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Child-to-Parent Bone Marrow Donation for Treatment of Sickle Cell Disease

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Natalie Johnson (not her real name) was a 25-year-old woman who had endured the chronic symptoms of sickle cell disease (SCD) since shortly after her birth. The symptoms of her SCD had progressed over her short lifetime from joint pain and swelling, in early childhood, to more severe pain that was difficult to manage as a teenager, with organ involvement as a young adult.

Natalie had always been under a doctor's care for her SCD. The hematology staff at a local hospital followed her consistently since she was a child. Between the ages of 11 and 14, she experienced sickle cell crises for which she was hospitalized each year; however, after age 14, her crises increased in frequency and she required hospitalizations every three months until age 24, when she was hospitalized approximately three weeks out of every month within that year. During this time of frequent crises, her hematologist began to discuss the possibility of bone marrow transplantation (BMT) with her. She was told that if a BMT was successful, she might be cured of her SCD. At that time she was very positive about this option, and began to pursue this with her mother and her doctors. Before the search for a potential donor took place, Natalie found out she was pregnant.

After a very complicated pregnancy, Natalie delivered a healthy baby girl named Faith (not her real name), and cord blood was collected and stored. Faith's biological father was not present for the birth nor was he involved with the baby after her birth. Natalie had not been in contact with him since before Faith's birth. Soon after the birth, Natalie began pretransplant therapy, but could not tolerate the treatments due to severe pain and fatigue. At that time, unfortunately, her right hip joint began to show signs of deterioration from her disease, and she had hip replacement surgery. She recovered well from this surgery, but continued to have severe and frequent pain crises, requiring her to take daily pain medication and resulting in frequent admissions to the hospital. She was not physically strong enough to continue with her transplant at age 25.

Her symptoms continued to progress to the point that her quality of life was severely compromised. Her hematologist believed that BMT was her best chance to improve the quality and length of her life. Her physician also believed that, without this intervention, Natalie had a life expectancy of 10 years or less, with progressive degeneration of her joints, severe organ involvement, and intractable pain. Natalie agreed to undergo BMT. Her mother, father, and brother agreed to be tested for donation, but her physicians wanted to test Faith's cord blood first. Should Faith be a close enough match, Natalie would have less chance of

rejection and other related complications. Surprisingly, her daughter's human leucocyte antigen (HLA) was found to be identical to her own, and therefore Faith might be an excellent donor. In addition to stem cells taken from Faith's cord blood, the transplant team wanted to harvest her bone marrow to have an adequate volume of the cells that would be needed for Natalie. Natalie agreed to allow her three-year-old daughter to donate bone marrow for her own transplant.

It is at this point that the hematology staff contacted the institutional clinical ethics consult service so the ethical issues surrounding the use of a child-to-parent BMT, as a means to cure the parent's SCD, could be explored. Children have been used as bone marrow donors in siblings for many years, and BMT in children with SCD has been done for the past 20 years. In this case, however, the child would not be a donor for a sibling, but for a parent, which the team had done only one other time.

This article will explore several of the ethical issues raised by the clinical ethics consult service, medical and legal staff, and the patient and her family including the following: Should a mother be allowed to consent for her young daughter's participation in a procedure that is solely for the mother's own physical benefit, which includes a risk of harm to the small child? Whose best interest is being served by going through with this procedure? Is there a conflict of interest involved, and, if so, should it impede the BMT process? What obligations exist on the part of the transplant team to Natalie and her daughter in preparation for this procedure?

We will also explore some of the less obvious ethical concerns related to the emotional and social transition that Natalie encountered as a result of her experience before and after her BMT.

INTRODUCTION

BRIEF OVERVIEW OF SCD

SCD is a fairly common genetic disorder, affecting 50,000 Americans, and seen most often in the United States within the African-American population. This disease affects the synthesis of hemoglobin, causing various symptoms throughout the body, including "hemolytic anemia, splenic dysfunction, pain crises and bacterial infections."[1] SCD continues to run a progressive course of organ destruction in those afflicted, for which there is currently no conclusive cure.

