

ASSOCIATION BETWEEN STRENGTHS AND NEEDS ON CANS-MH AND RISK OF SUBSEQUENT PSYCHIATRIC HOSPITALIZATION FOR YOUTH WHO COMPLETED HOME AND COMMUNITY BASED MEDICAID SERVICES WAIVER

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Presented at the
Children's Mental Health Services Staff Development Training Forum, Saratoga NY
12/3/2013

Background: Setting

- NYS HOME & COMMUNITY BASED SERVICES MEDICAID WAIVER (WAIVER)– in context of children’s services
 - Waiver children 5 to 21 with a serious emotional disturbance and at risk of out-of-home placement;
 - Waiver has been operating since 1995, 31 providers across NYS serve approximately 2768 children per year;
 - All children in Waiver receive Individualized Care coordination (ICC) services;
 - In addition, enhanced services are available to children and their families: Intensive-in-home (IIH), Respite Care (RC); Family Support Services (FSS); Crisis response services (CR); Skill building services (SB)



Use of the CANS-MH in the Waiver

- CANS-MH is used as a service planning and assessment tool in Waiver;
- Assessments are completed at admission, at the end of the first month in care (30 days), at every 6 month service plan update thereafter and at discharge.
- Waiver providers enter CANS-MH into a statewide online administrative information system – NYS OMH Child & Adult Integrated Reporting System (CAIRS)- which includes provider reports and provides a means of program oversight by OMH.



Study Objectives

To evaluate if the use of enhanced Waiver service components positively impact the risk of psychiatric hospitalization post discharge;

To identify risk and protective factors from the CANS-MH that are associated with psychiatric hospitalization post discharge.

Study Hypotheses

Higher doses of enhanced services (CR, IIH, RC, FSS, SB) received during an HCBS-Waiver episode are associated with decreased risk of psychiatric hospitalization post-discharge.

Higher CANS-MH needs (Problem Presentation, Risk Behaviors, Functioning) and lower CANS-MH strengths (Youth, Caregiver) are associated with increased risk of psychiatric hospitalization post-discharge.



Method: Study Design

- This is a retrospective study of youth discharged from HCBS-Waiver services between 4/1/2007 and 3/31/2012 (N=4,994, 68% of all Waiver children served during the corresponding time period);
- A sub-set of children were identified who had a CANS-MH (N=3,537, 71%) entered into CAIRS during their Waiver episode.

Methods: Data Source

- CAIRS was used as the source of Waiver admission and discharge date, child demographics, primary diagnosis at discharge & CANS-MH assessments;
- Medicaid claims were used to identify HCBS-Waiver services utilized during the Waiver episode and psychiatric hospitalizations post-discharge.

Methods: Analytical Constructs

Independent Variables:

- ***CANS-MH scores*** were computed for domains problem presentation, risk behavior, life functioning, child strengths and family strengths as mean scores normalized to a scale of 30, domains percentiles were categorized as ordinal categorical variables using distribution quartiles: low, med, high, very high.
- ***Waiver enhanced service utilization*** (IH,RC,FSS,CR,SB) were categorized as ordinal categorical variables based on median dollars spent: 0: no service, 1: low (below median), 2: high (above median)
- ***Waiver length of stay*** was categorized dichotomously as (<180 days >=180 days).
- ***Primary Diagnosis*** at discharge was categorized as:ADHD, Mood, Schizophrenia, Disruptive Behavior, Anxiety or other.
- ***Age*** was categorized as: 5-9, 10-12, 13-15, and 16 and older & ***Gender***

Dependent Variable:

Days to Psychiatric hospitalization post Waiver discharge

Methods: Statistical Analysis

- ***Descriptive***

Kaplan Meier estimator was used to determine overall time to hospitalization post discharge from Waiver. (Lifetest Procedure)

Log-rank tests with chi-square comparisons were used to examine relationships between independent variables (age, gender, Waiver services and CANS-MH scores) and time to having a psychiatric hospitalization. (Lifetest procedure)

- ***Multivariable***

- Cox regression survival statistical methods were used to compute the hazard ratios (HR) of being hospitalized given receipt of HCBS-Waiver services and/or including CANS-MH scores, models controlled for the length of waiver episode, age, gender, and primary diagnosis at discharge. (PHREG procedure).

