Features

Gatekeeping and Bias Against Pediatric Risk in Solid Organ Transplant

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ABSTRACT

We present the case of a three-year-old boy with an inherited progressive liver disease who developed liver failure and required a liver transplant to survive into adulthood. The child had a second medical condition that increased his risk of poor outcome during a liver transplantation, but the absolute risk was unknowable. Newer regulations, including the 2007 Centers of Medicare & Medicaid Services (CMS), which published the Conditions of Participation (CoPs) for United States transplant centers, fostered a new environment that created incentives for transplant centers to be more conservative in the selection of candidates and altered the traditional role of gatekeeping performed by the transplant team.[1] After reviewing the relevant U.S. transplant policies and their impact on transplant centers, this review seeks to provide ethical arguments related to justice, fairness, and utility in the distribution of scarce organs in this more risk-averse environment. The net effect of the changes in transplant regulation appears to be exclusion of potential candidates for whom solid organ transplant is clearly in their best interests. The change in the nature of gatekeeping may also undermine the trust of both patients and the public in transplantation.

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CASE REPORT

Alan is a three-year-old boy with liver failure due to an inherited progressive liver disease. He has had numerous complications as his liver function worsened, including portal hypertension, coagulopathy, and pathologic fractures. Without a transplant, he is expected to die in 18 to 24 months. Thus, the recommended therapy for his liver failure is transplantation. Liver transplantation is a highly efficacious, life-sustaining therapy. Complicating matters, Alan has a deformity of his cerebral vasculature (Moyamoya disease) that, despite a "successful" revascularization procedure, placed him at increased risk for stroke, particularly in the peri-operative period. After an extensive evaluation, it was determined that the increased risk of peri-operative stroke could not be quantified.

After a discussion with Alan's hepatologist, Alan's parents ask that he be considered for transplantation. Alan has an older sibling with the same hepatic disease who is a liver transplant recipient. In discussion, various members of the medical team question whether Alan should be a candidate for transplant because he has an increased risk for poor

surgical outcome; the transplant may be an inappropriate use of a donor liver; and a series of poor outcomes could affect the center's outcome statistics and potentially result in an audit, negative publicity, loss of inclusion in insurance networks, or closure of the center.

DISCUSSION

The shortage of available organs has been a central concern throughout the history of transplantation. In 2012 there were 585 children on the U.S. pediatric liver transplant wait list and 37 deaths.[2] In part due to the shortage of organs, transplant physicians have played the role of gatekeeper, choosing only certain individuals to give or receive an organ. In their classic text, Fox and Swazey described the goal of gatekeeping as "to optimize the patient's chances for survival and to offer him as enduring, active, and meaningful a post-transplant life as possible without undue physical, psychic, or social harm to himself, the donor, or their families."[3] This patient-centered approach focuses on identifying the medical suitability of a candidate and assessing whether the potential recipient would benefit sufficiently, relative to the burdens transplant would pose to the individual. If there is the potential for sufficient benefit, the patient will be accepted by the transplant center either for a living donor transplant or be placed in a national pool for a deceased donor transplant, for which allocation is based upon explicit criteria.

Liver transplantation represents the single, best, and only definitive therapy associated with prolongation of life in the setting of end-stage liver disease.[4] A successful transplant in a child of this age could be expected to last for 20 to 30 years.[5] Liver transplant does carry a risk of death from either the complications of surgery or failure of the allograft. While the risks of peri-operative death or catastrophic neurologic event are higher for Alan than they would be for a similar child experiencing liver failure but who has normal cerebral vasculature, the absolute risk is unknowable. In situations that offer a potential benefit to a child, but also the risk of significant morbidity, a medical team will often defer to the child's parents, recognizing the traditional role of parental authority in medical decision making. In this case, the medical team weighs the risks for Alan, with the added knowledge that he has a sibling who has had liver transplantation. The parents ask the team to proceed with transplant. In their view, the risks of the procedure are justified by its potential benefits.

