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Attacking Alcohol-Related Liver Disease by Taxing Alcohol Sales

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Abbreviation:

ALD: Alcohol-related liver disease

63 AUD: Alcohol use disorder
64 NIAAA: National Institute on Alcohol Abuse and Alcoholism
65 UNOS: United Network for Organ Sharing

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68 **Alcohol-related liver disease (ALD) is unabated in the US**

69 The public health impact of ALD is large and growing (Liangpunsakul et al., 2016). The incidence
70 of cirrhosis due to ALD is rising, driven in part by recent and historically unparalleled increases among
71 young people (Mellinger et al., 2018, Flemming et al., 2018). In parallel, mortality and liver
72 transplantation rates for persons with ALD have risen substantially (Tapper and Parikh, 2018, Mellinger
73 et al., 2018, Lee et al., 2019). Reducing alcohol consumption is the cornerstone of ALD management to
74 decrease the risk of progression from compensated to decompensated cirrhosis. At the individual level,
75 we have a variety of interventions, behavioral and pharmacological, which are proven to reduce the
76 harms of alcohol use disorder (AUD) (Peng et al., 2017). The effectiveness of these interventions is
77 limited by variable efficacy and sustainability as well as inadequate linkage to care (Addolorato et al.,
78 2016). Only 1 in 10 patients undergo psychotherapy; only 8 in 1000 receive pharmacotherapy for AUD,
79 with even lower rates for women (Mellinger et al., 2019).

80 **Successful interventions for AUD must be reliable and broad**

81 ALD is a population-level problem. As such, it requires broad policy-based solutions. Policies that
82 reduce access to alcohol or influence demand through minimum unit pricing may be the most effective
83 tools (Xuan et al., 2015, Naimi et al., 2014, Black et al., 2011, Holmes et al., 2014). Increased alcohol
84 taxes may result in decreased alcohol sales and consumption, particular for those with lower
85 socioeconomic status (Elder et al., 2010). One key measure of ALD's population-level burden is the
86 number of patients evaluated and waitlisted for liver transplant. The effect of alcohol taxes on alcohol
87 consumption and its influences on liver transplant listing for patients with ALD are elusive.

88

89 **A new study sheds light on the effect of alcohol taxes on transplant waitlisting for ALD**

90 In this issue of ACER, Shen et al address this concern. The authors utilized patient-level data
91 from the United Network for Organ Sharing (UNOS) data of 137,440 registrants on the liver transplant
92 waitlist from 2003-2015 linked to state-level per-capita alcohol consumption data from the National
93 Institute on Alcohol Abuse and Alcoholism (NIAAA). These patients were then dichotomized into 2 liver
94 transplant waiting list cohorts, ALD and non-ALD. The information on alcohol taxes consisted of state-
95 specific excise taxes and ad volerem taxes for both on-premise and off-premise consumption. Their
96 study yields 2 major findings. First, the authors identified an inverse relationship between excise taxes
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97 and alcohol consumption only for spirits but not wine or beer. For every 1% increase in spirits excise tax,
98 there is a trend of decreasing on-premise spirit consumption by 0.10%. Second, spirits consumption
99 showed the positive correlations with liver transplant listing. The changes in spirits purchasing due to
100 high excise taxes *and* consumption had led to fewer ALD liver transplant listings. Two sensitivity
101 analyses appear to confirm the validity of this association. In one, no association was observed between
102 sprits taxes/consumption and transplant waitlisting for hepatitis B; in another, when excluding the
103 population with Medicaid insurance, wine taxes/consumption were associated with ALD waitlisting.
104 Taken together, this study suggests that changes in taxation policies on spirits excise taxes may be
105 associated with reduced consumption and subsequent listing for liver transplantation.

106

107 **Major limitations**

108 There are two central limitations in the study design that impact our interpretation of these data.
109 First, the authors do not evaluate other alcohol policies that limit (or promote) access to alcohol. As an
110 extreme case, all-cause mortality fell when the Soviet government closed distilleries sharply limiting spirit
111 supply from 1984-1990 (Nemtsov, 2002). Limitations on the amount of, times when, and places where
112 alcohol can be purchased each have substantial impact on alcohol consumption (Xuan et al., 2015).
113 Without accounting for other policies, it is unclear where the magnitude of taxes has an effect on ALD
114 waitlisting that is independent of alcohol policy or merely a proxy for the strength of local policy.

115 Second, in order to establish the effect of tax on alcohol consumption, it must be shown that it
116 translates to a higher price for the consumer. This is not evaluated. The price alcohol influences
117 consumption as was observed where minimum unit pricing policies for alcohol were enacted (Holmes et
118 al., 2014, Brennan et al., 2014, Meier et al., 2016). However, because alcohol beverages are elastic
119 goods, increased taxes can be offset on the supply side by marginal changes in production or retail
120 profits or, on the demand side, by substitution of one drink for another. This contrasts with cigarette
121 taxes. Cigarettes have fewer alternatives and are therefore more inelastic. Studies have linked increased
122 taxes to both increased prices and decreased consumption and therefore lung cancer rates (Yeh et al.,
123 2017, Pierce et al., 2010). Third, the temporal association between taxes and the effect on the indication
124 for waitlisting was not examined. The authors examine waitlisting events and alcohol taxes cross-
125 sectionally. However, the association between consumption and waitlisting occur asynchronously. Most
126 patients who are waitlisted today have been sober for more than a year, may have had their most
127 injurious alcohol consumption many years, if not decades, previously (DiMartini et al., 2006).

128

129 **Future directions**

130 First, data linking taxes to price are necessary to understand the mechanism by which tax
131 increases may have an effect on alcohol consumption versus minimum unit pricing, which is a more

132 direct form of price control. Second, clarifying the observed association of taxes with spirits consumption,
 133 is key to optimizing policies informed by this work. Research is needed to determine whether this reflects
 134 that the unit price of spirits is simply more expensive than beer or wine to begin with. Similarly, the
 135 authors found that wine taxes/consumption were associated with waitlisting in privately insured persons.
 136 This association may be due to chance given multiple comparisons or could indicate that consumers of
 137 other alcoholic beverages are less likely to be referred for liver transplantation. Prospective studies of
 138 increased taxes with contemporaneous controls may be needed to validate these associations and also
 139 control for differences in local alcohol policies in alcohol restrictions. Third, transplant waitlist registration
 140 represents only a sliver of ALD's impact on society. To quantify the potential impact of alcohol taxes,
 141 further data are needed with respect to the incidence of cirrhosis and decompensation as well as
 142 disability-adjusted life-years attributed to ALD. Finally, the optimal study design would evaluate the effect
 143 of taxes/prices on clinical outcomes over time, assessing changes at multiple time points in the future
 144 (e.g. 1, 3, 5 years).

145 Conclusion

146 Alcohol use disorder is a serious threat to our public health. We are in need of tools that can
 147 reduce the burden of ALD and its complications. Shen et al have extended the literature by linking taxes
 148 on spirits to transplant waitlisting for ALD. These welcome data represent an important contribution that
 149 clearly lights the path forward.

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