

# Cost Savings to the State of Oregon due to Resource Facilitation for Individuals with Traumatic Brain Injury

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## Introduction

This report examines potential cost savings to the state of Oregon if it implemented a state-wide brain injury resource facilitation program to support people with brain injury, including traumatic brain injury (TBI), and their families. In this context, resource facilitation is a system where trained navigators provide critical information concerning available services and supports to brain injury survivors and their family members.

Most calculations are based on program data for Iowa assembled by Geoffrey Lauer, Chief Executive Officer of the Brain Injury Alliance of Iowa. Iowa has an established resource facilitation program in place, which currently serves about 1,000 people per year. Oregon's population is 35 percent higher (Iowa: 3.1 million; Oregon: 4.2 million) implying that a similar program could enroll about 1,350 people with TBI annually.

I focus on four sources of cost savings that resource facilitation can create: savings due to (i) a shift from institutionalized care to home- and community-based services, (ii) a reduction in psychiatric inpatient stays, (iii) a reduction in the number of people enrolled in Medicaid, and (iv) a reduction in the number of people in jail. While high-quality, peer-review evidence on most of these channels is currently lacking, calculations using Iowa's program data and plausible assumptions suggest significant potential for resource facilitation to reduce state expenditures. Specifically, estimated annual savings are:

- Shift towards home- and community-based services: \$267,799 annually.
- Avoidance of psychiatric inpatient stays: \$70,000 annually.
- Reduction in the number of Medicaid enrollees: \$18,935 annually.
- Reduction in the number of people in jail: \$20,250 annually.

Longer-term cost savings could be of a magnitude higher. For instance, the 10-year discounted cost savings for a scenario where enrollment gradually increases to

1,350 program participants within five years of program initiation are estimated to be \$3,600,916 under the assumption that annual cost savings per person with TBI do not extend over several years. Assuming further that costs savings for people with TBI who switch to home- and community-based services because of resource facilitation extend to an average of 10 years, would yield to even higher cost savings: the 10-year discounted costs savings for the same gradual enrollment scenario are estimated to be \$13,987,407 in this case.

## **Source #1: Shift from institutionalized care to home- and community-based services (HCBS)**

**Context:** People who require medical services provided in an institutional setting may alternatively receive home- and community-based services (HCBS). Providing home- and community-based services instead of institutional care has the potential of delivering substantial cost savings to the state: HCBS waivers are required to be cost neutral (i.e., not to exceed the state estimated expenditures for comparable levels of institutional care), and states that had non-institutional care programs experienced lower spending growth than states that did not have such programs in place (Kaye et al., 2009; Kitchener et al., 2006). However, not all people who could receive HCBS may know about this option. Resource facilitation has the potential to increase the number of people with TBI on HCBS by providing information and guidance.

**Potential cost savings per person:** There exists little evidence regarding potential cost savings due to HCBS. The most comprehensive study calculated average waiver and institutional costs by state and reported a potential cost savings of \$164,193 per person and year for Oregon (Harrington et al., 2011). I estimate that the state of Oregon pays about 23.3 percent of average Medicaid costs (see Appendix for details), which implies that the state could save \$38,257 annually per person switching from institutional care to HCBS.

**Potential number of people affected:** To my best knowledge, there are no studies examining the effect of resource facilitation on the number of people receiving HCBS. Iowa program data suggests that resource facilitation could avoid 7 institutional care cases per 1,000 people served.

**Potential overall cost savings:** Resources facilitation would reduce state expenditures by \$267,799 annually under these assumptions.

## Source #2: Psychiatric inpatient stays avoidance

**Context:** An analysis provided by the Oregon State Hospital showed that 188 out of 3,206 patients served at the hospital between January 1, 2016 and May 8, 2019, or 5.9 percent, had TBI as a primary diagnosis. This includes patients with a new TBI diagnosis and patients who were previously diagnosed with TBI. Resource facilitation could lower the number of people with TBI admitted to the state hospital by facilitating better care or better care coordination.

**Potential cost savings per case:** The average hospital expenses per inpatient day was \$4,062 in Oregon in 2017.<sup>1</sup> A recent article in the Oregonian reported inpatient costs in the amount of \$1,324 per day and patient, but did not mention whether these are costs to the state or overall costs.<sup>2</sup> In what follows, I conservatively assume that an inpatient stay costs the state on average \$1,000 per day and patient.

**Potential number of avoided cases:** To my best knowledge, there are no studies examining the effect of resource facilitation on psychiatric inpatient stays. Iowa program data suggests that resource facilitation could avoid 7 stays per 1,000 people served, with each stay being on average 10 days long.