Although screening for the early detection of persons with SCD is routinely done, treatments often do not successfully manage symptoms or halt progression of the disease. It is estimated that the average lifespan for a person with SCD is between 42 and 46 years of age.[2] Throughout the course of this disease, the person suffers much physiological and psychological stress. Pain and symptom management regimes often cause reliance and dependence on healthcare systems. Infection, which tends to "occur in previously damaged areas such as the lungs, kidneys, and bones,"[3] threatens people with SCD throughout their lifetime. The frequency of pain crises peaks in young adults with SCD, and is accompanied by musculoskeletal strain and painful joint swelling.[4] Traditionally, standard therapy focused on preventative action and symptom-based treatment in the acute phase. Symptoms of SCD may vary from mild to severe in individuals;[5] in this case, Natalie suffered from very severe clinical symptoms. Only recently has BMT been offered to adult patients as a treatment for SCD, and it is reported that BMT may offer the only curative therapy.[6]

DISCUSSION

BMT FOR SCD

BMT for SCD in children has been performed since the mid-1980s. Studies report a cure rate among children who have had BMT to be greater than 80 percent, with rates of transplant-related morbidity (such as graft-versus-host disease, infection, adverse drug affects from the medications associated with the transplant itself) and mortality at about 10 percent. This research reports that children in the early stages of SCD have better outcomes from BMT than those in more advanced stages.[7] The donor pool is often restricted, because bone marrow from a related HLA-matched donor is therapeutically preferable to bone marrow from a nonrelated donor. A familial match is optimal, but is only rarely available. Future research on unrelated

HLA-matched donation from adult donors or from newborn stem cells contained in umbilical cords may improve the chances of successful BMT for those in need.[8] In a recent review of 127 pediatric patients who received HLA-identical sibling donor BMT, 77 percent (98 patients) were free of SCD at the three-year mark.[9] Hoppe and Walters note, "since the first allogeneic transplant for SCD in 1984, approximately 175 children with SCD have received matched sibling-donor HCT [hematopoietic cell transplantation] . . . with overall 82 percent survival free from sickle cell anemia."[10] Davies and Roberts report an overall graft rejection rate of around 10 to 15 percent.[11]

Given all of the morbidity and early mortality otherwise associated with SCD, it would appear that BMT/HCT can significantly alter the course of this disease. The evidence appears favorable for children, but what about adults with SCD — can BMT/HCT help adults suffering from SCD? Unfortunately, adult patients with SCD have not usually been considered appropriate candidates for the therapy. This may be because, by the time a person with SCD reaches adulthood, significant end-organ damage may have occurred, which would prohibit the toxic conditioning regimes required for HCT.[12] However, should the SCD be cured in adult patients, they may be able to continue a life free of the debilitating symptoms of this disease. In fact, van Besien and colleagues surveyed adult patients with SCD, and found that many patients would be interested in HCT as a curative measure and would be willing to accept considerable risk to undergo it.[13]

Given that BMT/HCT for SCD has been performed for over 20 years in children, should it be considered experimental for adults in whom BMT has rarely been used for this purpose? Perhaps not, since BMTs/HCTs have been performed on hundreds of adults through the years for other diseases, for which the outcome data are widely available. Research is designed to systematically investigate a particular hypothesis, and is thus subject to various federal regulations designed to protect human subjects. BMT for SCD has been adequately researched in pediatric populations. As Kodish and colleagues noted in 1990, the use of BMT in this case would simply be for a new indication; therefore, it might be accepted as a nonexperimental therapy.[14] Although the new indication for an old therapy may not be considered experimental in nature, there would seem to be a strong obligation on the part of physicians and institutions that the proposed indication be well studied and reviewed by known experts in the field. And, since performing BMT/HCT in adults may not be considered an urgent procedure, perhaps review by an institutional review board would be helpful to clarify any patient-protection issues that may not have been initially obvious.

Should a mother be allowed to consent for her young daughter to participate in a procedure that is therapeutic for the mother that includes nontherapeutic risk for the child? This discussion must take into account that children have long participated in research and nontherapeutic interventions for which they receive little or no benefit. An example of a nontherapeutic intervention would include a minor sibling donating bone marrow to his or her sibling who has cancer. The ethical issues surrounding the participation of children in research has been debated for years. In reality, however, curative treatments for many childhood diseases would not have been possible but for the participation of children in research. Cancer therapy research trials, for example, are often offered for children who may not be of the age of consent or assent, as the case may be. As children reach teenage years, they are often asked to participate in the decision-making process and may be asked to give their assent for participation in research trials. Even in cases when assent from the child is sought, it is the parent or guardian who must consent for a minor child to participate, in hopes that the child will benefit from the therapy, or, at the very least, other children might benefit.

