Social Determinants in Liver Transplantation

Joel T. Adler M.D., M.P.H., and Heidi Yeh M.D.

An accumulating body of evidence points toward the powerful role of social and environmental factors, referred to as the *social determinants of health*, in shaping disease patterns and outcomes.^{1,2} The World Health Organization has defined the social determinants of health (Table 1) as “the conditions in which people are born, grow, live, work, and age.”³ In both the developing and the developed world, social determinants likely have a greater influence on health and disease than medical care alone.^{2,4} Because the social determinants of health are fundamental components in the causal pathways of disease, we suggest that focusing on them in the context of liver disease will offer insights into strategies for improving health outcomes for patients with end-stage liver disease (ESLD) in the United States. In this review, we focus on access to and outcomes after liver transplantation among patients with ESLD.

Development of Liver Disease

For example, environments that foster low levels of physical activity coupled with dependence on calorie-rich diets have been linked to the development of maturity-onset diabetes and obesity, both of which are risk factors for nonalcoholic fatty liver disease.⁵ Another major cause of cirrhosis in the United States is hepatitis C infection,⁶ which is associated with low socioeconomic status (SES), drug use, and incarceration.⁷ In some states, however, incarceration also provides access to treatment that might not otherwise be available to this population.^{8,9} Once cirrhosis is established, lower surveillance rates for hepatocellular carcinoma (HCC) are seen in patients with low SES and poor insurance.^{10,11} In a previous issue of this journal, Kim and Singal¹² reviewed disparities in prevention or early detection of HCC based on patient demographics, provider level factors, and system function.

Access to the Liver Transplant Wait List

Multiple studies have shown that wait-list rates vary widely by place of residence,¹³ with decreasing urbanization,¹⁴ increasing distance from a transplant center,¹⁵ and smaller number of transplant centers in the area¹⁶ being associated with lower likelihood of being listed. As in HCC surveillance, these point to multiple environmental issues that need to be overcome to provide better access to the wait list, from neighborhood characteristics to transportation issues to provider availability and awareness of transplantation as an option. In addition, liver transplant programs have identified many social barriers to qualifying for liver transplantation listing, including low education level and inadequate housing.¹⁷ Social support, a nearly universal requirement for listing, is a serious concern, because caregiver burden and quality of life are significantly worse than in the national reference population.¹⁸ Private health insurance strongly increases the likelihood of being listed.¹⁹ Although improving patients' educational attainment may be outside the scope of what a transplant program can provide, health “navigators” have been used effectively in renal transplantation²⁰ and could conceivably be applied to liver transplantation. Similarly, providing transportation, home health aides, and/or visiting nurses may help mitigate the need for patients to provide their own social support.

Wait-List Outcomes

The allocation system plays a critical role in disparities and access to transplantation. The United States is divided into 58 Donor Service Areas (DSAs), which arose spontaneously from cooperating hospitals under the respective organ procurement organizations. There is considerable variability

Abbreviations: DSA, Donor Service Area; ESLD, end-stage liver disease; HCC, hepatocellular carcinoma; SES, socioeconomic status

From the Division of Transplant Surgery, Department of Surgery, Massachusetts General Hospital, Boston, MA

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TABLE 1 Social Determinants of Health

Neighborhood and built environment	Community-based resources Public safety Transportation options
Social and community context	Cohesion Residential segregation Community norms
Education	Quality of education Job training Language and literacy
Economic stability	Income/wealth Job market
Health and health care	Access to health care services Exposure to crime and violence Insurance status and ability to pay

The conditions in which we live are powerful influences on health; many of these topic areas are overlapping. List was modified from Healthy People 2020 (<http://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-health>).

among DSAs in the likelihood of transplant versus death on the wait list.²¹ As a theoretical means of overcoming this obstacle, patients are allowed and encouraged to travel to more favorable DSAs to be listed and transplanted, but in reality, this option is available to only a small subset of high SES patients who have the means to relocate or travel long distances on very short notice.²² At the DSA level, evidence suggests that variability in wait-list outcomes is related to transplant center number and density.^{13,16,21,23,24} It is obviously difficult to legislate center location and existence, but a more feasible intervention might be to reorganize DSA boundaries to equalize organ distribution, thus increasing patients' chances at transplantation.²⁵ Such proposals are predicted to improve overall access to transplantation and wait-list outcomes, but they are undergoing further review and analysis to evaluate unintended effects, in particular, the potential for isolated centers currently serving sparse populations to close because of organs being sent to

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high-density centers, paradoxically decreasing access to transplantation.

Posttransplant Outcomes

Posttransplant outcomes are associated with social determinants as well. Although perioperative outcomes of low SES recipients do not differ significantly from those of higher SES, lower SES is associated with an increased risk for death 2 years after transplantation.²⁶ Poor health literacy is associated with unintentional nonadherence,²⁷ which is a risk factor for death and graft failure posttransplant.²⁸ Lower income and limited literacy are also associated with a greater number of posttransplant hospitalizations,²⁷ and it is important to consider whether the cost and effort of up-front education and providing home health care support would be effective enough to be offset not only by longer graft and patient survival, but also by the savings from decreasing complications and admissions.

Conclusions

Overall access to and outcomes after liver transplantation have improved significantly over the last 50 years because of medical and technical advances, but we are just beginning to understand the profound effect of social determinants in liver transplantation. More work needs to be done to elucidate the mechanisms behind the observed associations outlined in this review, to intelligently design effective interventions to improve outcomes. Although many potential solutions may fall outside the traditional purview of health care delivery, the health care community would do well to assume responsibility for them.

CORRESPONDENCE

Heidi Yeh, M.D., Division of Transplant Surgery, Massachusetts General Hospital, 55 Fruit Street, White 516, Boston, MA 02114. E-mail: hyeh@partners.org

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