**Potential overall cost savings:** Resource facilitation could reduce state expenditures by a total of \$70,000 annually under these assumptions.

## Source #3: Reduction in the number of people enrolled in Medicaid

**Context:** Oregon currently covers about 850,000 people through its Medicaid program.<sup>3</sup> The state expanded its program with the Patient Protection and Affordable Care Act in 2014. Since then, all adults with income below 138 percent of the poverty level are eligible for Medicaid. Currently, 94 percent of Oregonians are insured.<sup>4</sup> People with TBI who were previously not enrolled in Medicaid might enroll in the program because they are unable to find work after their injury. Resource facilitation could support re-employment and therefore could reduce the number of people with TBI enrolled in Medicaid.

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<sup>1</sup> <https://www.kff.org/health-costs/state-indicator/expenses-per-inpatient-day-by-ownership/>

<sup>2</sup> <https://www.oregonlive.com/pacific-northwest-news/2019/05/oregon-mental-hospital-is-worlds-most-expensive-homeless-shelter-state-health-director-says.html>

<sup>3</sup> <https://www.medicaid.gov/medicaid/program-information/medicaid-and-chip-enrollment-data/report-highlights/index.html>

<sup>4</sup> Author's calculations using the American Community Survey.

**Potential cost savings per case:** Average Medicaid expenditures for people with disabilities were \$16,252 in Oregon in 2014.<sup>5</sup> Using this number as a proxy for Medicaid costs for people with TBI, and assuming an average state matching rate of 23.3 percent (own calculations; see Appendix for details), implies that the state pays on average \$3,787 per Medicaid beneficiary with TBI.

**Potential number of people affected:** There exists clear evidence from peer-reviewed journal articles that resource facilitation has a positive effect on employment. In two randomized control trials taking place in Indiana, Trexler and colleagues have shown that resource facilitation increases employment rates of people with TBI by about 25 percent – a substantial program effect (Trexler et al., 2010, 2016).

Assuming that people with TBI are equally likely to be on Medicaid compared to the general population implies that 200 out of 1,000 cases of people with TBI are enrolled in Medicaid. Of these, 50 would be able to find a job due to resource facilitation if the employment effect of resource facilitation was 25 percent. Assuming further that one in five of them leave the program due to having found employment implies that 10 out of 1,000 people with TBI served by resource facilitation would leave Medicaid rolls due to employment.

Resource facilitation could also increase enrollment in Medicaid by encouraging some people with TBI to enroll in the program. In 2017, about 6 percent of people living in Oregon reported not having insurance.<sup>6</sup> Of these, 35 percent had an income below 138 percent of the poverty level. Applying the same numbers to people with TBI implies that about 20 out of 1,000 cases do not have insurance and could qualify for Medicaid based on their income. Assuming further that the program caused 25 percent of them to gain insurance implies that 5 people per 1,000 cases gain Medicaid insurance through resource facilitation.

Taken together, the net decrease in Medicaid enrollment due to resource facilitation is estimated to be 5 per year.

**Potential cost savings:** Resource facilitation would reduce state expenditures by \$18,935 annually under these assumptions.

## Source #4: Reduction in the number of people in jail

**Context:** Incarcerated people have a much higher prevalence of traumatic brain injuries (Farrer and Hedges, 2011; Slaughter et al., 2003; CDC, 2007). Resource facilitation could lower jail rates among people with TBI by providing resources and support.

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<sup>5</sup> Conversation with Geoffrey Lauer and <https://www.kff.org/medicaid/state-indicator/medicaid-spending-per-enrollee/>

<sup>6</sup> Author's calculations using the American Community Survey.

**Potential costs savings per avoided jail stay:** I assume that jail stays cost the state \$45 per person and day. This number is conservatively based on a study that reports costs of \$85 per jail day for Kansas.<sup>7</sup>

**Potential number of jail days avoided:** Iowa program data suggests that resource facilitation avoids 18 jail stays, with an average length of 25 days.

**Potential cost savings:** Resource facilitation could reduce state expenditures by \$20,250 annually under these assumptions.

## Long-term cost savings

In this section, I report estimated cumulative 10-year savings per 1,000 people served by resource facilitation, as well as estimated 10-year cumulative savings under a scenario where program participation first increases before reaching a stable level. Table 1 shows total cumulative cost savings across all cost savings domains by scenario and year, and Table 2 shows cumulative discounted cost savings for the scenario with gradual enrollment and each of the cost savings domains. Discounted cumulative cost savings express future savings as present value using a discount rate, assumed to be 4 percent annually.

