Development of a Severity Index to measure Outcomes in ACT teams

Antonio Olmos-Gallo (aolmos@mhcd.com), **MHCD** Robert Bremer, **UCHSC** James Zahniser, **Greenville College** Marshall Thomas, **Colorado Access**

Rationale

Use a combination of interval/ratio and nominal scales to evaluate the outcomes of a program

- Indicators make perfect sense to the program stakeholders, and can be very meaningful to everyone involved with the program: from funders to staff, to clients and the community
- Might have been used in similar programs across the nation, and may have been used for benchmarking

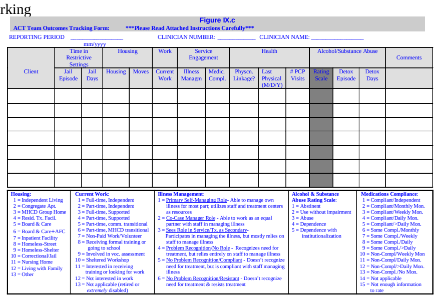


Figure IX.c

ACT Team Outcomes Tracking Form: ***Please Read Attached Instructions Carefully***

REPORTING PERIOD ____________ mm/yyyy CLINICIAN NUMBER: __________ CLINICIAN NAME: ______________

Client	Time in Restrictive Settings: Jail Episode	Jail Days	Housing: Housing	Moves	Work: Current Work	Service Engagement: Illness Managm	Medic. Compl.	Health: Physcn. Linkage?	Last Physical (M/D/Y)	# PCP Visits	Alcohol/Substance Abuse: Rating Scale	Detox Episode	Detox Days	Comments

Housing: 1 = Independent Living; 2 = Congregate Apt.; 3 = MHCD Group Home; 4 = Resid. Tx. Facil.; 5 = Board & Care; 6 = Board & Care+AFC; 7 = Inpatient Facility; 8 = Homeless-Street; 9 = Homeless-Shelter; 10 = Correctional/Jail; 11 = Nursing Home; 12 = Living with Family; 13 = Other

Current Work: 1 = Full-time, Independent; 2 = Part-time, Independent; 3 = Full-time, Supported; 4 = Part-time, Supported; 5 = Part-time, comm. transitional; 6 = Part-time, MHCD transitional; 7 = Non-Paid Work/Volunteer; 8 = Receiving formal training or going to school; 9 = Involved in voc. assessment; 10 = Sheltered Workshop; 11 = Interested in receiving training or looking for work; 12 = Not interested in work; 13 = Not applicable (retired or *extremely* disabled)

Illness Management: 1 = Primary Self-Managing Role- Able to manage own illness for most part; utilizes staff and treatment centers as resources; 2 = Co-Case Manager Role - Able to work as an equal partner with staff in managing illness; 3 = Sees Role in Service/Tx. as Secondary- Participates in managing the illness, but mostly relies on staff to manage illness; 4 = Problem Recognition/No Role - Recognizes need for treatment, but relies entirely on staff to manage illness; 5 = No Problem Recognition/Compliant - Doesn't recognize need for treatment, but is compliant with staff managing illness; 6 = No Problem Recognition/Resistant - Doesn't recognize need for treatment & resists treatment

Alcohol & Substance Abuse Rating Scale: 1 = Abstinent; 2 = Use without impairment; 3 = Abuse; 4 = Dependence; 5 = Dependence with institutionalization

Medications Compliance: 1 = Compliant/Independent; 2 = Compliant/Monthly Mon.; 3 = Compliant/Weekly Mon.; 4 = Compliant/Daily Mon.; 5 = Compliant/>Daily Mon.; 6 = Some Compl./Monthly; 7 = Some Compl./Weekly; 8 = Some Compl./Daily; 9 = Some Compl./>Daily; 10 = Non-Compl/Weekly Mon; 11 = Non-Compl/Daily Mon.; 12 = Non-Compl/>Daily Mon.; 13 = Non-Compl./No Mon.; 14 = Not applicable; 15 = Not enough information to rate

PLEASE FILL IN **ALL** BLANKS – THIS IS VERY IMPORTANT

However, because of the nature of the measures, these categorical indicators could not be combined as a single measure to generate a "severity index" that may be used to evaluate consumer's improvement either across time, or compared to other members of their program

In 2002, as part of an evaluation effort, we were faced with the challenge of using this measure to evaluate consumers in the ACT team and compare them to another group of consumers in a different team. We decided to take this challenge and develop a quantitative score that will allow us to establish such comparison