While different physicians and parents could make different assessments about the candidate's best interests or whether pursuing liver transplantation in this patient represents an effective use of the limited community resource of donated livers, traditionally consideration of a candidate focuses only upon on these largely patient-centered concerns. The 2007 CMS CoPs changed the focus of gatekeeping by introducing a new concern: the viability of the transplant center.[6] The net effect has been to promote the selection of lower risk candidates and the exclusion of candidates for whom transplant is in their best interests, but who may pose a risk to the viability of the transplant center.

The goal of the CoPs was to create greater transparency for transplant center outcomes and to encourage quality improvement measures.[7] The CoPs include a set of regulations about minimum patient and graft survival rate criteria that are based upon observed and expected one-year patient and graft survival from reports by the Scientific Registry of Transplant Recipients (SRTR).[8] These outcomes are evaluated in six-month increments over the previous two and one-half years. Transplant centers that have two periods of performance that are below expected outcomes in the previous two years are required to undergo an audit, at considerable expense, and risk shutdown or exclusion from insurer networks. Smaller transplant centers that perform less than 10 transplants per two and one-half year period, including most pediatric transplant centers, are audited for a single death or graft loss in the first year following transplant. Up to 10 percent of kidney, liver, and heart transplant programs were identified as underperforming by CMS when it examined SRTR program-specific reports for the period 1 January 2005 through 30 June 2007. Some transplant centers reported quality improvements as a result of this auditing.

There are a number of concerns with the CoPs model.[9] The CoPs model uses a one-sided t-test, rather than the two-sided t-test used by SRTR, to compare observed versus expected outcomes. (A t-test assesses whether the means of two groups are statistically different from each other; a two-sided t-test tests the difference between the samples.) This difference increases the number of transplant centers that may be flagged as poorly performing. The predictive models for expected outcomes are also limited by a low C-statistic. (A C-statistic, or concordance statistic, is a measure of "goodness of fit" for binary outcomes in a logistic regression model.) A low C-statistic is 0.66 for kidneys; 0.5 indicates no predictive value and 1 represents perfect predic-

tive value. Finally, the difference between audited programs and those not audited is not dramatic; Schold and colleagues noted that from 2007 to 2009, the mean difference in one-year graft survival between audited and non-audited transplant centers was less than 5 percent (87.8 percent versus 92.3 percent).[10] Some of these issues have been addressed by a transition from an observed versus an expected analysis to a Bayesian analysis in January, 2015; however, concerns still exist regarding the limitations of the predictive models upon which they are based. When a model cannot adequately adjust for the medical complexity of a donor recipient and a donor, and the consequences of an audit are potentially severe, it is prudent for a transplant center to become more conservative in the selection of both the recipient of an organ and the selection of an organ. This is the approach taken by the Johns Hopkins adult liver transplant center as part of their Systems Improvement Agreement in 2010.[11] As a result of the audit, the transplant center lost several insurance contracts.

We found further evidence of this conservative approach in an anonymous internet survey of 21 surgical and medical directors of pediatric kidney transplantation centers.[12] Respondents were given a variety of vignettes of higher risk including risk of recurrence, patients' noncompliance, multiple medical comorbidities, and shortened life span. In each of these vignettes, careproviders felt that transplantation was in the child's and her family's best interests, however, more than 50 percent of respondents for each case reported they would explicitly consider the potential negative impact of a poor outcome on their center's viability when considering each patient. Similarly, concerns regarding a transplant center's performance may explain the lower than expected acceptance rate for liver grafts observed from 2005 through 2010, and the finding that 55 percent of the candidates for liver transplant who died or who were removed from the transplant list received one or more offers of a high-quality liver donation. Further, a 2009 survey of transplant providers found that more that half of the transplant centers were less likely to accept medically or socially complex recipients and poorer quality organs.[13] Among centers that had been audited, more than 80 percent reported more conservative behavior.

A more conservative approach by transplant centers may account in part for the observed decline in the number of pediatric liver and deceased donor pediatric kidney transplants performed in the U.S. since the institution of the regulations.[14] The change in careproviders' behavior means that the metric, in effect, is now reflecting the relative complexity of transplant candidates and quality of accepted donor organs at centers, rather than acting as a true marker of the quality of the transplant centers. The net result is that fewer transplants are performed, potentially more donor organs are wasted, and higher risk patients who could benefit from solid organ transplantation are excluded.

