Main Text Tables for The Cost-Effectiveness of Long-Term Post-Treatment Peer Recovery Support Services in the United States

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Table 1. Cost-effectiveness table for long-term, post-treatment peer recovery support services.

Intervention	**Total Cost**	**Total Effectiveness**	**Incremental Cost**	**Incremental Effectiveness**	**ICER***
Health System Perspective					
Specialty SUD treatment alone	-$135,973,281	25,439,966 QALYs added 783,843 people in recovery, year 3	--	--	--
Treatment + long-term PRSS	$3,237,597,197	26,011,893 QALYs added 1,103,247 people in recovery, year 3	$3,373,570,477	571,927 QALYs added 319,404 people in recovery, year 3	$5,898.60 $10,562.08
Societal Perspective					
Specialty SUD treatment alone	-$7,677,929,256	25,439,966 QALYs added 783,843 people in recovery, year 3	--	--	--
Treatment + long-term PRSS	-$5,721,031,671	26,011,893 QALYs added 1,103,247 people in recovery, year 3	$1,956,897,584	571,927 QALYs added 319,404 people in recovery, year 3	$3,421.58 $6,126.72

* ICER = Incremental Cost-Effectiveness Ratio

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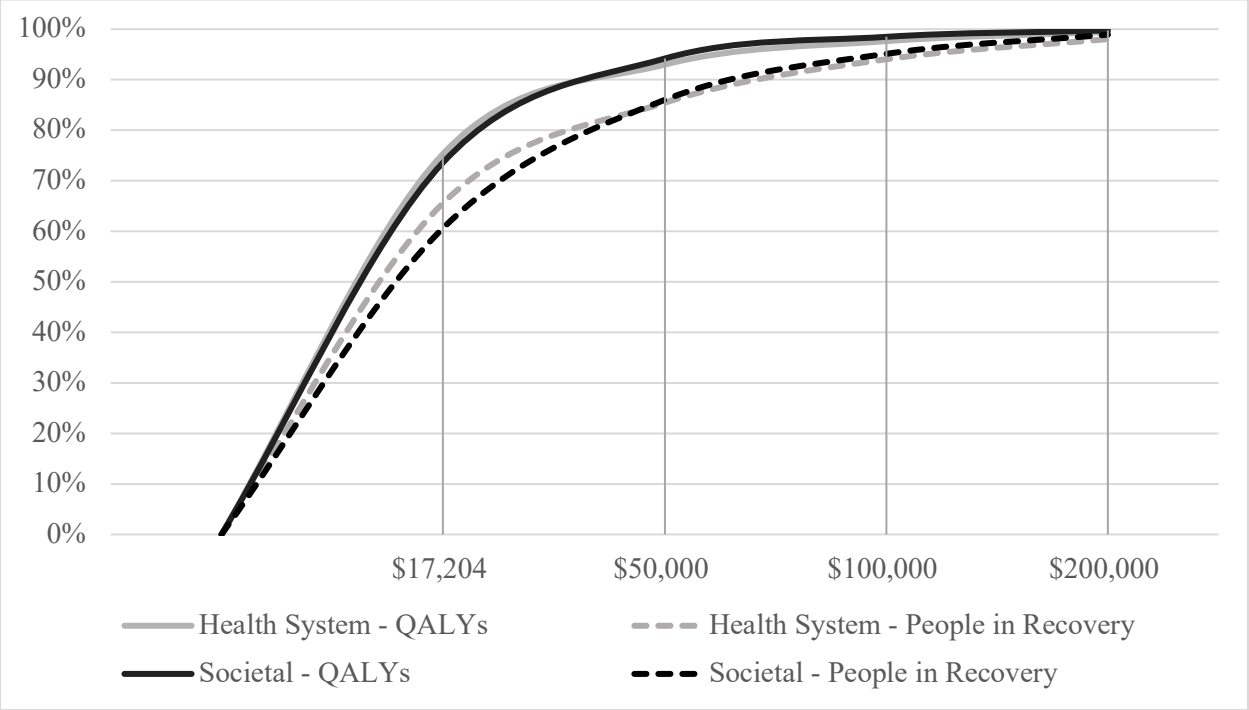
Table 2. Result of the one-way sensitivity analyses for long-term, post-treatment peer recovery support services.