Method

In order to develop the severity score based on the indicators, we first created a rough classification of the outcomes into severity levels

Team Tracking Form Scoring Table

DATA SOURCE	SEVERE NEED (3)	NEED (2)	MINIMAL NEED (1)	NO NEED (0)	WEIGHTING VARIABLE (from survey)
ACT: Claims + chart review for 'Care Control: Claims (no 'Care)	1/>31 or >3/any	1/>10 or >2/any	1/<11	0/0	Episodes/Days of Hospitalization
ACT: Claims Control: Claims	>3/any	1/>7 or >2/any	1/<7	0/0	Episodes/Days in ATU
ACT: Claims Control: Claims	>90 days	31 - 90 days	1-30 days	0/0	Days spent in Residential Units
ACT: OTF Control: OTF	> 3 moves/11 mo.	2 moves/11 mo.	1 move/11 mo.	1 moves/11 mo.	Housing Stability/Instability
	Homeless	Res or Group Home or NH	Boarding Care	Other Category	Housing Status
ACT: OTF Control: OTF	Abuse+ Detox or Rating of Dep or Dep w/ Instit.	Any Detox time or Rating of Abuse		Abst. Or using w/o impairment	Alcohol/Substance Abuse AND/OR Episodes/Days in Detox
ACT: OTF Control: OTF	> 1 in 1 year	1 in 1 year	0 in one year	0 in one year	Episodes/Days in Jail
ACT: OTF Control: OTF	6	5 or 4	3	1 or 2	Illness Management
	13 to 8	7 to 4	3	2 to 1	Medication Compliance

To determine how to weight these outcome variables, a desirability of outcomes survey was developed and administered to local program managers and experts in the field of Assertive Community Treatment

Weighting system developed using **Thurstone's method of paired comparisons** (Nunally & Bernstein, 1994)

For all possible pairs of the outcomes listed on the previous page, please place a check mark next to the outcome that you believe is more important to measure in evaluating an ACT team.

Alcohol/Substance	☐	1	☐	Days spent in
Episodes/Days in ATU	☐	2	☐	Episodes/Days in Detox
Episodes/Days of Hospitalization	☐	3	☐	Episodes/Days in Jail
Housing Status	☐	4	☐	Housing Stability/Instability
Illness Management	☐	5	☐	Medication Compliance
Alcohol/Substance Abuse	☐	6	☐	Episodes/Days in ATU
Days spent in Residential Units	☐	7	☐	Episodes/Days in Detox
Episodes/Days in Jail	☐	8	☐	Housing Status
Housing Stability/Instability	☐	9	☐	Episodes/Days of Hospitalization
	☐	10	☐	Alcohol/Substance Abuse
Illness Management	☐	11	☐	Days spent in Residential Units
Episodes/Days in ATU	☐	12	☐	Episodes/Days of Hospitalization
Episodes/Days in Detox	☐	13	☐	Housing Status
Episodes/Days in Jail	☐	14	☐	Housing Stability/Instability
Housing Status	☐	15	☐	Illness Management
Housing Stability/Instability	☐	16	☐	Medication Compliance
Days spent in Residential Units	☐	17	☐	Episodes/Days in ATU
Episodes/Days in Detox	☐	18	☐	Episodes/Days in Jail
	☐	19	☐	Housing Status
Housing Stability/Instability	☐	20	☐	Alcohol/Substance Abuse
Episodes/Days in ATU	☐	21	☐	Illness Management
Episodes/Days in Jail	☐	22	☐	Days spent in Residential Units
	☐	23	☐	Episodes/Days in Detox
Episodes/Days of Hospitalization	☐	24	☐	Illness Management
Housing Status	☐	25	☐	Alcohol/Substance Abuse
Days spent in Residential Units	☐	26	☐	Housing Stability/Instability
	☐	27	☐	Episodes/Days in ATU
Illness Management	☐	28	☐	Episodes/Days in Detox
Episodes/Days in Jail	☐	29	☐	Medication Compliance
Days spent in Residential Units	☐	30	☐	Episodes/Days of Hospitalization
Alcohol/Substance Abuse	☐	31	☐	Episodes/Days in Jail
Housing Stability/Instability	☐	32	☐	Episodes/Days in ATU
Episodes/Days of Hospitalization	☐	33	☐	Housing Status
Episodes/Days in Detox	☐	34	☐	Housing Stability/Instability
Illness Management	☐	35	☐	Episodes/Days in Jail
Episodes/Days of Hospitalization	☐	36	☐	Alcohol/Substance Abuse
Housing Status	☐	37	☐	Days spent in Residential Units
Housing Stability/Instability	☐	38	☐	Illness Management
Episodes/Days in ATU	☐	39	☐	Episodes/Days in Jail
Days spent in Residential Units	☐	40	☐	Medication Compliance
Episodes/Days in Detox	☐	41	☐	Episodes/Days of Hospitalization
Alcohol/Substance Abuse	☐	42	☐	Illness Management
Housing Status	☐	43	☐	Episodes/Days in ATU
Episodes/Days of Hospitalization	☐	44	☐	Medication Compliance
Episodes/Days in Detox	☐	45	☐	Alcohol/Substance Abuse

