sum to 1.00 by converting them to proportions of total synthesized row TPs.

7. Rows of TPs for originating FLs and study-level systems were then assembled to create full TP matrices for B, M, and R systems and cells compared to test study predictions.

8. TP matrices were characterized in terms of average net positive TPs (operationally defined below) and these measure were correlated with service recipient and study characteristics using meta-regression when data availability permitted.

9.

Full description of Resource Associated Functional Level Scale (RAFLS)

RAFLS
Functional Level 1 At risk. Dangerous to Self, others, or property of value. Unable or unwilling to control violent, aggressive or escape seeking behavior. Requires continuous (24 hour) supervision, high staff/patient ratio, locked or limited access facility.
Functional Level 2 Acutely symptomatic. Symptoms result in behavior that is seriously disruptive or dangerous, and/or prevent role functioning. Examples of symptoms: lack of reality testing, hallucinations or delusions, impaired judgement, impaired communication, or manic behavior. If suicidal or homicidal, is able/willing to control impulses with assistance. May be able to carry out some activities of daily living. Requires continuous supervision, moderate staff/patient ratio, and limited access facility.
Functional Level 3 Lacks ADL skills. Symptoms no longer result in behavior that is disruptive or dangerous. (Nuisance behaviors should not be considered seriously disruptive or dangerous). Lacks sufficient ADL and/or personal care skills to carry out role functions. Skills lacking because: 1) never mastered, or 2) atrophied through disuse from creation of extreme dependency, neglect, lack of motivation. Requires continuous (24 hour) prompting, skill training, and encouragement. Moderate staff/patient ratio needed.
Functional Level 4 Lacks community living skills. Able to carry out ADL personal care skills. Role functioning impaired by lack of community living skills or motivation to perform. Community living skills include: housekeeping, money management, using public transportation, ability to engage in competitive employment, maintaining interpersonal contacts. Requires regular and substantial (e.g., 2 or more hours per day), but not necessarily continuous training, prompting, and encouragement.
Functional Level 5 Vulnerable to stresses of everyday life. Can perform role functions, at least minimally, in familiar settings and with frequent support to deal with the ordinary stresses of everyday life; e.g., can perform housekeeping tasks, although may need the regular assistance of a roommate, homemaker-aid, etc., or can work outside of sheltered situations with an understanding employer or on-site support or counseling. Becomes dysfunctional under the stresses associated with the frustrations of everyday life and novel situations. Requires frequent (e.g., weekly) information, encouragement, and instrumental assistance.
Functional Level 6 Vulnerable to extreme or unusual stress. Can perform role functions adequately except under extreme or unusual stress. At these times, the support of natural or generic helpers such as: family, friends, clergy, or physician, is not sufficient. Mental health services are required for the duration of stress; or performs role functions adequately, but seeks mental health services because of feelings of persistent dissatisfaction with self or personal relationships. Intensity and duration of treatment can vary.
Functional Level 7 Mental health system independent. Can obtain support from natural helpers or generic services (e.g. primary care). Does not require or seek mental health specialty services.

Study level technical variables.

	Basic		aintenance		covery- oriented		All	
	N		N	%	N	%	N	
N of Study level systems	5	26	7	37	7	37	19	100
Stationarity								
Checked, confirmed	1	20	2	29	2	29	7	37
Checked, not confirmed	1	20	3	43	1	14	3	16
Assumed and/or discussed, not empirically checked	1	20	1	14	1	14	3	16
Not Discussed	2	40	1	14	3	43	6	32
1st v. 2nd order properties checked								
Compared goodness of fit for 1st versus 2nd order matrices or compared subgroup matrices based on person or study variables other than time period in which transition probabilities calculated.	1	20	2	29	3		43	6	32
Did not test first for goodness of fit other than stationarity	4	80	5	71	4		57	13	68
Reported 2nd order matrix	0	0	2	29	0		0	2	11
Predictive validity								
Not tested	2	40	5	71	3		43	10	53
Tested - found	3	60	2	29	4		57	9	47

Meta-regression of service recipient variables on average net positive transition probabilities.

Variable	Subgroups	r
Service recipient variables		
% with diagnoses of schizophrenia and related disorders	0-75 vs. 76-100	-0.50**
% White	50-64 vs. 66-69	0.77
% Male	35-59 vs. 70-98	0.40
% Age	28-40 vs. 41-49	0.02
Study variables		
Original State Measure	Service type or location vs. FL/Symptom pattern	-0.13*
Stationarity Checked	NI, Not checked vs. checked	-0.13
Predictive Validity Checked	Not tested vs. Tested	0.36
Publication Date	Pre 2000 vs. 2000 and after	-0.28

*t=.5, df = 17, two tailed p=.30; **t=-1.99, df = 12, one tailed p = .03