Table 1: Total cumulative cost savings by year

Year	Scenario: per 1,000 enrollees		Scenario: gradual enrollment increase		
	Cumulative undiscounted	Cumulative discounted	Enrollment	Cumulative undiscounted	Cumulative discounted
1	376,984	376,984	500	188,492	188,492
2	753,968	739,469	800	490,079	478,480
3	1,130,952	1,088,012	1,000	867,063	827,023
4	1,507,936	1,423,149	1,200	1,319,444	1,229,187
5	1,884,920	1,745,396	1,350	1,828,372	1,664,222
6	2,261,904	2,055,250	1,350	2,337,301	2,082,524
7	2,638,888	2,353,186	1,350	2,846,229	2,484,737
8	3,015,872	2,639,663	1,350	3,355,158	2,871,481
9	3,392,856	2,915,121	1,350	3,864,086	3,243,350
10	3,769,840	3,179,985	1,350	4,373,014	3,600,916

Total annual cost savings across all four domains described above is estimated to be \$376,984. Cumulative 10-year cost savings if 1,000 people were served each year thus

<sup>7</sup> [https://storage.googleapis.com/vera-web-assets/downloads/Publications/the-price-of-jails-measuring-the-taxpayer-cost-of-local-incarceration/legacy\\_downloads/price-of-jails-summary.pdf](https://storage.googleapis.com/vera-web-assets/downloads/Publications/the-price-of-jails-measuring-the-taxpayer-cost-of-local-incarceration/legacy_downloads/price-of-jails-summary.pdf)

Table 2: Cumulative cost savings by domain and year

Year	HCBS	Inpatient stays	Medicaid disenrollment	Jail avoidance
1	133,900	35,000	9,468	10,125
2	339,899	88,846	24,033	25,702
3	587,494	153,565	41,539	44,424
4	873,181	228,241	61,739	66,027
5	1,182,217	309,020	83,590	89,395
6	1,479,367	386,692	104,600	111,864
7	1,765,089	461,377	124,802	133,470
8	2,039,821	533,189	144,228	154,244
9	2,303,986	602,239	162,906	174,219
10	2,557,991	668,634	180,865	193,426

amount to \$3,769,840. The corresponding discounted cumulative 10-year cost savings are \$3,179,985. In a scenario where enrollment in resource facilitation starts at a lower level, increases during the first program years, and then reaches a plateau comparable of that found in Iowa (taking differences in population into account), cumulative 10-year cost savings are estimated to be \$4,373,014 (undiscounted) and \$3,600,916 (discounted), respectively. Cost savings due to a shift from institutionalized care to HCBS account for more than two-thirds of the total cost savings, followed by cost savings due to a reduction in inpatient stays, jail avoidance and, finally, Medicaid disenrollment.

The calculations thus far assume that resource facilitation only reduces costs during the year it is provided to people with TBI. This assumption seems not very realistic for some of the domains. Specifically, patients who switch to HCBS instead of using institutionalized care due to resource facilitation likely remain in HCBS for several years. As a result, the initial resource facilitation leads to further cost savings for the same patient during subsequent years.

As an alternative scenario, I assume that cost savings from HCBS extend to an average of 10 years. Under this assumption, cost savings from resource facilitation increase dramatically over time (Tables 3 and 4). The 10-year cumulative cost savings are estimated to be \$13,907,945 (1,000 people served each year, undiscounted), \$11,182,550 (1,000 people served each year, discounted), \$17,609,936 (gradually roll-out, undiscounted), and \$13,987,407 (gradually roll-out, discounted). The Appendix describes these calculations in further detail.

Table 3: Total cumulative cost savings by year, longer HCBS stays

Year	Scenario: per 1,000 enrollees		Scenario: gradual enrollment increase		
	Cumulative undiscounted	Cumulative discounted	Enrollment	Cumulative undiscounted	Cumulative discounted
1	376,984	376,984	500	188,492	188,492
2	1,021,767	996,968	800	704,318	684,479
3	1,934,349	1,840,701	1,000	1,616,900	1,528,212
4	3,076,473	2,856,045	1,200	2,987,449	2,746,625
5	4,448,139	4,028,551	1,350	4,839,198	4,329,508
6	6,011,090	5,313,183	1,350	6,949,182	6,063,761
7	7,765,326	6,699,581	1,350	9,317,401	7,935,399
8	9,672,590	8,148,945	1,350	11,892,207	9,892,040
9	11,732,882	9,654,380	1,350	14,673,601	11,924,377
10	13,907,945	11,182,550	1,350	17,609,936	13,987,407