Raters are presented with all possible pairs of desired outcomes. Then indicates which member of the pair will be preferred under the specific conditions. The result of that comparison is converted into a percent.

A matrix is created indicating the percent of times that each one of the outcomes was chosen over its counterparts

PERCENT OF TIMES COLUMN WAS CHOSEN OVER ROW

	AA	RU	ATU	DETOX	HOSP	JAIL	H_STT	H_STAB	IM	MC
AA	0.500	0.267	0.600	0.133	0.867	0.467	0.733	0.467	0.533	0.600
RU	0.733	0.500	0.800	0.333	0.933	0.800	0.600	0.200	0.733	0.600
ATU	0.400	0.200	0.500	0.133	0.867	0.667	0.467	0.533	0.600	0.533
DETOX	0.867	0.667	0.867	0.500	1.000	0.867	0.733	0.867	0.667	0.667
HOSP	0.133	0.067	0.133	0.000	0.500	0.400	0.200	0.000	0.267	0.200
JAIL	0.533	0.200	0.333	0.133	0.600	0.500	0.733	0.600	0.467	0.267
H_STT	0.267	0.400	0.533	0.267	0.800	0.267	0.500	0.467	0.467	0.333
H_STAB	0.533	0.800	0.467	0.133	1.000	0.400	0.533	0.500	0.600	0.467
IM	0.467	0.267	0.400	0.333	0.733	0.533	0.533	0.400	0.500	0.467
MC	0.400	0.400	0.467	0.333	0.800	0.733	0.667	0.533	0.533	0.500

Next, we convert the percents to normal deviates Zjk (i.e., Z-scores from statistical tables)

Calculate for each category (i.e., column) sums and then averages. However, remove first pairs that are "widely separated" (i.e., the blank cells in the table) since those combinations never "overlap" (i.e., the rater will never pick the other category)

Z-SCORE Table

	AA	RU	ATU	DETOX	HOSP	JAIL	H_STT	H_STAB	IM	MC
AA	0	-0.622	0.253	-1.112	1.112	-0.083	0.622	-0.083	0.083	0.253
RU	0.622	0	0.842	-0.432	1.499	0.842	0.253	-0.842	0.622	0.253
ATU	-0.253	-0.842	0	-1.112	1.112	0.432	-0.083	0.083	0.253	0.083
DETOX	1.112	0.432	1.112	0	.	1.112	0.622	1.112	0.432	0.432
HOSP	-1.112	-1.499	-1.112	.	0	-0.253	-0.842	.	-0.622	-0.842
JAIL	0.083	-0.842	-0.432	-1.112	0.253	0	0.622	0.253	-0.083	-0.622
H_STT	-0.622	-0.253	0.083	-0.622	0.842	-0.622	0	-0.083	-0.083	-0.432
H_STAB	0.083	0.842	-0.083	-1.112	.	-0.253	0.083	0	0.253	-0.083
IM	-0.083	-0.622	-0.253	-0.432	0.622	0.083	0.083	-0.253	0	-0.083
MC	-0.253	-0.253	-0.083	-0.432	0.842	0.622	0.432	0.083	0.083	0
Sum	-0.423	-3.659	0.327	-6.366	6.282	1.88	1.792	0.27	0.938	-1.041
Average	-0.0423	-0.3659	0.0327	-0.70733	0.78525	0.188	0.1792	0.03	0.0938	-0.1041

Finally, the value of the lowest score (i.e., the most negative mean) is subtracted from each other score so as to avoid negative scores:

- These weights were used to underscore the importance of one outcome over the other as defined by experts in the field. We used these results to create a weighting schema for our severity score