- The SAS[©] system was used to perform all statistical analysis.

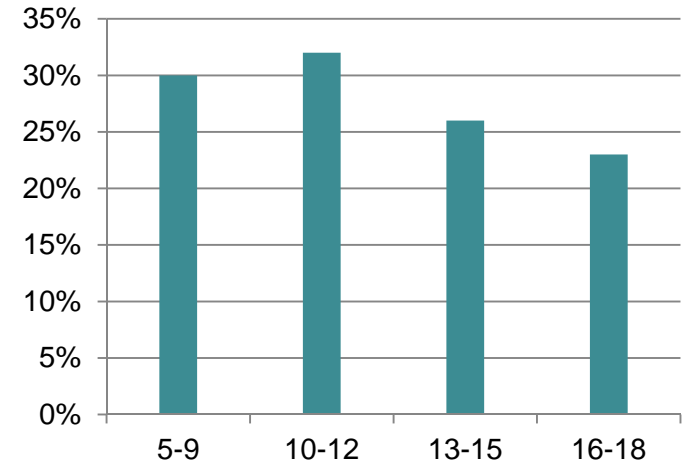
Descriptive Statistics

Table I: Demographics of Youth Included in the Study (N=4994)

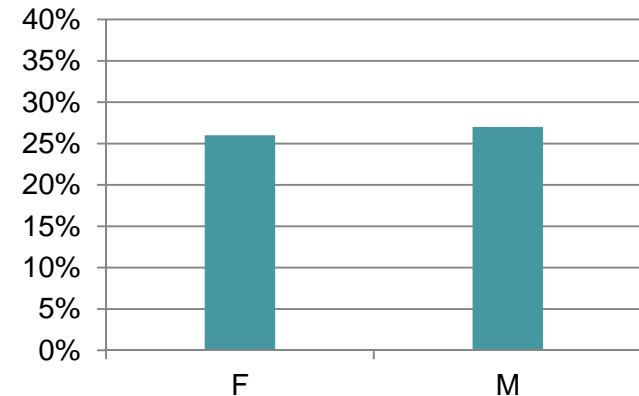
Age	Mean	25 pct	median	75 pct
Overall	14	11	14	16

	Youth Studied (#, %)	Hospitalized (Uncensored)		Test of Equality over Strata	
				Chisq	Pr>Chisq
Age				26.44	<0.0001
5-9	632	190	30%		
10-12	1081	342	32%		
13-15	1716	453	26%		
16-18	1565	358	23%		
Gender				0.154	0.695
F	1971 (39%)	516	26%		
M	3023 (61%)	827	27%		

