

# Rethinking the Paradigm: The Evolving Care of Children with Trisomy 13 and 18

Kimberly L Spence<sup>1</sup>, Erica K Salter<sup>2</sup>

## ABSTRACT

A chromosomal evaluation should be used to provide better care for a child and their family, not limit it. However, in many pediatric institutions, the diagnosis of a chromosomal abnormality automatically circumscribes the medical and surgical options made available to the family. For example, alongside many other comorbidities (including severe cognitive impairment), infants diagnosed with trisomy 13 or 18 (T13/18) often have cognitive heart defects (e.g., atrial or ventricular septal defects, patent ductus arteriosus, atrioventricular septal defects) that can be successfully repaired or palliated in the general population. However, because T13/18 have historically been considered “lethal” diagnoses or “incompatible with life”, surgical correction of these defects is not frequently offered, and instead infants with these diagnoses are managed with a noninterventionist, “comfort care” approach in which the infant is simply allowed to expire after birth. In recent years, however, more data have emerged from centers that regularly pursue medical and surgical interventions in this population, demonstrating improved outcomes in both quality and quantity of life. Simultaneously, the pediatric ethics literature has argued that treatment decisions for infants with T13/18 are frequently informed by unfounded biases concerning disability and quality of life. Now that neonatology is equipped with improved medical and ethical evidence, the practice of categorically excluding infants with a T13/18 diagnosis from life-saving interventions should be challenged, and instead, parents of these infants should be offered targeted interventions, including corrective and palliative procedures, and included in the process of shared decision-making about which interventions best meet the family’s goals of care.

**Keywords:** Ethics, Trisomy 13, Trisomy 18.

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## INTRODUCTION

A chromosomal evaluation should be used to provide better care for a child and their family, not limit it. However, in many pediatric institutions, the diagnosis of a chromosomal abnormality automatically circumscribes the medical and surgical options made available to the family. For example, alongside many other comorbidities (including severe cognitive impairment), infants diagnosed with trisomy 13 or 18 (T13/18) often have cognitive heart defects (e.g., atrial or ventricular septal defects, patent ductus arteriosus, atrioventricular septal defects) that can be successfully repaired or palliated in the general population. However, because T13/18 have historically been considered “lethal” diagnoses or “incompatible with life”,<sup>1</sup> surgical correction of these defects is not frequently offered, instead infants with these diagnoses are managed with a noninterventionist, “comfort care” approach in which the infant is simply allowed to expire after birth. In recent years, however, more data have emerged from centers that regularly pursue medical and surgical interventions in this population, demonstrating improved outcomes in both quality and quantity of life.<sup>2-4</sup> Simultaneously, the pediatric ethics literature has argued that treatment decisions for infants with T13/18 are frequently informed by unfounded biases concerning disability and quality of life. Now that neonatology is equipped with improved medical and ethical evidence, the practice of categorically excluding infants with a T13/18 diagnosis from life-saving interventions should be challenged, and instead, parents of these infants should be offered targeted interventions, including corrective and palliative procedures, and included in the process of shared decision-making about which interventions best meet the family’s goals of care.

<sup>1</sup>Department of Pediatrics, Saint Louis University School of Medicine, Saint Louis, Missouri, United States of America

<sup>2</sup>Center for Health Care Ethics, Saint Louis University, Saint Louis, Missouri, United States of America

**Corresponding Author:** Kimberly L Spence, Department of Pediatrics, Saint Louis University School of Medicine, Saint Louis, Missouri, United States of America, Phone: + 314-577-5642, e-mail: Kimberly.spence@health.slu.edu

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## PRECEDENT FOR CULTURAL SHIFT