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The new regulations have changed the nature of gatekeeping by providing incentives to consider only the lowest risk candidates. As a result, transplant providers' decision making is no longer exclusively patient-centered, but now is focused on the viability of the transplant center. This departure from a patient-centered approach has potential consequences, including the introduction of bias against potential candidates on the basis of medical complexity, particularly if a transplant center had a poor outcome with a different patient. The net effect is exclusion of potential candidates for whom solid organ transplant is clearly in their best interests. The change in the nature of gatekeeping may also undermine the trust of patients and the general public in transplantation. In light of these changes, it is important for pediatric transplant decisions to be made carefully, responsibly, and openly, using the best information available, and for parents to be

given the opportunity to appeal decisions and to be informed of the potential to be considered by a different transplant center. Continued progress is needed at the national level in the U.S. to identify new ways to assess quality in an increasingly risk-averse environment.

While it may not be prudent, in the current regulatory climate, we feel the focus of decision making should remain on likelihood of benefit to the child. It would be inappropriate to accept any patient for transplantation if the odds of the survival of the graft or the patient were extremely low, not because of issues of stewardship or the viability of transplant centers, but because it would not be in the patient's interest. Such a patient would be forced to undergo painful surgery for little or no benefit that may, instead hasten death. In situations of uncertainty, such as this case, in which a successful transplant would be of significant benefit to a child but carries a higher risk of peri-operative complications, we should allow the child's parents to choose to pursue potentially efficacious therapy, provided they are adequately informed.

PRIVACY

The case presented above was created as a fictionalized adaptation from several actual cases in pediatric liver, heart, and kidney transplantation that involved similar themes.

NOTES

1. The CMS Conditions of Participation (CoPs) for transplant centers are published in U.S. Department of Health and Human Services, Centers for Medicare & Medicaid Services, "42 CFR Parts 405, 482, 488, and 498, Medicare Program; Hospital Conditions of Participation: Requirements for Approval and Re-Approval of Transplant Centers To Perform Organ Transplants; Final Rule," 30 March 2007, *https://www.cms.gov/Medicare/Provider-Enrollment-andCertification/GuidanceforLawsAnd Regulations/Downloads/TransplantFinalLawandReg.pdf.*

2. Recipients, Scientific Registry of Transplant, "2012 Annual Data Report," *http://srtr.transplant.hrsa.gov/annual_reports/20102/Default.aspx.*

3. R.C. Fox and J.P. Swazey, *The Courage to Fail: A Social View of Organ Transplants and Dialysis* (Chicago: University of Chicago Press, 1974).

4. D.C. Cronin et al., "Parental Refusa; of a Liver Transplant for a Child with Biliary Artresia," *Pediatrics* 131, no. 1 (January 2013): 1414-6.

5. Ibid.

6. CMS Conditions of Participation (CoPs), see note 1 above.

7. Ibid.

8. M.M. Abecassis et al., "American Society of Transplant Surgeons Transplant Center Outcomes Requirements—A Threat to Innovation," *American Journal of Transplantation* 9, no. 6 (June 2009): 1279-86.

9. Ibid.; A.M. Cameron and B.E. Sullivan, "Regulatory Oversight in Transplantation: There and Back Again," *JAMA Surgery* 148, no. 11 (November 2013): 997-8; J.D. Schold, C.J. Arrington, and G. Levine, "Significant Alteration in Reported Clinical Practice Associated with Increased Oversight of Organ Transplant Center Performance," *Progress in Transplantation* 20, no. 3 (September 2010): 278-87; J.D. Schold et al., "The Association of Center Performance Evaluations and Kidney Transplant Volume in the United States," *American Journal of Transplantation* 13, no. 1 (January 2013): 67-75.

10. Schold et al., "The Association of Center Performance Evaluations," see note 9 above.

11. Cameron and Sullivan, "Regularoy Oversight in Transplantation," see note 9 above.

12. A. Wightman, unpublished data; please contact the author for additional information.

13. Schold, Arrington, and Levine, "Significant Alteration in Reported Clinical Practice," see note 9 above.