DOES INCREASED SPENDING ON ALCOHOLISM TREATMENT LEAD TO LOWER CIRRHOSIS DEATH RATES?

REGINALD G. SMART*, ROBERT E. MANN and SEANG-LOOI LEE

Addiction Research Foundation, 33 Russell Street, Toronto, Canada, M5S 2S1

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Abstract — The purpose of this study was to see if recent changes in the funding of alcoholism programmes in the United States were related to changes in liver cirrhosis death rates. Data on per-capita spending, per-capita alcohol consumption and cirrhosis death rates were gathered from various sources for the years 1979 and 1989 for the 50 states and the District of Columbia. Regression analysis showed that greater increases in spending on alcoholism across US states were associated with greater declines in cirrhosis mortality rates. Since alcohol-related deaths cause large productivity losses and treatment is relatively cheap this creates large savings for society.

INTRODUCTION

During the 1980s spending on specialized alcoholism treatment increased greatly in the USA and Canada. Data for Ontario indicate that spending increased by about 30% and during the same time period deaths from liver cirrhosis decreased by about 22% (16.6 per 100,000 population in 1980 to 13.0 per 100,000 population in 1990; Smart and Mann, 1991). Mann et al. (1988) have shown that early decreases in liver cirrhosis morbidity rates (1975–1982) were related to increased levels of treatment in the different regions of Ontario. Virtually all of the changes in treatment rates were due to increases in government funding on programmes. This paper examines the effect of increased spending on the treatment of alcohol problems in the USA.

In the United States, financing of alcohol programmes changed drastically during the 1980s. The number of states that mandated private insurance coverage of alcoholism treatment more than doubled. In about the same period insurance coverage of alcohol abuse treatment increased from 36 to 83% of employees at medium and large companies (Morrisey and Jensen, 1991). Huber et al. (1994) showed that total spending, both private and public, on specialty treatment increased by 137% between 1979 and 1989. Much of this was accounted for by the large increase (251%) in private funding compared to public spending (60%). As expected, the number of treated clients increased from about 307,000 to 511,000, based on the National Drug and Alcoholism Treatment Utilization Survey (NDATUS) surveys of clients in treatment on a particular day (NDATUS, 1979, 1989).

The variations in spending changes by state were very large. For example, Oregon and Arizona had small declines in total spending (−5 and −7%) and Tennessee had only a 1% increase. However, New Jersey increased spending by 355%, Rhode Island by 340% and Virginia by 261%. It would be expected, based on the experience in Ontario (Mann et al., 1988), that states with the largest increases in funding would have larger decreases in alcohol-related problems such as cirrhosis. Another factor that would be expected to influence changes in cirrhosis death rates would be average, or per-capita, consumption of alcohol. Much previous work indicates that per-capita consumption may be the strongest determinant of cirrhosis mortality rate change over time, or differences between regions (e.g. Bruun et al., 1975; Popham et al., 1976; Skog, 1980; Smart and Mann, 1991). In the US, following an extended period of increases beginning with the repeal of prohibition, per-capita consumption demonstrated modest declines over the 1980s.

The purpose of this study was to examine the contribution of changes in spending on alcoholism treatment and in per-capita consumption to
changes in cirrhosis mortality rates in the US between 1979 and 1989. Based on previous research, we predicted that both changes in treatment spending and changes in alcohol consumption have contributed significantly to changes in cirrhosis mortality rates over that time period. The purpose of this paper is to examine the relationship between the changes in funding by state and liver cirrhosis death rates.

METHODS

The data on spending on specialty alcoholism treatment were obtained from Huber et al. (1994) by summing the figures for private and public spending. They obtained most of the data from the NDATUS (1979, 1989) surveys sponsored jointly by the National Institute on Alcohol Abuse and Alcoholism and the National Institute on Drug Abuse. These surveys obtain data from both private and public treatment centers, such as clinics and hospitals, on people treated on 30 April. Both inpatient and outpatient facilities for treating alcoholics are included. Unfortunately, data are not included from private physicians, hospital stays not specifically for alcoholism treatment or self-help groups such as Alcoholics Anonymous. Huber et al. (1994) did improve estimates by imputing some missing data and the details are given in their report. The data are for spending in dollars per capita, with 1979 inflated to 1989 values, based on the consumer price index. Comparable data on spending were available by state only for the years 1979 and 1989 and hence an analysis can be done only for these two years.

The data on per-capita alcohol consumption were obtained from the report by Williams et al. (1993) sponsored by the National Institute on Alcohol Abuse and Alcoholism. Per-capita consumption was expressed as gallons of alcohol based on the population aged 14 years or over.