% of Hospitalized, by Age Group



% of Hospitalized by Gender



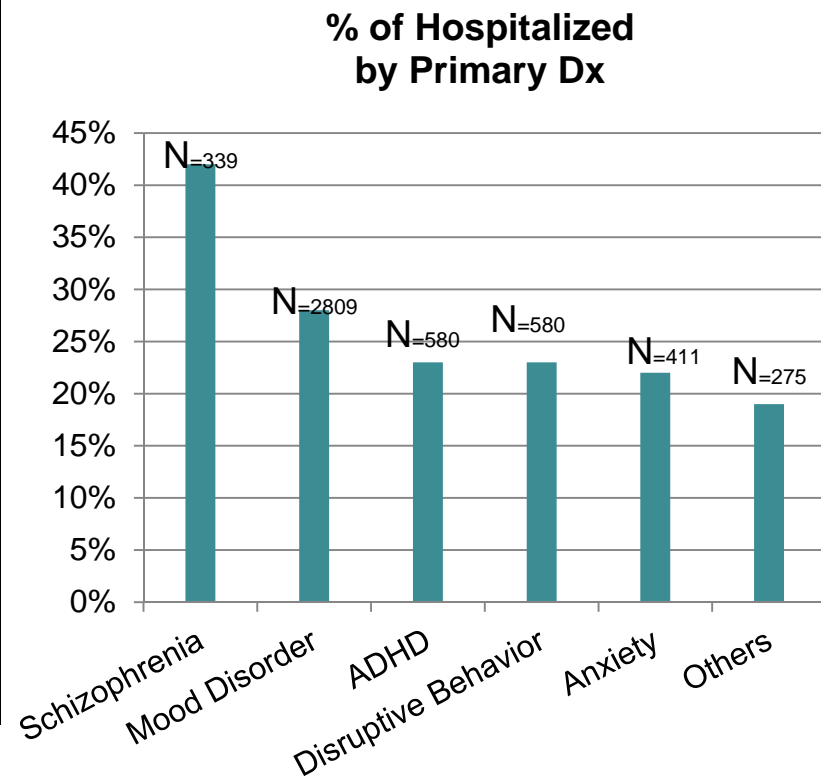
Descriptive Statistics

Table 2: Clinical Characteristics of Youth Included in the Study (N=4994)

Primary Diagnosis upon Waiver Completion	Youth Studied (#, %)	Hospitalized* (Uncensored)	
Schizophrenia	339 (7%)	143	42%
Mood Disorder	2809 (56%)	788	28%
ADHD	580 (12%)	136	23%
Disruptive Behavior	580(12%)	132	23%
Anxiety	411 (8%)	91	22%
Others	275 (6%)	53	19%
Total Youth	4994 (100%)	1343	27%

Test of Equality over Strata

Chisq*	Pr>Chisq
71.84	<0.01*

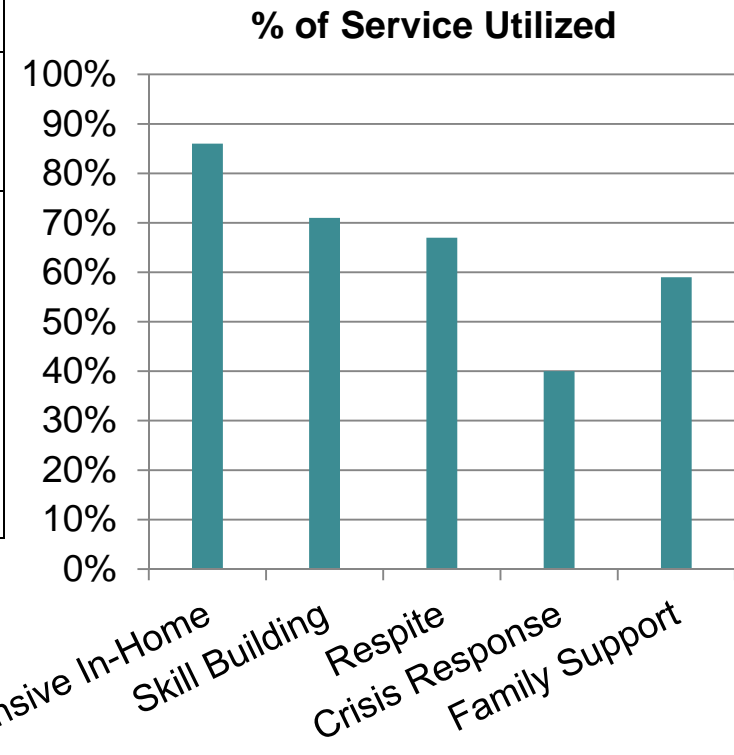


Descriptive Statistics

Table 3: Waiver Services Utilized during the Waiver Episode by Youth Included in the Study (N=4994)