Even relatively recent events demonstrate the ways in which the medical ethos around individuals with disabilities can shift dramatically. For example, consider the Baby Doe Regulations of 1984, catalyzed in part by the widely publicized case of Baby Doe, in which life-saving treatment options were withheld from an infant with Trisomy 21 (T21), primarily because of judgments about his quality of life. These federal regulations prohibit medical providers from withholding medically indicated treatment from disabled infants with life-threatening conditions when that treatment would likely be effective at correcting or ameliorating all such conditions.<sup>5</sup> The regulations included four situations in which treatment would not be required: (1) to the chronically or irreversibly comatose, (2) if futile, (3) if inhumane, or (4) would merely prolong dying.<sup>5</sup> The

legacy of Baby Doe has been improved survival rates and quality of life for more patients with T21 and their families.<sup>6</sup> Alongside a significantly improved life-expectancy (from 25 years in 1983 to 49 years in 1997), care providers were newly able to study the long-term effects of T21 and the unique physiology of infants with T21, providing optimized and individualized care.<sup>6,7</sup> For example, the increased recognition of pulmonary hypertension as a complicating factor of congenital heart disease led to more nuanced care for these children with altered timelines of repair of cardiac defects as well as increased surveillance for certain complications.<sup>8</sup> This improved understanding of the unique physiology translated to increased rates of survival and improved outcomes for children with T21. These significant medical developments only occurred because the Baby Doe ruling required health care institutions to offer otherwise medically indicated treatment to a population that had been regularly excluded from intervention.

## IMPROVING OUTCOMES

The original survival data published reported survival rates of approximately 10% at one year of age for infants with T13/18.<sup>9</sup> This led physicians to consider these chromosomal defects “lethal” and to recommend comfort measures for these families. In fact, most textbooks of pediatrics and neonatology report that most babies with T13 and T18 die in the first year of life and that, for the rare survivor, quality of life is unacceptably poor.<sup>10</sup> As a result, many medical textbooks explicitly recommend against life-saving interventions in this population. However, time has revealed this prognosis to be a self-fulfilling prophecy. If babies are expected to die with or without treatment, they will not be treated. And if not treated, they will certainly die, thus fulfilling the prophecy of lethality. While there remain some cases in which certain life-saving interventions for T13/18 infants would be futile toward relevant family goals (e.g., continued survival, living at home with family, better quality of life), this is no longer the case for all T13/18 patients, as targeted interventions are frequently able to meet these goals. An unbalanced or apparently hopeless clinical presentation will cause many parents to find alternative sources of information, including social media groups dedicated to parent support. These groups typically offer parents a more positive outlook, including first-hand accounts of parents of children with T13/18 with very good outcomes, causing some to worry these groups cause unrealistically positive expectations.<sup>10,11</sup> It should not surprise us, however, that parents will seek out more balanced information and the possibility of hope when it is not presented by their clinical team.

As occurred with infants with T21, interventional studies largely from the United States and Japan have demonstrated improved survival in children offered medical and surgical interventions.<sup>3,12–14</sup> Congenital heart disease is very common in infants with T13/18 and one of the primary sources of mortality.<sup>15</sup> Given the shortened lifespan, comorbidities as well as cognitive impairments, the surgical treatment of congenital heart disease has become very controversial. However, recent data concerning cardiac surgical outcomes in infants with T13 and T18 are promising. For example, in Japan about 94% of infants with T13/18 had congenital heart disease; patients who underwent operative repair survived longer than those who did not have surgery.<sup>14</sup> Furthermore, recent studies have demonstrated improved outcomes (longer lengths of survival and higher rates of survival to discharge) for patients who underwent complete repair versus a palliative procedure.<sup>3</sup>

Expectant management of congenital heart disease led to death prior to discharge about 50% of the time.<sup>15</sup> Though some infants might not benefit from cardiac interventions, many will and a categorical exclusion of T13/T18 infants from surgical intervention only perpetuates injustice against disabled populations.