In Natalie's case, however, the therapy in question is not to treat her child's illness, but rather to treat her own illness. In this case, Faith is a three-year-old potential bone marrow donor who is not able to understand the personal health risks associated with this donation. Faith may understand that she will be experiencing the pain of the procedure to help her mother, but it is difficult to know how much of this she will truly understand. But, as with most healthcare decisions made for small children, her mother and the healthcare team will probably have her best interest in mind, as they proceed with the treatment plan. One could argue that it is in the toddler's best interest to have her mother healthy — to be free of SCD so that she may live longer and be able to give Faith the physical and emotional care that she needs without the interruptions that

SCD causes. One could also argue that it is in the toddler's best interest to know, down the road, that she was allowed to help her mother. If not given this opportunity by those who are in the position to do so, she may feel a great sense of sadness and anguish over not being given the chance to help her mother when she needed her. McCormick argues that parental consent in such cases would be morally valid "insofar as it is a reasonable presumption of the child's wishes." In addition, human beings — including children — are social in nature, and through our social interaction we wish to support our own values and the values of those around us.[15] It is reasonable, then, to presume that Faith's wishes would be to donate her own bone marrow to help her mother. Lantos discusses the concept of "involuntary altruism" as it relates to children as organ donors. He states, "in certain situations, parents may allow or encourage their children to act in ways that are detrimental to their interests in order to benefit another person. In other words, parents can choose, on behalf of their children, to have the children act altruistically."[16] Delany agrees that children should be allowed to exercise altruism and be given the right to be bone marrow donors through the consent of their parents.[17]

MORAL DECISION MAKING AND THE FAMILY

Ethical analysis involves looking at the moral decision-making process within the context of this family as well as the related ethical principles of respect for autonomy, beneficence, and nonmaleficence.[18] The burden of legal and moral consent for Natalie and Faith in this case is Natalie's. She must consent for herself and for her daughter so that these procedures can proceed. She is the autonomous agent for herself and for her young child. However, we suggest that the moral nature of this consent decision be taken within the context of the family, which may be defined as "a set of people who are indefinitely committed to care for each other and for those dependent on them."[19] The members of this immediate family include Natalie, Natalie's mother (with whom Natalie lives), and Faith. All three members are stakeholders in this decision and in its ultimate outcome. Family members have a crucial role in moral decision making for children.[20] This is consistent with a family-based model of moral reasoning. In this situation, the decision for both Natalie and Faith involves the context of illness and potential cure for Natalie as well as the interrelatedness of Natalie, Faith, and Natalie's mother, all within this same context. As such, then, the moral decision to allow Faith to be a donor for Natalie is consistent with respect for a family decision-making model. In Natalie's case, her three-year-old daughter is the only one who can provide her with the treatment that can enhance her life, which in turn enhances her own life, and the life of Natalie's mother.

CONFLICT OF INTEREST

A common complaint when a proxy decision has been made that directly benefits the proxy is that a conflict of interest is present. When a conflict of interest is present, red flags often go up regarding a hidden motive that may lurk behind the otherwise accepted proxy decision. In Natalie's case, we suggest that a bilateral/collateral conflict of interest is present: that is, Natalie's decision to allow Faith to be a BMT donor directly benefits both. Therefore the principle of beneficence is clear, although on the surface one might argue that the principle of nonmaleficence may be violated, as Faith will sustain some physical harm during the procedure. The role of mother and the role of the child are complimentary here, because they have a joint interest unique to their family. It would be impossible to separate the interest of the mother from the interest of the daughter. Further, it may be argued that Faith has a moral obligation to be a donor to her mother, based "on their degree of emotional relatedness."[21] This obligation is directly related to the risks of BMT.

Nonetheless, the autonomy of Natalie to make decisions for her daughter and to act as her agent must be viewed within the familial context. Ross discusses the rights and duties of parents to children, within the context of the family unit, which would allow a parent to make a decision for a child to serve the interests of the family as a unit: "Parents must have the freedom to consider their own needs and interests provided that they have ensured for the provision of their child's basic needs."[22] For Natalie, her mother, and her daughter, a viable family goal is for Natalie to be free of debilitating SCD, which would allow her to better meet the needs of her daughter and to be less of a burden on her mother. In such a familial context it is impossible to separate individual interests from familial interests. However, it would not be acceptable for Natalie to

consent for Faith to undergo a procedure for which the potential harm to Faith was so great, or greater than the potential benefits to Natalie, unless a proportionate familial goal or interest would then be attained.