Service Utilized	#(%) Youth Studied	\$ amount spent*				# Hours
		Mean	25 pct	median	75 pct	median
Intensive In-Home	4281 (86%)	49.1	7.5	20	41	20
Skill Building	3536 (71%)	4512	832	2548	5726	53
Respite	3347 (67%)	5456	988	2850	6765	60
Crisis Response	1981 (40%)	4	1	2	4.75	2
Family Support	2851 (59%)	1384	234	705	1728	15
Total Youths	4994 (100%)					

Cut-off for categorizing high vs low service utilization during the Waiver episode



*The total \$ amount claimed by the services is used as a proxy for the quantity of services provided.

Descriptive Statistics

Table 4. Youth with completed HCBS-Waiver episodes by discharge year and proportion hospitalized post discharge (Uncensored, Descriptive Analysis)

Discharge FY Year	Total Episodes		# Episodes followed by hospitalization		# Episodes followed by hospitalization within 1 year		# Episodes followed by hospitalization within 2 year	
	N	%	n	% of total	n	% of total	n	% of total
2007-2008	641	13%	227	35%	130	20%	173	27%
2008-2009	974	20%	332	34%	191	20%	260	27%
2009-2010	1098	22%	289	26%	170	15%	248	23%
2010-2011	1098	22%	276	25%	206	19%	269	*
2011-2012	1183	24%	219	19%	209	*	219	*
Total	4994	100%	1343	27%	906	18%	1169	23%

*Rate not shown due to censored data

Table 5. Probability of Hospitalization* for children with completed WAIVER episodes (Survival Analysis, accounting for censored data, N=4,994)

	Overall	
Time post waiver completion	# of Youth at Risk	Estimated hospitalization free survival probabilities [95%CI]
0 days	4994	1
7 days	4806	0.99 [0.99, 0.99]
30 days	4640	0.96 [0.96, 0.97]
90 days	4148	0.91 [0.90, 0.92]
180 days	3656	0.86 [0.85, 0.87]
1 year	2737	0.79 [0.78, 0.80]
2 years	1622	0.70 [0.68, 0.71]
3 years	934	0.63 [0.62, 0.65]

*Estimates computed as proportion of Not Hospitalized using the Kaplan-Meier survival function estimator