Other surgical interventions have shown similar successes. Nishi et al. reported on 24 patients with T18 who underwent tracheoesophageal fistula repair, a potentially fatal complication that usually requires surgery shortly after birth (r17). Of these patients, 17 went on to tolerate enteral feeds, none suffered intraoperative deaths or anesthetic complications.<sup>16</sup> Of note, the 1 year survival rate was 17% for those infants managed with palliative procedures and 27% of those who underwent complete repair, emphasizing the benefits of complete repair over palliative options in some cases.<sup>16</sup> The steepest part of the survival curve for these patients occurs in the first few months with approximately 40% of T13 and about 35% of T18 alive at 30 days.<sup>2</sup> However, those who make it to a month of life then have a 60% (T13) and 71% (T18) probability of survival to one year.<sup>17,18</sup> Among the most common situations motivating an institutional transfer are infants who survived the first few months of life, and now have conditions that would benefit from surgical intervention, but are being treated at an institution that has a philosophy of care that excludes T13/18 infants from aggressive intervention. These patients with T13/18 represent a subgroup most likely to benefit from more aggressive interventions, having “beaten the odds” of an early death from apnea. More facilities should consider reevaluating institutional practices around T13/18 interventions in general, but especially this sub-group, for whom the benefits are even more likely to exceed the risks.

It is critical to do more research and identify factors influencing outcomes in infants with T13/18 to best serve this population. A common goal of many families is to simply take their child home. It would seem from this preliminary data that many fairly routine medical and surgical interventions such as fetal monitoring, cesarean sections for fetal distress, resuscitation, gastrostomy tubes, and ventricular septal defects (VSD) repairs achieve this goal better than the traditional non-interventionist philosophy of care. And most importantly, these decisions should be made with, not simply for, the parents of these infants.

## ETHICAL CONSIDERATIONS: QUALITY OF LIFE, DISABILITY, AND SHARED DECISION-MAKING

As presented above, medical training (via analysis of medical textbooks) almost uniformly presents T13/18 as a lethal diagnosis resulting in a very short lifespan characterized by poor quality of life. Judgments about the quality of a T13/18 infant’s life is likely informed by evidence that these diagnoses are usually accompanied by comorbidities of physical (e.g., limb malformations, growth restriction, rocker bottom feet, and myelomeningocele) and developmental disabilities (e.g., hearing and vision deficiencies, communication difficulties, and low IQ). Judgments or assumption about what life with these disabilities might be like can result in a significant bias against offering medical or surgical interventions. However, as has been well documented, children and adults with disabilities experience a much higher quality of life than others assume for them. This phenomenon of under-estimation of quality of life by outside observers—known as the “disability paradox”—is exhibited by not only strangers, but by clinicians, caregivers, and even parents of the disabled individual.<sup>19–21</sup> Simply put, assumptions

T13/T18 babies experience a uniformly low quality of life are likely wrong. In fact, despite significant delays, children who survive past 1 year of age show continued achievement of developmental milestones across their lifespan, and there are some older children who even grow to exceed the average developmental quotient.<sup>11,22</sup>

Further, even severe developmental disabilities do not eliminate an individual's ability to give or receive love, nor do they impair a child's ability to relate to their parents, siblings, or loved ones. Studies show that children with T13/18 can communicate in a variety of ways including smiling, laughing, reaching, and vocalizing, and the majority (66%) of parents of children with T13/18 reported their child produced at least one word, gesture, or augmentative and alternative communication form.<sup>23-25</sup> Further, families describe their child's life as "significant," "valuable," and "transformative to the lives of those around them," no matter how short or how disabled.<sup>26,27</sup>

Although the data suggest that (contrary to the conventional presumption of medicine) many children with T13/18 will experience improved outcomes in the quality (and quantity) of their life with the provision of targeted medical and surgical interventions, this should not lead us to presume that all parents would, or should, choose aggressive interventions for their child. Instead, shared decision-making should remain the model for care for these patients. Shared decision-making requires the presentation of accurate, balanced, and up-to-date information about the possible implications of a T13/18 diagnosis, including both the possible negative consequences (which have been traditionally over-emphasized) and the possible positive consequences (traditionally under-emphasized, or absent altogether). Families that are told by medical providers that their child's life lacks value or will only be characterized by suffering and burden may cause parents to "fight back," and escalate care, even in situations where it does not serve the child's well-being. Thus, medical providers should acknowledge the impact of their own biases and value judgments on parental decision-making and seek to create a therapeutic alliance that is marked by honesty, transparency, and empathy.