What are the potential harms of this procedure for Faith? The harvesting of bone marrow from a donor has been described as simple and generally safe — with pain as the most common complication.[23] In addition, there are risks associated with general anesthesia. However, given that the overall risk of bone marrow donation from a three-year-old child is relatively low, Faith's interest in helping her mother, based on her emotional relatedness and notwithstanding her status as a child, should be taken into account.

To better quantify this conflict of interest, the known risks to Natalie's daughter should be weighed against the known benefits to herself. The risk to the child should be justified by the expected benefits to Natalie. As previously discussed, both Natalie and her daughter have a substantial interest in Natalie's good health: Natalie would be free from the progressively debilitating disease that has caused her pain and loss of mobility, and Faith would have her mother around to raise her and to be her mommy.

Others may be interested in seeing this procedure take place. For example, the physicians may wish to do this procedure because it not only helps Natalie and subsequently her daughter, but it might also promote their reputation, their program, and ultimately, their institution. None of the interests described would be wrong in and of themselves; however, the interests of the physicians and their institution should weigh less than the interests of Natalie and her daughter.

What obligations exist on the part of the transplant team to Natalie and Faith in preparation for the procedure? The obligations on the part of the transplant team appear to be several. First, the team should be honest and open with Natalie about the treatment options available to her, BMT being one. She should be given information on this procedure as it relates to children, and be informed that it has only been performed on a very small number of adults for the treatment of SCD. Natalie's physicians felt that her disease would progress rapidly without BMT, so the option to wait until Faith was old enough to fully participate in the consent process was not thought to be clinically appropriate. Without the transplant, Natalie's other clinical options would be to treat her symptoms and complications as they arose, knowing that her condition would be progressive and debilitating, and ultimately lethal.

The team should provide Natalie with anticipatory counseling about this procedure related to (1) the risks to her daughter, (2) the expected benefits to herself, and (3) the postoperative phase of BMT, including medication regime and their side-effects.

She should meet with a social worker and be encouraged to provide an advance directive to guide clinicians, should she lack decisional capacity after the procedure. She might also need to explore childcare options for her daughter, in case she has serious complications, and perhaps have a legal guardian, such as Natalie's mother, named in advance, as the child's father is not involved. Perhaps a child advocate should be appointed to assist when a parent must consent for the use of her child as a bone marrow donor. This would allow for a somewhat objective review of the situation and may help to insure adequately informed and voluntary consent.[24]

ETHICS CONSULT FOR A FAMILY/TEAM MEETING

Natalie's medical team requested that the clinical ethics consult team meet with the team, family, and institutional legal representative to discuss the ethical issues prior to the proposed BMT. All of the issues previously described were discussed in detail, and all of the known risks and benefits to donor and recipient were reviewed. The authors, the clinical ethics consultants, further explored the need for Natalie to fill out some form of advance medical directive and for Natalie and her mother to look into guardianship for Faith, should Natalie die during the treatment. Natalie and her mother followed-up with the institutional legal affairs office to complete the appropriate legal paperwork that made Natalie's mother Faith's legal guardian, if needed.

At the conclusion of the meeting, all present believed it was appropriate for Natalie to consent for her daughter. All believed that appropriate information had been presented to allow Natalie to make an informed

decision. The ethics consultants made themselves available to the team and to the family for follow-up.

Critical ethical analysis of this case is not simply an individual risk/benefit evaluation, but a more intimate analysis of the individuals in the context of the family unit. Within a family-based model of moral decision making, respect for the interests of each member within the family is taken into account. The principles of beneficence, nonmaleficence, and respect for autonomy are also evaluated within the familial context. Concurrently, we believe that there is a stronger obligation on the part of Faith to assume the risk of this procedure on behalf of her mother, even though it is her mother who ultimately allows Faith to fulfill this obligation.

Based upon post-procedural interactions with Natalie and her medical team, we realize that we should have suggested in advance that Natalie be assisted by a counselor who has experience in chronic illness and in the issues that may come up should Natalie be sickle-cell free after the BMT.[25] For instance, would Natalie be able to function in her new context? Would she have psychological addictions related to her role as a SCD "patient"? Did she have an addiction to pain medication, and, if she did, how would she deal with addiction when she no longer needed SCD-related medication? What should Natalie expect after the procedure? Would she be seen in the clinic often? Would she still need pain medicine?