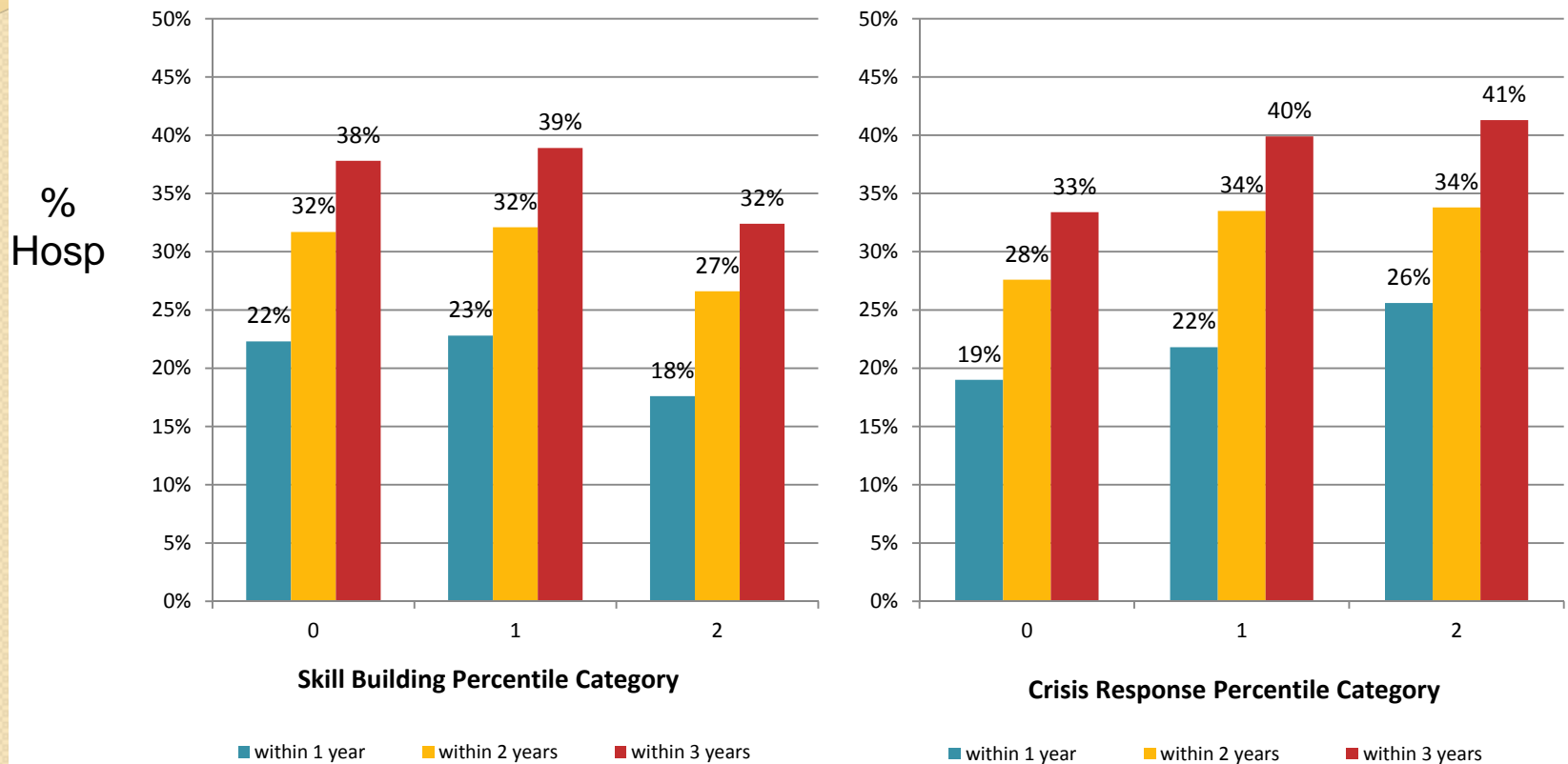
Table 6 Waiver Service Use and Estimated Hospitalization Rates Over time

Service Type and Dose Level during the Waiver Episode	Youth Studied (#, %)	Estimated Hospitalized within		
		1 year	2 years	3 years
Intensive In-Home (chisq=1.85; p=0.396)				
0	713 (14%)	22%	31%	37%
1	2198 (44%)	22%	31%	37%
2	2083 (42%)	20%	29%	35%
Skill Building (Chisq=22.35; p<0.01*)				
0	1458 (29%)	22%	32%	38%
1	1770 (35%)	23%	32%	39%
2	1766 (35%)	18%	27%	32%
Respite (Chisq=5.85; p=0.054)				
0	1647 (33%)	19%	27%	33%
1	1672 (33%)	23%	31%	37%
2	1675 (34%)	21%	32%	39%
Crisis Response (Chisq=18.55; p<0.01*)				
0	3013 (60%)	19%	28%	33%
1	1075 (22%)	22%	34%	40%
2	906 (18%)	26%	34%	41%
Family Support (Chisq=5.44; p=0.066)				
0	2143 (43%)	22%	31%	37%
1	1423 (28%)	22%	30%	36%
2	1428 (29%)	18%	29%	36%
Total Youths	4994 (100%)	21%	30%	37%

*Log Rank test applied, to test equality over strata, p<0.05

**Results:
Bivariate**

Estimated % of Youth Hospitalized post discharge, by Waiver Service Category Percentile of Utilization