Table 4: Cumulative cost savings by domain and year, longer HCBS stays

Year	HCBS	Inpatient stays	Medicaid disenrollment	Jail avoidance
1	133,900	35,000	9,468	10,125
2	545,898	88,846	24,033	25,702
3	1,288,684	153,565	41,539	44,424
4	2,390,618	228,241	61,739	66,027
5	3,847,503	309,020	83,590	89,395
6	5,460,604	386,692	104,600	111,864
7	7,215,750	461,377	124,802	133,470
8	9,060,379	533,189	144,228	154,244
9	10,985,013	602,239	162,906	174,219
10	12,944,482	668,634	180,865	193,426

## Conclusions

The calculations presented here suggest potentially substantial cost savings of a brain injury resource facilitation program in Oregon. Most of these cost savings would come from redirecting people with TBI away from high-cost services to lower-cost services.

There are a number of reasons why actual cost savings might differ from the ones presented here. Brain injury resource facilitation may yield other possible cost savings or revenue increases to the state that are not included in this report, such as an increase in the income tax or a reduction in prison stays. Conversely, brain injury resource facilitation could increase program utilization, which in turn could imply higher costs to the state. Finally, most calculations presented in this report are based on program data from Iowa, and these might not translate exactly to Oregon.

The cost savings calculations presented here do not include all benefits of a brain injury resource facilitation program. For instance, better return to work prospects may lead to better social relationships. Similarly, brain injury resource facilitation could improve care for chronic conditions or lower homelessness rates, which could increase quality of life among people with TBI. Such benefits of brain injury resource facilitation often go hand in hand with cost reductions, if, for instance, better care coordination implies fewer visits to hospitals, but in some instances, they may imply higher costs through higher service utilization.

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## Appendix

There are three federal matching rates relevant for Oregon's Medicaid program:<sup>8</sup>

- The traditional matching rate: The rate is 61.23 percent in Oregon for the 2020 fiscal year.<sup>9</sup>
- The newly-eligible matching rate: The federal matching rate is 90 percent starting 2020.
- The Children's Health Insurance Program (CHIP) matching rate: The rate is 84.36 percent in Oregon for the fiscal year.<sup>10</sup>

The number of newly eligible Medicaid recipients due to the ACA was estimated to be about 550,000 when 964,000 people were enrolled in the program in 2018.<sup>11</sup> KFF reported that about 850,000 people were enrolled in Medicaid in February 2019, and about 125,000 children enrolled in CHIP, for a total of about 975,000.<sup>12</sup> Based on these numbers, it is reasonable to assume that about half of the adult Medicaid population in Oregon is enrolled through the ACA. This implies the following fractions: 43.6 percent traditional Medicaid enrollees; 43.6 percent newly eligible Medicaid enrollees; and 12.8 percent CHIP enrollees. Applying the matching rates to these fractions implies a weighted average matching rate of 0.767 ( $0.436 \cdot 0.6123 + 0.436 \cdot 0.9 + 0.128 \cdot 0.8436 = 0.767$ ), which in turn implies that the state of Oregon pays 23.3 percent of Medicaid and CHIP expenditures.

I assume that for a cohort of 7 people with TBI who switch to HCBS because of resource facilitation:

- One person stays on the program for three years;
- One person stays on the program for six years;
- One person stays on the program for eight years;
- One person stays on the program for 10 years;
- One person stays on the program for 12 years;

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<sup>8</sup> <https://www.kff.org/medicaid/issue-brief/understanding-how-states-access-the-aca-enhanced-medicaid-match-rates/>

<sup>9</sup> <https://www.kff.org/medicaid/issue-brief/understanding-how-states-access-the-aca-enhanced-medicaid-match-rates/>

<sup>10</sup> <https://www.kff.org/other/state-indicator/enhanced-federal-matching-rate-chip/>

<sup>11</sup> <https://www.healthinsurance.org/oregon-medicaid/>

<sup>12</sup> <https://www.medicaid.gov/medicaid/program-information/medicaid-and-chip-enrollment-data/report-highlights/index.html>

- One person stays on the program for 14 years; and
- One person stays on the program for 17 years.

The average HCBS program duration is thus 10 years. I further assume that these people would not have switched to HCBS in the absence of resource facilitation during the 10-year period.

Based on these assumptions, the number of people with TBI who switched to HCBS due to resource facilitation is:

- 7 during the first program year;
- 14 during the second program year;
- 21 during the third program year;
- 27 during the fourth program year;
- 33 during the fifth program year;
- 38 during the sixth program year;
- 43 during the seventh program year;
- 47 during the eighth program year;
- 51 during the ninth program year;
- 54 during the tenth program year.

The results shown in Tables 3 and 4 then follow from using these numbers for HCBS cost savings.