research note

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ABOUT THE STUDY

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Potential Economic Impact of Resource Facilitation for Post-Traumatic Brain Injury Workforce Re-Assimilation

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INTRODUCTION

This research note provides an estimate of the potential economic impact of Resource Facilitation (RF) on traumatic brain injury (TBI) patients in Indiana. We simulate the economic impact of this intervention on the estimated population of traumatic brain injury patients in Indiana per year and provide estimates of the earnings losses associated with TBI associated long-term disability. These losses will, potentially, be avoided as a result of RF interventions.

METHOD & ESTIMATION ISSUES

A major benefit of RF is return to work. A recent randomized clinical trial describes those who were treated with RF versus a control group were significantly more likely to return to work .[3] Therefore, in order to quantify the economic impact of RF in Indiana, we begin by modeling the potential annual workforce loss due to TBI-related long-term disability. Then, we can estimate a portion of the economic impact of RF by comparing the lost earnings of TBI patients who were and were not treated with RF. This estimate is a lower bound estimate of the total economic impact. Further discussions will provide estimates of the economic value of additional considerations such as fringe benefits, Medicare/Medicaid costs, and state-level taxes.

ESTIMATION OF THE INCIDENCE OF TBI RESULTING IN LONG-TERM DISABILITY IN INDIANA

Indiana-specific data regarding incidence of TBI-related long-term disability were not readily available. Therefore, national statistics (as described below) were adjusted by a weight of Indiana's population relative to the United States' population to determine the incidence of TBI-related long-term disability in Indiana. The national incidence data was drawn from various sources: specific national statistics for the annual number of TBI-related long-term disabilities; national estimates of the annual number of TBI-related long term disability by age, gender and level of disability; the national statistics of the number of hospitalizations associated with TBI-related long-term disability annually.

ESTIMATION OF WAGES LOST IN INDIANA DUE TO TBI-RELATED LONG-TERM DISABILITY

Methodology 1: The first estimate we provide is a baseline estimate of the potential annual earnings applicable to those in Indiana who suffer a long-term disability due to TBI. This estimation has two parts. First, we use the estimation of TBI incidence in Indiana, as previously described, to estimate the annual workforce loss. Data indicating the number of persons who return to work

with and without RF treatment in conjunction with employment statistics for persons before suffering a TBI are used to adjust the Indiana TBI incidence. Next, we adjust the workforce loss estimation by average annual earnings of an Indiana resident to estimate the annual amount of wages lost due to TBI-related long-term disability.

Methodology 2, Age—Education Adjusted Estimates: To provide estimates of the wages lost in Indiana due to TBI-related long-term disability, we modify the baseline model to incorporate age and educational attainment statistics. First, national statistics for TBI incidence, by age group and education level, were adjusted for Indiana. For this method, we assume workforce eligible persons are individuals no younger than 15 and no older than 79. Another important factor included in this methodology is gender. Males are twice as likely as females to be subject to a TBI and the average male's earnings in Indiana is greater than the average female's earnings for all education attainment groups. Finally, the estimation of workforce loss is adjusted to account for those who return to work with and without RF treatment.

RESULTS

THE INCIDENCE OF TBI RESULTING IN LONG-TERM DISABILITY IN INDIANA

80,000 and 99,000 people in the United States suffer a TBI resulting in a long-term disability due to TBI annually.[5,6,7] The aggregate TBI incidence in the United States annually is between 1,500,000 and 1,700,000.[1,2] This range can be further categorized by injury severity as: mild, moderate, and severe. Approximately, 15%-25% of TBI are moderate to severe requiring hospitalization.[1,3,6,10,11] Using these incidence rates Indiana's share of TBI-related long-term disability is 6,181 persons per year.