Log Rank test $Pr < .01$ for both categories

Table III: Effects of Waiver Enhanced Services Utilization on Risk of Hospitalization for Children Discharged from HCBS-Waiver*

Independent variable	Chi-Square	Pr > ChiSq	Hazard Ratio [95% CI]
Age	44.94	<.0001**	0.942 [0.925, 0.958]
LOS (>=180 days vs <180)	31.022	<.0001**	0.693 [0.609, 0.788]
Mood Disorder	38.73	<.0001**	1.484 [1.310, 1.680]
Schizophrenia	82.21	<.0001**	2.508 [2.065, 3.045]
Intensive-In-Home (round to \$10)	3.67	0.0553**	0.996 [0.993, 1.000]
Skilling Building (round to \$1000)	9.79	<.0001**	0.981 [0.969, 0.993]
Respite (round to \$1000)	13.34	0.0003**	1.015[1.007, 1.023]
Crisis Response (round to \$1)	17.58	15.27**	1.008[1.004, 1.012]
Family Support (round to \$100)	0.2102	0.6466	1.001 [0.997, 1.004]

*Multivariate Cox Regression model is adjusted for age, primary diagnosis of mood or schizophrenia;

**Significant at p<0.05 test level

***All Services are continuous, based on the total amount of spending.

Table 5 Comparisons of Demographic and Clinical Characteristics for Youth who completed Discharge CANS-MH with Overall Youth Studied

	Youth Studied Waiver Discharge			Youth Studied with CANS-MH			
	Total	Hospitalized (Uncensored)*	Estimated hospitalization within 3 years	Total	Hospitalized (Uncensored)*	Estimated hospitalization within 3 years	Avg Days btw CANS and Disch Dt
Overall	4994	1342 (27%)	36%	3537	957 (27%)	36%	47
F	1971 (39%)	516 (26%)	35%	1347 (38%)	353 (26%)	34%	43
M	3023 (61%)	827 (27%)	37%	2190 (62%)	604 (28%)	38%	49
5-9	632 (13%)	190 (30%)	40%	460 (13%)	138 (30%)	40%	46
10-12	1081 (22%)	342 (32%)	45%	792 (22%)	248 (31%)	44%	54
13-15	1716 (34%)	453 (26%)	36%	1186 (34%)	311 (26%)	36%	49
16-18	1565 (31%)	358 (23%)	30%	1099 (31%)	260 (24%)	31%	40
LOS<180	1135 (23%)	376 (33%)	41%	617 (17%)	204(33%)	42%	20
LOS>=180	3859 (77%)	967 (25%)	35%	2920 (83%)	753(27%)	35%	52
Schizophrenia	339 (7%)	143 (42%)	53%	233 (7%)	103 (44%)	54%	41
Mood Disorder	2809 (56%)	788 (28%)	38%	1987 (56%)	559 (28%)	38%	44
ADHD	580 (12%)	136 (23%)	31%	460 (13%)	117 (25%)	34%	50
Disruptive Behavior	580(12%)	132 (23%)	30%	419 (12%)	93 (21%)	29%	49
Anxiety	411 (8%)	91 (22%)	30%	268 (8%)	52 (19%)	26%	58
Others	275 (6%)	53 (19%)	32%	170 (5%)	33 (19%)	31%	54