TRANSPLANT OUTCOME AND FOLLOW-UP

At two-year follow-up, Natalie felt "like a new person," and five-year-old Faith had adjusted well, and was a typical kindergarten student. However, the two years after transplant required a series of adjustments for Natalie and her family. Natalie recalls that her childhood was not easy because of her SCD. She missed too many days of school to track, missed field trips with her school friends, and could not participate in most sports for fear she would have a crisis. She missed teenage dances and other social events and was hospitalized frequently for long periods, even spending several holidays in the hospital. Her life and the life of her mother revolved around her illness. Her mother was dedicated to her, not experiencing the independence that her friends had. She often missed work to care for Natalie and sacrificed to make sure that Natalie received the healthcare she required. The first year of Faith's life, Natalie was in the hospital 36 weeks out of the year.

After she made the decision that she would have the BMT, Natalie began to daydream about what it would be like to be "normal": she wondered what it would be like not to go to the hospital every month or not experience the frequent pain that was so much a part of her life; she dreamed of running outside and playing in the snow without the fear of triggering a crisis. Natalie was very optimistic and was confident in her physicians. She had read all she could find on the topic, and when the time came for her transplant, she and her family were ready.

When the transplant was over, she was told that it was a success and neither she nor her daughter experienced any complications from their procedures. She was cured of SCD. She was normal. She was discharged and expected to do very well.

Although her physicians believed her to be medically cured of her SCD, her transition from years of SCD to being physically cured of the disease was not easy. After several visits to her doctors still complaining of intense pain, her doctors became frustrated that she continued to ask for prescription pain medication, and even suggested that she had addiction issues for which she was referred to a therapist and addiction specialists. She began to feel abandoned by her physicians, who had always been so attentive prior to the BMT, but now appeared frustrated that she continued to behave as though she still had SCD. Her first year post-transplant was emotionally difficult and filled with frustration. She had not been prepared for the intense emotional transition that was taking place. She dreamed about being cured, but was not prepared to leave the only world she had known — the world which evolved around pain, doctor visits, hospitals, and medication. We explored elsewhere the difficult transition from chronic illness to cure that Natalie experienced.[26]

At two and one-half years post-transplant, Natalie and her family were finally able to adjust emotionally to her new physical health. She came to realize that she had not been prepared for the major life changes that occurred after BMT. Her healthcare team did not anticipate the psychosocial adjustments that might have

prompted pretransplant therapy, as BMT in adults for SCD had rarely been done.

Natalie is forever grateful for the success of her treatment and is letting her guard down a bit and moving on with her life, enjoying her new life with her daughter and mother.

CONCLUSION

In specific circumstances when an adult BMT/HCT match cannot be found, we believe that it is acceptable for a child to serve as bone marrow donor to his or her parent. It is always preferable to use matched related donors when possible, rather than a nonrelated donor via a bone marrow registry. BMT/HCT has been shown to be successful in curing children of SCD, enhancing quality and length of life, while the risk of treatment-related mortality appears reasonable. It has not, however, been used for treatment of SCD in many adults.

No long-term data exist on whether the risk to a child donor is justified by the potential benefits to a parental recipient. Preliminary data suggest that this procedure may be helpful to adult patients, but is less helpful than this procedure has been in their pediatric cohort.

There is room for future research related to the use of children as living organ/tissue donors to their parents, or even to other adult family members. Should there be an age limit on when a child can be involved as a living organ donor, specifically BMT or HCT donation? Should the institutional ethics committee be systematically involved when a child is sought as a living organ donor for a minor sibling or an adult family member? How involved should the child be in the decision to become a living donor? Clearly, the older the child is, the better understanding he or she might have regarding the procedure. Should a child advocate be assigned to each child who is being considered for bone marrow donation, and, if so, what are the parameters of the role as advocate?

In addition, close psychosocial follow-up should be provided to these patients to better address their specific post-transplant needs.

Finally, new models of ethical decision making on behalf of vulnerable populations, as with minor children, may need further exploration.

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NOTES

1. CDC Morbidity and Mortality Weekly Report, "Update: Newborn Screening for Sickle Cell Disease — California, Illinois, and New York, 1998," *Journal of the American Medical Association* 284, no. 11 (2000): 1373-4.