The data on chronic liver disease and cirrhosis (ICD 571) deaths for 1979 and 1989 were obtained from the National Institute on Alcohol Abuse and Alcoholism which used data from the National Center for Health Statistics to prepare the state by state death rates. They were expressed as rates per 100,000 total population. As with the spending data, state-by-state death rates were only available for 1979 and 1989.

Table 1. Changes in spending on alcoholism programmes, per-capita alcohol consumption and liver cirrhosis 1979–1989 by state

<table>
<thead>
<tr>
<th>State</th>
<th>Spending on alcoholism treatment</th>
<th>Per-capita alcohol consumption</th>
<th>Liver cirrhosis death rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>1.09</td>
<td>-0.09</td>
<td>-0.17</td>
</tr>
<tr>
<td>DC</td>
<td>0.43</td>
<td>-0.23</td>
<td>-0.08</td>
</tr>
<tr>
<td>Wyoming</td>
<td>0.18</td>
<td>-0.29</td>
<td>-0.10</td>
</tr>
<tr>
<td>Minnesota</td>
<td>0.09</td>
<td>-0.11</td>
<td>-0.10</td>
</tr>
<tr>
<td>Montana</td>
<td>0.38</td>
<td>-0.22</td>
<td>+0.14</td>
</tr>
<tr>
<td>New Mexico</td>
<td>0.89</td>
<td>-0.14</td>
<td>-0.08</td>
</tr>
<tr>
<td>Colorado</td>
<td>0.40</td>
<td>-0.25</td>
<td>-0.07</td>
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<tr>
<td>Oregon</td>
<td>-0.05</td>
<td>-0.14</td>
<td>-0.32</td>
</tr>
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<td>Wisconsin</td>
<td>0.56</td>
<td>-0.11</td>
<td>-0.10</td>
</tr>
<tr>
<td>Maine</td>
<td>1.97</td>
<td>-0.08</td>
<td>-0.28</td>
</tr>
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<td>Arizona</td>
<td>-0.07</td>
<td>-0.15</td>
<td>-0.18</td>
</tr>
<tr>
<td>New York</td>
<td>2.56</td>
<td>-0.16</td>
<td>-0.40</td>
</tr>
<tr>
<td>Nebraska</td>
<td>0.68</td>
<td>-0.15</td>
<td>-0.13</td>
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<tr>
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<td>-0.01</td>
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<td>1.31</td>
<td>-0.06</td>
<td>-0.25</td>
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<tr>
<td>Vermont</td>
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<td>-0.19</td>
<td>-0.14</td>
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<tr>
<td>Rhode Island</td>
<td>3.40</td>
<td>-0.12</td>
<td>-0.13</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>0.25</td>
<td>-0.09</td>
<td>-0.12</td>
</tr>
<tr>
<td>North Carolina</td>
<td>0.16</td>
<td>-0.05</td>
<td>-0.09</td>
</tr>
<tr>
<td>California</td>
<td>0.25</td>
<td>-0.18</td>
<td>-0.26</td>
</tr>
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<td>Idaho</td>
<td>2.02</td>
<td>0.21</td>
<td>-0.21</td>
</tr>
<tr>
<td>Kansas</td>
<td>1.38</td>
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<td>-0.21</td>
</tr>
<tr>
<td>Utah</td>
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<td>-0.18</td>
<td>-0.39</td>
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<tr>
<td>Washington</td>
<td>1.64</td>
<td>-0.18</td>
<td>-0.20</td>
</tr>
<tr>
<td>Virginia</td>
<td>2.61</td>
<td>-0.09</td>
<td>-0.24</td>
</tr>
<tr>
<td>Arkansas</td>
<td>0.94</td>
<td>+0.11</td>
<td>-0.09</td>
</tr>
<tr>
<td>South Carolina</td>
<td>1.21</td>
<td>-0.05</td>
<td>-0.02</td>
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<td>Florida</td>
<td>1.13</td>
<td>-0.13</td>
<td>-0.10</td>
</tr>
<tr>
<td>Iowa</td>
<td>2.52</td>
<td>-0.13</td>
<td>-0.10</td>
</tr>
<tr>
<td>Tennessee</td>
<td>0.01</td>
<td>-0.04</td>
<td>-0.12</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>1.31</td>
<td>-0.09</td>
<td>-0.16</td>
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<tr>
<td>Georgia</td>
<td>0.76</td>
<td>-0.08</td>
<td>-0.12</td>
</tr>
<tr>
<td>Illinois</td>
<td>1.09</td>
<td>-0.13</td>
<td>-0.20</td>
</tr>
<tr>
<td>North Dakota</td>
<td>0.40</td>
<td>-0.12</td>
<td>-0.05</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>1.16</td>
<td>-0.16</td>
<td>-0.20</td>
</tr>
<tr>
<td>Michigan</td>
<td>0.67</td>
<td>-0.10</td>
<td>-0.15</td>
</tr>
<tr>
<td>Maryland</td>
<td>2.12</td>
<td>-0.19</td>
<td>-0.18</td>
</tr>
<tr>
<td>Louisiana</td>
<td>0.82</td>
<td>-0.12</td>
<td>-0.12</td>
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<tr>
<td>Kentucky</td>
<td>1.51</td>
<td>-0.11</td>
<td>-0.10</td>
</tr>
<tr>
<td>Nevada</td>
<td>0.50</td>
<td>-0.25</td>
<td>-0.47</td>
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<tr>
<td>Delaware</td>
<td>1.13</td>
<td>-0.03</td>
<td>-0.29</td>
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<tr>
<td>Hawaii</td>
<td>0.39</td>
<td>-0.17</td>
<td>-0.27</td>
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<tr>
<td>Texas</td>
<td>2.10</td>
<td>-0.11</td>
<td>-0.09</td>
</tr>
<tr>
<td>Indiana</td>
<td>1.62</td>
<td>-0.06</td>
<td>-0.24</td>
</tr>
<tr>
<td>Mississippi</td>
<td>1.00</td>
<td>-0.04</td>
<td>+0.06</td>
</tr>
<tr>
<td>Alabama</td>
<td>0.69</td>
<td>-0.04</td>
<td>-0.09</td>
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<tr>
<td>Missouri</td>
<td>2.21</td>
<td>-0.07</td>
<td>-0.21</td>
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<tr>
<td>Oklahoma</td>
<td>2.25</td>
<td>-0.14</td>
<td>0.37</td>
</tr>
<tr>
<td>West Virginia</td>
<td>1.29</td>
<td>-0.13</td>
<td>-0.17</td>
</tr>
<tr>
<td>Ohio</td>
<td>1.73</td>
<td>-0.08</td>
<td>-0.25</td>
</tr>
<tr>
<td>New Jersey</td>
<td>3.55</td>
<td>-0.04</td>
<td>-0.08</td>
</tr>
<tr>
<td>USA (total)</td>
<td>1.14</td>
<td>-0.12</td>
<td>-0.16</td>
</tr>
</tbody>
</table>