Table 6 Domain Score* Distribution of CANS-MH included

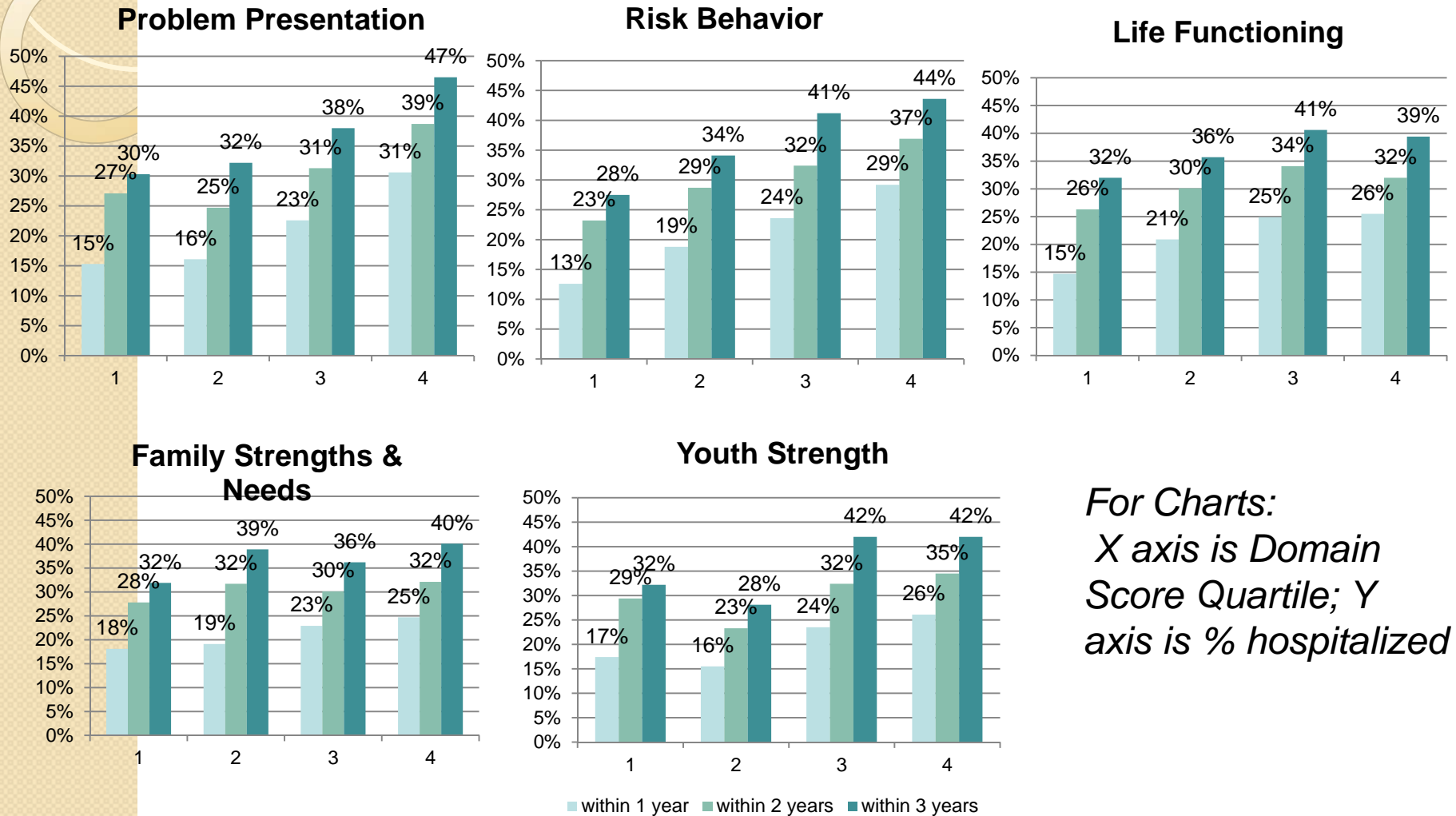
	Average	<i>Sd</i>	25 pct	50 pct	75 pct
Problem Presentation	11.3	4	8.9	11	14
Risk Behavior	7.6	4.5	5	6.7	10
Life Functioning	8.8	4.5	5.7	8.6	11.4
Family Strength	8.4	5	5	8.8	11.3
Child Strength	13.3	4.8	10	13.3	16.7
Composite**	27.7	11.2	19.7	26.9	35

*Domain Scores were calculated as $\text{Sum}(\text{valid dimension scores}) / \text{N}(\text{valid dimension scores}) * 10$; their Quatiles were used to define Youth level of Needs/Strength categories.