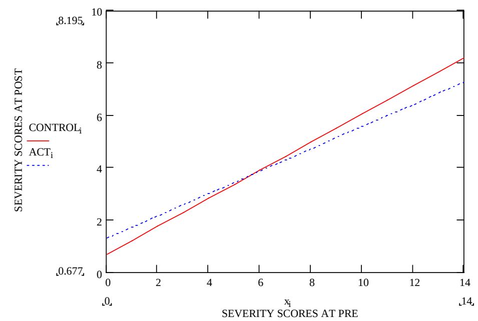
Minimum score: Episode/Days in Detox. Z-score: -0.70733
Categories sorted in descending order:

Mean		WEIGHT
0.785	Episodes/Days of Hospitalization	1.49258
0.188	Episodes/Days in Jail	0.89533
0.179	Housing Status	0.88653
0.094	Illness Management	0.80113
0.033	Episodes/Days in ATU	0.74003
0.030	Housing Stability/Instability	0.73733
-0.042	Alcohol/Substance Abuse	0.66503
-0.104	Medication Compliance	0.60323
-0.366	Days spent in Residential Units	0.34143
-0.707	Episodes/Days in Detox	0.00000

Regression Discontinuity

Pre-test and post-test scores were determined from data collected at a nine month interval by the consumers' clinicians

Clear trend toward significance with the ACT team scores being higher than those of the control group (those that benefit the most from ACT services are those with a higher severity score at PRE)



Evaluation of consumer's improvement over time

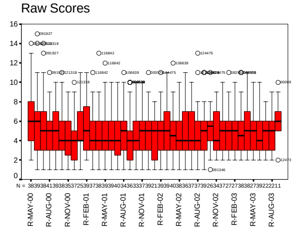
Determine if consumers are either improving or maintaining gains, and whether the changes noticed in the severity score parallels the clinical observations performed by the team clinicians

Data compiled for consumers (period: May 00 - Sept 03). The number of consumers varied as consumers were admitted and discharged from the team

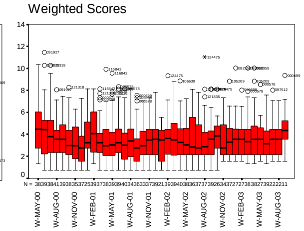
How does the weighted severity score compare to raw scores?

- Areas deemed more important get more weight, therefore able to flag potential outliers at the high end of the scale
- We lose outliers on the negative side (consumers with very low scores)

Raw Scores



Weighted Scores



Stability/Instability

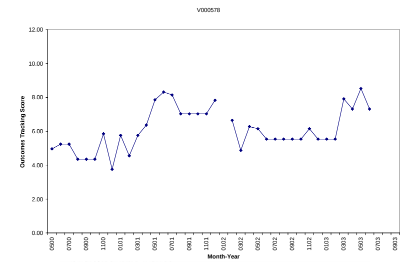
Due to their own recovery path, consumers' recovery can sometimes be unstable

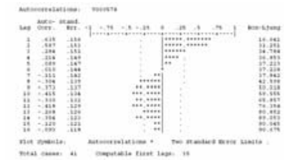
- Common with consumers who have a crisis or are just getting engaged in the team
- Chronic consumers with unresolved issues of substance abuse

With the help of clinicians it was found that statistical analyses used to determine periodicity (i.e., Autocorrelation) provide a fair assessment of stability/instability in consumers

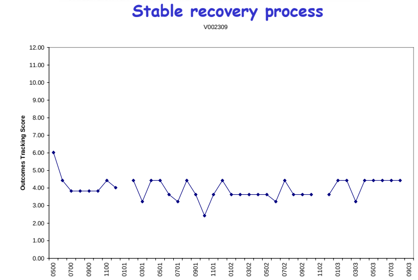
- Periodicity with significant short lags (i.e., lag 1-6 larger than 2 std-errors) can be considered as UNSTABLE
- Clinicians/Program manager agreed with the judgments of stability/instability from the Autocorrelation

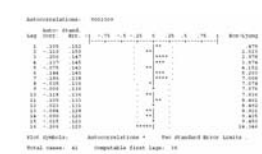
Unstable recovery process





Stable recovery process





Potential Uses

In an informal pool, clinicians/program manager found this information as potentially very useful when performing their 6-month reviews

Also when evaluating transitions to other teams/discharge from ACT services.

Future directions

- Fine-tuning of the scores to set thresholds for different levels of severity
- Linkage of this data to other sources of information that may help validate the scale
- Rescoring of the severity scores using a different group of experts
- Analysis of the severity scores using Rasch models
- Linkage of the scores to other measures of improvement