	Cost per QALY Added		Cost per person in recovery at Y3	
Variable	**Low**	**High**	**Low**	**High**
Health System Perspective				
Tpp - Peer worker pay	$840.92	$20,699.82	$1,505.76	$37,065.27
Tpu - PRSS utilization (15 minute units)	$415.59	$16,380.83	$744.15	$29,331.65
Tt - Cost of specialty SUD treatment	$7,378.18	$4,419.02	$13,211.43	$7,912.73
Rp – Return to chaotic use among PRSS	$4,398.94	$251,843.12	$7,876.78	$450,948.04
Rt – Return to chaotic use among TAU	$11,356.32	$1,497.01	$20,334.71	$2,680.55
Retp – Retention in PRSS through completion/graduation or to 1 year	$51,092.59	$3,270.04	$91,487.08	$5,855.37
Nt – Total receiving specialty SUD treatment in Texas	$5,898.60	No change	$10,562.08	No change
Api - Averted medical costs for PRSS	$6,892.07	$4,905.13	$12,341.00	$8,783.16
Ati - Averted medical costs for TAU	$5,077.39	$6,719.81	$9,091.61	$12,032.55
Recovery utility (0.6-1)*	$70,454.63	$3,078.15	N/A, not impacted by utility	
SUD utility	$2,902.30	$19,990.90	N/A, not impacted by utility	
Societal Perspective				
Tpp - Peer worker pay	-$1,636.10	$18,222.81	-$2,929.61	$32,629.90
Tpu - PRSS utilization (15 minute units)	-$5,043.16	$19,620.16	-$9,030.32	$35,132.01
Tt - Cost of specialty SUD treatment	$4,105.15	$2,738.02	$7,350.72	$4,902.72
Rp – Return to chaotic use among PRSS	$846.34	$425,761.09	$1,515.47	$762,364.00
Rt – Return to chaotic use among TAU	$11,257.58	-$2,898.06	$20,157.89	-$5,189.29
Retp – Retention in PRSS through completion/graduation or to 1 year	$82,610.24	$488.67	$147,923.01	$875.02
Nt – Total receiving specialty SUD treatment in Texas	$3,421.58	No change	$6,126.72	No change
Ci - per-person averted societal costs among those in recovery (PRSS or treatment only)	$5,573.95	$2,378.21	$9,980.76	$4,258.44
Pp - Per-person, per-episode patient time costs for participating in PRSS	$439.85	$9,137.93	$787.60	$16,362.45
Recovery utility (0.6-1)*	$47,491.46	$2,074.90	N/A, not impacted by utility	
SUD utility	$1,956.36	$13,475.30	N/A, not impacted by utility	

* = Incremental effectiveness values below a recovery utility weight of 0.6 were negative, indicating the program was less effective than treatment alone when recovery utility is below 0.6.

Figure 1. Cost-effectiveness acceptability curve. Probability of PRSS being cost-effective compared to specialty SUD treatment only, simulated over 10,000 iterations.



Supplementary Materials

Supplementary Table 1. Model parameters for long-term, post-treatment peer recovery support services cost-effectiveness analysis.

Variable	Base Case	Low	High	Source	Model
Tpp - Peer worker reimbursement per 15 minutes	$8.97	$3.66	$24.49	(Bureau of Labor Statistics, 2022; Videka et al., 2019)	H,S
Tpu - PRSS service utilization (in 15 minute increments)	212	76	472	(Health and Human Services Commission, 2020; Videka et al., 2019)	H,S
Tt - Cost of specialty SUD treatment	$17,203.74	$10,623.54	$23,783.94	(Alexandre et al., 2012; Bureau of Labor Statistics, 2021; French et al., 2008)	H,S
Nt – Total receiving specialty SUD treatment in Texas	2,572,000	2,423,000	2,721,000	(Substance Abuse and Mental Health Services Administration, 2020)	H,S
Api – per-person averted medical costs under PRSS^	$1,186.66	$949.32	$1,423.99	(Mangrum et al., 2018)	H
Ati – per-person averted medical costs under treatment only^	$913.05	$730.44	$1,095.66	(Morse & Bride, 2016)	H
Ci – per-person averted societal costs among those in recovery (PRSS or treatment only)^	$7,690.77	$6,152.62	$9,228.92	(National Drug Intelligence Center, 2011; Sacks et al., 2015)	S
Pp – Per-person, per-episode patient time costs for participating in PRSS	$1,479.23	$530.29	$3,293.38	(Ashford et al., 2021; Bureau of Labor Statistics, 2019; Health and Human Services Commission, 2020)	S
Proportions					
Rp – Return to chaotic substance use prevalence among those receiving PRSS, year 1	17%	9%	50%	(Ashford et al., 2021; Mangrum et al., 2018)	H,S
Rt – Return to chaotic substance use among those receiving treatment only, year 1	50%	40%	87%	(Dutra et al., 2008; McLellan et al., 2000)	H,S
Retp – Retention of participants in long-term PRSS to completion/ graduation/ 1 year.^	70%	10%	90%	(Mangrum et al., 2018)	H,S

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Variable	Base Case	Low	High	Source	Model
Utility Weights					
Recovery utility^	0.8	0.5	1	(Nyman et al., 2007; Whiteford et al., 2013)	H,S
SUD utility	0.586	0.359	0.741	(Whiteford et al., 2013)	H,S

H = Health System Perspective Model
S = Societal Perspective Model
^ = Estimated range of variation not available in the literature, so examined an arbitrarily-selected range of variation, typically +/- 20%.