** Composite score is computed as Problem Presentation + Risk Behavior + Life Functioning ranging from 0-90

Results: Bivariate

Chart 2: Estimated % of Youth Hospitalized post discharge, by CANS-MH Domain Percentile Category



*For Charts:
X axis is Domain
Score Quartile; Y
axis is % hospitalized*

Test of equality level is $P < 0.05$, significant for all domains

Table IV Effects of Enhanced Services and CANS-MH Scores on Risk of Hospitalization for Youth Discharged from HCBS-Waiver¹

	Chi-Square	Pr > ChiSq ²	Hazard Ratio [95% CI]
Age	28.86	<.001	0.944 [0.925, 0.964]
LOS (>=180 days vs. <180 days)	5.65	0.0174	0.812 [0.684, 0.964]
Mood Disorder	25.79	<.001	1.464 [1.264, 1.696]
Schizophrenia	72.37	<.001	2.711 [2.154, 3.411]
Intensive-In-Home (round to \$10) ³	1.22	0.269	0.997 [0.992, 1.002]
Skilling Building (round to \$1000) ³	4.51	0.0337	0.985 [0.972, 0.999]
Respite (round to \$1000) ³	11.65	0.0006	1.014[1.006, 1.023]
Crisis Response (round to \$1) ³	14.35	0.0002	1.027[1.013, 1.041]
Family Support (round to \$100) ³	0.03	0.8482	1.000 [0.997, 1.004]
Problem Presentation ⁴	8.02	0.0046	1.035[1.011, 1.059]
Risk Behavior ⁴	7.26	0.0071	1.027[1.007, 1.047]
Life Functioning ⁴	1.92	0.1654	0.986 [0.968, 1.006]
Family Strength ^{4,5}	1.62	0.2029	0.991[0.976, 1.005]
Child Strength ^{4,5}	5.41	0.0200	1.020 [1.003, 1.037]

1. Multivariate Cox Survival Regression is adjusted for age, LOS, primary diagnosis of mood or schizophrenia;

2. Significant at p<0.05 test level

3. All Services are continuous , based on the total amount of spending.

4. CANS-MH domain scores were computed as sum(valid dimension scores)/n(valid dimensions)*10 ranging from 0-30

Discussion

Waiver Services

- Consistent with our hypothesis, this study indicated that increased utilization of skill building services decreased the risk of hospitalization for youth.
- However, contrary to our hypothesis, higher dose of two types of enhanced services (crisis response and respite) were associated with an increased risk of hospitalization.
- It is possible that the increased risk of hospitalization associated with higher doses of respite and crisis response services could be confounded with the unmeasured youth and family factors which are also associated with an increased risk of hospitalization.
- Longer duration in the Waiver program was also associated with decreased risk of hospitalization post discharge- this is encouraging in support of utilizing enhanced community service models to support child and family stability in the community.



Discussion

CANS-MH

- Needs on CANS-MH problem-presentation, risk-behavior and life functioning domains were associated with increased risk of hospitalization.
- Whereas, Youth and Family strengths were associated with lower risks of hospitalization

Clinical and Demographic Factors

- Having a mental health diagnosis of mood or schizophrenia at discharge was associated with increased risk of hospitalization;
- Age was inversely associated with risk of hospitalization (younger children had a greater risk post waiver service to be hospitalized)



Limitations & Next Steps

- This study lacked a comparison population – future work will compare youth who received higher levels of care (Residential Treatment) and lower levels of care (Intensive case management) to youth who received Waiver to compare time to hospitalization post discharge;
- In addition, psychiatric hospitalization experiences pre and during Waiver service utilization were not included in this analysis.
- Given that these previous hospitalization experiences of may be predictive of subsequent experiences it will be important to examine these factors in future work.