(+) Increase, (−) decrease.
Table 2. Regression of changes in liver cirrhosis death rates onto changes in per-capita alcohol consumption and spending on alcoholism programmes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Zero order correlation</th>
<th>Slope</th>
<th>Standardized regression coefficient</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. All United States included</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>0.13</td>
<td>0.29</td>
<td>0.17</td>
<td>1.24</td>
</tr>
<tr>
<td>Spending</td>
<td>-0.22</td>
<td>-0.03</td>
<td>-0.25</td>
<td>-1.77*</td>
</tr>
<tr>
<td>Multiple R</td>
<td>0.28</td>
<td>0.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Nevada, New Jersey and Montana excluded</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>0.12</td>
<td>0.21</td>
<td>0.14</td>
<td>1.01</td>
</tr>
<tr>
<td>Spending</td>
<td>-0.33</td>
<td>-0.04</td>
<td>-0.34</td>
<td>-2.46b</td>
</tr>
<tr>
<td>Multiple R</td>
<td>0.36</td>
<td>0.13</td>
<td></td>
<td>3.39b</td>
</tr>
</tbody>
</table>

* 0.05 < P < 0.10.

RESULTS

Because some data were not available for a long series of years but only 1979 and 1989, the analysis could not be based on the usual time series method. We therefore based it on relative changes by state between the years 1979 and 1989 (or nearest year available).

The state-by-state data for changes in spending, per-capita alcohol consumption and cirrhosis deaths are shown in Table 1. It can be seen that, between 1979 and 1989, overall spending increased by 114%, whereas per-capita alcohol consumption was decreased by 12.0% and liver cirrhosis deaths also decreased by 16%. However, the variations are considerable. As stated earlier, they were very large for spending with mostly increases and a few decreases. However, all states but one (Arkansas) showed a decrease in per-capita alcohol consumption, and all but two (Montana and Mississippi) had a decrease in cirrhosis rates.