ESTIMATION OF WAGES LOST IN INDIANA DUE TO TBI-RELATED LONG-TERM DISABILITY

Methodology 1: With RF treatment, a clinical trial shows 64% are employed post-treatment; while without RF treatment, 36% are employed post-treatment.[3] Therefore, on average 1,003 Indiana residents would return to work with RF treatment. The average earnings for those employed in Indiana and who are 25 years old or older is $30,925.[14] Therefore, the average economic impact of RF treatment is $31,017,775 annually in avoided lost wages.

TABLE 1: TBI-RELATED DISABILITIES PER AGE GROUP IN INDIANA

Age Group	Percentage	Persons	Percent Employed
0-4	15.8 %	979	
5-9	6.8 %	418	
10-14	7.6%	472	
15-19	11.0%	680	36.7%
20-24	9.6%	591	65.5%
25-34	12.5%	770	77.1%
35-44	9.6%	595	77.1%
45-54	8.0%	497	77.8%
55-64	5.0%	311	61.1%
65-74	4.2%	262	23.2%
75 +	9.8%	607	5.8%
Total	**100 %**	**6,181**	

Methodology 2, Age—Education Adjusted Estimates: Next, the lost wages are further adjusted by age, percent employed, and educational attainment. Please see Table 1.[1,2,14]

Adjusting by age, we assume only age groups 15-79 are workforce eligible. This results in approximately 4,313 persons per year who suffer a long-term disability due to TBI. Using the age distribution for Indiana residents affected by TBI-related long-term disability, the percentage of persons employed per age group, and the educational attainment and respective average salaries (Please see Table 2[14]) we estimate the potential annual earnings lost. We adjust this by the return to work rate with and without RF treatment, as previously mentioned.

To map the 15-19 and 20-24 age groups, we assumed persons in those age groups to have less than high school, high school graduate, or some college or associate's degree level of educational attainment. The average earnings for the appropriate educational attainment groups are multiplied by the number of estimated Indiana residents in the respective age groups. The individuals between 25-79 years old were appropriately distributed across each educational attainment level and the respec-

TABLE 2: EDUCATIONAL ATTAINMENT & EARNINGS OF INDIANA RESIDENTS

Education Level	Percentage of Residents	Average Male Wages	Average Female Wages
Less than high school	14.2%	$24,767	$14,259
High school graduate*	36.5%	$34,855	$21,089
Some college or associate's degree	27.3%	$41,415	$25,726
Bachelor's Degree or higher	14.0%	$55,177	$35,480
Graduate degree or higher	7.9%	$68,895	$49,401

**includes equivalency*

tive earnings per educational attainment group were applied. Using this methodology, we estimate the average economic impact of RF treatment to be $22,561,796 annually.

DISCUSSION

It is important to bear in mind the estimates of approximately $31 million and $22.5 million in additional earnings recaptured as a result of RF treatment is a very conservative, annual estimate. Further analysis could be done to illustrate additional loss by incorporating long-term projections of wages lost as opposed to only annualized estimates. This could be done utilizing age groups, similar salary estimates as in method 2, and tracking when each particular age group enters and leaves the workforce; and the present value of the flows. For example, when a 45 year old suffers a disability due to TBI, the economy forgoes roughly 20 years of their earnings. Assuming those wages are $30,000 annually, the present value of the lost earnings is over $1 million over the remainder of the individuals working life. Aggregating this example across our sample provides avoidable lost earnings with a present value in billions of dollars due to annual undertreated TBI in Indiana.

As previously mentioned, there are other potential losses to the state of Indiana due to the annual workforce loss that are not reflected in our estimates. For instance, the estimates do not reflect the annual losses to business tax revenues ($10 million) or personal tax revenues ($4.8 million) that result from workforce loss. Fringe benefits and Medicare/Medicaid costs are other examples of such losses not reflected in this research note.

This study assumes only those who suffer a long-term disability from TBI are lost from the workforce. TBI-related injuries that do not result in a long-term disability could still cause temporary loss to the workforce. However, the current methodology implicitly makes the derived estimates more conservative.

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