2. V. Thomas and N. Westerdale, "Sickle Cell Disease," *Nursing Standard* 11, no. 25 (1997): 40-7.

3. See note 1 above.

4. Ibid.

5. J. Bowman and R. Murray, *Genetic Variation and Disorders in Peoples of African Origin* (Baltimore, Md.: Johns Hopkins University Press, 1990).

6. See note 2 above; E. Kodish et al., "Bone Marrow Transplantation for Sickle Cell Disease: A Study of Parents' Decisions," *New England Journal of Medicine* 325, no. 19 (1991): 1349-53; F. Johnson et al., "Bone-Marrow Transplantation in a Patient With Sickle-Cell Anemia," *New England Journal of Medicine* 311 (1984): 780-3; F. Johnson, "Bone Marrow Transplantation in the Treatment of Sickle Cell Anemia," *Journal of Pediatric Hematology/Oncology* 7 (1985): 254-7; A. Woolfrey et al., "Successful Bone Marrow Transplant for Sickle Cell

Disease after Non-Myeloablative Preparation," *Journal of Pediatric Hematology/Oncology* 22, no. 4 (2000): 38; K. van Besien et al., "Allogeneic Stem Cell Transplantation for Sickle Cell Disease: A Study of Patients' Decisions," *Bone Marrow Transplantation* 28 (2001): 545-9.

7. Ibid.

8. M. Walters, "Bone Marrow Transplantation for Sickle Cell Disease: Where do We Go from Here?" *Journal of Pediatric Hematology/Oncology* 21, no. 6 (1999): 467-74.

9. Ibid.

10. C. Hoppe and M. Walters, "Bone Marrow Transplantation in Sickle Cell Anemia," *Current Opinion in Oncology* 13, no. 2 (2001): 85-90.

11. S. Davies and I. Roberts, "Bone Marrow Transplant for Sickle Cell Disease — An Update," *Archives of Disease in Childhood* 75, no. 1 (1996): 3-6.

12. K. van Besien et al., "Fludarabine-Based Conditioning for Allogeneic Transplantation in Adults with Sickle Cell Disease," *Bone Marrow Transplantation* 26 (2000): 445-9.

13. Ibid.

14. E. Kodish et al., "Bone Marrow Transplantation in Sickle Cell Disease: The Trade-off Between Early Mortality and Quality of Life," *Clinical Research* 38, no. 4 (1990): 694-700.

15. R.A. McCormick, "Proxy Consent in the Experimentation Situation," *Perspectives in Biology and Medicine* 18 (1974): 11-3.

16. J. Lantos, "Children as Organ Donors: An Argument for Involuntary Altruism," in *Primum Non Nocere Today,* 2nd ed., ed. G. Burgio and J. Lantos (Amsterdam, the Netherlands Elsevier Science B.V., 1998), 75-84.

17. L. Delany, "Altruism by Proxy: Volunteering Children for Bone Marrow Donation — Protecting Children from Forced Altruism: the Legal Approach," *British Medical Journal* 312, no. 7025 (1996): 240-3.

18. T. Beauchamp and J. Childress, *Principles of Biomedical Ethics,* 5th ed. (New York: Oxford University Press, 2001).

19. M. Mahowald, *Women and Children in Health Care: An Unequal Majority* (New York: Oxford University Press, 1993), 240.

20. Ibid., 249-52.

21. L. Ross et al., "Should All Living Donors be Treated Equally?" *Transplantation* 74, no. 3 (2002): 418-21.

22. L. Ross, *Children, Families, and Health Care Decision-Making* (New York: Oxford University Press, 1998), 20-30.

23. P. Browett and S. Palmer, "Altruism by Proxy: Volunteering Children for Bone Marrow Donation: Legal Barriers Might Have Catastrophic Effects," *British Medical Journal* 312, no. 7025 (1996): 242-3; K. Chan et al., "Use of Minors as Bone Marrow Donors: Current Attitude and Management: A Survey of 56 Pediatric Transplantation Centers," *Journal of Pediatrics* 128, no. 5 (1996): 644-8.

24. F. Serota et al., "Role of Child Advocate in the Selection of Donors for Pediatric Bone Marrow Transplantation," *Journal of Pediatrics* 98, no. 5 (1981): 847-50.

25. K. Orfali and L. Anderson-Shaw, "When Medical Cure is not an Unmitigated Good," *Perspectives in Biology and Medicine* 48, no. 2 (Spring 2005): 282-92.

26. Ibid.