The measures of relative change in liver cirrhosis were regressed onto relative change in per-capita consumption and spending. It can be seen from Table 2A that the overall regression equation was not significant for relative change in liver cirrhosis mortality rates. However, the individual impact of spending changes approached significance (P = 0.08). We subsequently examined the data for the presence of outliers. A group of three states (Nevada, New Jersey and Montana) had elevated values of Cook’s d in comparison with the remainder of the sample. Two of the states (Montana and New Jersey) had the largest Studentized Residual Values (both greater than ±2.5), while Nevada had the second highest leverage value in the data set. The analysis was, therefore, repeated excluding the data from these three states. The results demonstrated a substantially improved fit of the data (Table 2B). The overall regression equation was significant (F = 3.39, P < 0.02) and reductions in liver cirrhosis death rates were significantly associated with increases in spending on alcoholism treatment.

DISCUSSION

In earlier studies, we demonstrated a significant association between: (1) increased treatment for alcohol abuse and decreased cirrhosis morbidity in Ontario (Mann et al., 1988); (2) increased Alcoholics Anonymous membership and decreased cirrhosis mortality rates in the USA (Mann et al., 1991). Holder and Parker (1992) found, in a time series analysis of North Carolina data, a significant negative relationship between treatment admissions and cirrhosis mortality. The present data are consistent with these earlier observations.
in suggesting that, across US states between 1979 and 1989, greater increases in spending on treatment for alcohol abuse were associated with greater decreases in cirrhosis mortality rates.

Changes in treatment rates and changes in cirrhosis mortality rates across US states between 1974 and 1983 showed no significant relationships (Mann et al., 1991). The current findings differ from this earlier study, and there are a number of possible explanations. We had previously used estimates of treated clients in each state derived from NDATUS information for 1974 and 1983. These figures were point-prevalence estimates of cases in treatment on particular days, and the day chosen (and month) differed between the two surveys. Numerous factors could contribute to day-to-day or seasonal fluctuations in clients in treatment, which could render these point prevalence estimates less accurate as measures of treatment activity over the year than the annual funding for treatment reported by Huber et al. (1994) and used here. In addition, the change in treatment levels between 1974 and 1983 was much smaller than between 1979 and 1989. Also, per-capita consumption was increasing over much of the 1970s, plateaued in 1980–1981, and declined thereafter, and thus in the present data more consistent declines in per capita consumption were observed.

The removal of three outliers from the analysis strengthened the results considerably. All three states were extreme in some respects. Cirrhosis mortality rates increased in Montana over the time period examined, while these decreased in all other states except for Mississippi. While New Jersey had the largest increase in treatment spending, it had only a very small change in cirrhosis mortality. However, it also had one of the smallest changes in per-capita consumption of alcohol, which much previous research demonstrates to be a major determinant of cirrhosis rates (e.g. Smart and Mann, 1991). Nevada had one of the smaller increases in treatment spending, but the largest decline in cirrhosis rates. However, Nevada also had the second largest decline in per-capita consumption; as well, its absolute per-capita consumption levels were the highest among all the states.

Contrary to prediction, the impact of changes in per-capita consumption of alcohol on cirrhosis mortality changes was not statistically significant, although it was in the expected direction. Much previous work demonstrated the existence of a positive relationship between per-capita consumption and cirrhosis mortality rates (e.g. Bruun et al., 1975; Popham et al., 1976; Skog, 1980; Smart and Mann, 1991). One possible reason for the discrepancy between the present study and previous work is that, in the present work, the amount of change in alcohol consumption was relatively small, at least in comparison to the amount of change observed in other studies (e.g. Bruun et al., 1975; Skog, 1980). Thus, the restriction in range of this independent measure may have resulted in smaller and more variable effects in the present analysis.

The results suggest that states which increased their spending on alcohol treatment programmes had decreased deaths from liver cirrhosis. Although these observations should be considered preliminary, we should note here that any reductions in alcohol-related deaths create considerable savings in both human hardship and money. Rice et al. (1990) have estimated that 22.6 person-years are lost for each alcohol abuse death. Of course, the person-years lost will differ for different specific causes of alcohol-related deaths. For example, there are likely to be more years lost for those dying in alcohol-related traffic crashes than for those dying from cirrhosis. Also, the average productivity losses for the age group (45–64 years) most likely to die of cirrhosis are $210,039 per death. Huber et al. (1994) have provided figures which show that the treatment cost per case in specialty alcoholism treatment units is $7436. Even though many alcoholics are treated several times, this may represent a very large saving for society. However, the issues involved in estimating the actual dollar values are very complicated and are discussed by Rice et al. (1990). We believe that this is the first time the potential for such savings based on increased treatment spending has been demonstrated. These results suggest that efforts to improve treatment facilities and their availability have been beneficial in the recent past and could be in future.

REFERENCES

SPENDING ON ALCOHOLISM TREATMENT AND CIRRHOSIS DEATHS


National Drug and Alcoholism Treatment Utilization Survey (NDATUS), (1979) National Institute on Alcohol Abuse and Alcoholism, Rockville, MD.