Supplementary Table 2. Stage transition probabilities for probabilistic sensitivity analysis.

Health state	Year 1 Prob.	Year 2 Prob.	Year 3 Prob.	Source
Recovery to recovery, PRSS	0.83	0.66	0.86	(Dennis et al., 2007; Mangrum et al., 2018)
Recovery to recovery, treatment only	0.5	0.66	0.86	(Dennis et al., 2007; Dutra et al., 2008; McLellan et al., 2000)
Recovery to chaotic use	Remaining probability when recovery to recovery and mortality probabilities are subtracted from 1.			
Background Mortality by Age Category				
Age Category	**Recovery**	**SUD**	(Decker et al., 2017; Eddie et al., 2019; Kochanek et al., 2020; Lindblad et al., 2016)	
20-24	0.010916	0.010916		
25-29	0.011751	0.014951		
30-34	0.012541	0.015741		
35-39	0.014886	0.014746		
40-44	0.018992	0.018852		
45-49	0.024862	0.027682		
50-54	0.032653	0.035473		
55-59	0.044558	0.068778		
60-64	0.065021	0.089241		
65-69	0.093287	0.117507		
70-74	0.137072	0.161292		
75-79	0.204364	0.228584		
80-84	0.305685	0.329905		
85-90	0.430047	0.454267		
90-95	0.586341	0.610561		
95-100	0.743793	0.768013		

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I. Health System Perspective Formulas

Intervention Costs

The total cost of a PRSS episode

$$Tpp * Tpu * Nt$$

Is added to the total cost of those needing specialty SUD treatment again under the PRSS condition. We assume that only 10% of those who need treatment in a given year receive it in the US (rate is from the National Survey on Drug Use and Health, SAMHSA, 2020).

$$(Nt * Retp * Rp * 0.1 * Tt) + (Nt * (1 - Retp) * Rt * 0.1 * Tt)$$

We then subtract averted medical costs attributable to those who are retained in recovery under the PRSS condition and those who drop out of PRSS prematurely (they save the same amount that those in the treatment only condition save per person).

$$(Api * Retp * (1 - Rp) * Nt) + (Ati * (1 - Retp) * (1 - Rt) * Nt)$$

Treatment as Usual Costs

The total cost of the initial treatment episode is not included in the model, because we modeled our population as all starting in specialty SUD treatment, thus the same total cost would be in both the PRSS and Treatment sides of the numerator equation, and would zero out. Instead, we start with the cost of those receiving specialty SUD treatment again under the treatment as usual condition, using the same assumption described above for PRSS. As above, we assume that only 10% of those who need treatment in a given year receive it in the US.

$$Nt * Rt * 0.1 * Tt$$

Averted medical costs attributable to treatment as usual are subtracted from re-treatment costs.

$$Ati * (1 - Rt) * Nt$$

II. Societal Perspective Formulas

Intervention Costs

The total cost of a PRSS episode

$$Tpp * Tpu * Nt$$

Is added to the total cost of those needing specialty SUD treatment again under the PRSS condition. As above, we assume that only 10% of those who need treatment in a given year receive it in the US.

$$(Nt * Retp * Rp * 0.1 * Tt) + (Nt * (1 - Retp) * Rt * 0.1 * Tt)$$

We then add total patient time for PRSS:

$$Pp * Tpu * Nt * Retp$$

Finally, the total societal cost savings attributable to those who are retained in recovery under the PRSS condition and the societal cost savings that would be realized by treatment alone (for the proportion who drop out of PRSS prematurely) is subtracted from PRSS episode and PRSS patient time costs:

$$(Ci * Retp * (1 - Rp) * Nt) + (Ci * (1 - Retp) * (1 - Rt) * Nt)$$

Treatment as Usual Costs

The total cost of the initial treatment episode is not included in the model, because we modeled our population as all starting in specialty SUD treatment, thus the same total cost would be in both the PRSS and Treatment sides of the numerator equation, and would zero out. Instead, we start with the cost of those receiving specialty SUD treatment again under the treatment as usual condition, using the same assumption described above for PRSS.

$$Nt * Rt * 0.1 * Tt$$

Patient time costs are not included for the treatment as usual condition because untreated SUD has serious impacts on an individual's ability to work or engage in other productive activities. This provides an underestimate of treatment as usual costs. Instead, societal cost savings attributable to treatment as usual are subtracted from re-treatment costs.

$$Ci * (1 - Rt) * Nt$$

III. Effect Estimation

Quality-adjusted life expectancy and people retained in recovery at 3 years were estimated using an Excel-based Markov chain created by the research team (HSB) using the transition matrices and mortality rates described in the model parameter tables. The tool can be made available upon request to the corresponding author: sierra.j.castedodemartell@uth.tmc.edu