The medical team then should explore each family's unique preferences, values, hopes, and fears, including any relevant emotional, financial, relational, and practical aspects of the diagnosis.<sup>28</sup> In addition, the family should be encouraged to explore, and in some cases challenge (when affected disproportionately by the disability paradox) their own notions of quality of life. Further, medical decision-making about a complex diagnosis like T13/T18 is never a single, one-size-fits-all encounter; providers should anticipate many ongoing conversations and, as circumstances change, revisit the family's goals and the interventions best suited to meet those goals. Only when informed by a specific family's experiences, challenges, and goals of care can clinicians cultivate a trusting, therapeutic relationship with families and recommend interventions that are truly family centered.

## CONCLUSION

The legacy of Baby Doe provides historical precedent for a shift in the paradigm of care for all infants with a chromosomal abnormality, but specifically those with T13/18. Indeed, T13/18 have been called the "next Baby Doe."<sup>29</sup> Baby Doe demonstrates that medical knowledge and the resulting decision-making structures evolve over time with the emergence of new data, new evidence about quality of life based on those data, and thus, new ethical principles undergirding decision-making. Therefore, rather than categorically

limit care, genetic diagnosis of T13 or T18 should provide clinical insight and help inform therapeutic interventions the same way a diagnosis of T21 is able to guide targeted and compassionate care today. With the parent's unique goals of care in mind, the individual patient's distinct pathophysiology should guide management, not the medical care team's judgment about the child's future cognitive abilities. Management should be targeted to a family's specific goals of care, pragmatic and guided by the same ethical principles by which other children with the same underlying conditions are managed. Certainly, there will be babies who die shortly after birth, but there is a significant number who survive and should be given the same opportunities for care, treatment, and dignity as other children.

## REFERENCES

1. Wilkinson D, deCrespigny L, Xafis V. Ethical Language and Decision-making for Prenatally Diagnosed Lethal Malformation. *Semin Fetal Neonatal Med* 2014;19(5):306–311. DOI: 10.1016/j.siny.2014.08.007.
2. Nelson KE, Rosella LC, Mahant S, et al. Survival and Surgical Interventions for Children with Trisomy 13 and 18. *Journal of the American Medical Association* 2016;316(4):420–428. DOI: 10.1001/jama.2016.9819.
3. Peterson R, Calamur N, Fiore A, et al. Factors Influencing Outcomes After Cardiac Intervention in Infants with Trisomy 13 and 18. *Pediatr Cardiol* 2018; 39(1):140–147. DOI: 10.1007/s00246-017-1738-y.
4. Weaver M, Anderson V, Beck J, et al. Interdisciplinary Care of Children with Trisomy 13 and 18. *Am J Med Genet* 2021;185A: 966–977. DOI: 10.1002/ajmg.a.62051.
5. US Congress Public Law 98-457, "Child Abuse Amendments of 1984".
6. Yang Q, Rasmussen SA, Friedman JM. Mortality associated with Down's syndrome in the USA from 1983 to 1997: A Population-based Study. *Lancet* 2002;23;359(9311):1019–1025. DOI: 10.1016/s0140-6736(02)08092-3.
7. Leonard S, Bower C, Petterson B, et al. Survival of Infants Born with Down's Syndrome: 1980–96. *Paediatr Perinat Epidemiol* 2000;14(2):163–167. DOI: 10.1046/j.1365-3016.2000.00252.x.
8. Bull C, Rigby ML, Shinebourne EA. Should Management of Complete Atrioventricular Canal Defect be Influenced by Coexistent Down Syndrome? *Lancet* 1985;18;1(8438):1147–1149. DOI: 10.1016/s0140-6736(85)92444-4.
9. Rasmussen SA, Wong LY, Yang Q, et al. Population-based Analyses of Mortality in Trisomy 13 and Trisomy 18. *Pediatrics* 2003; 111(4 Pt 1): 777–784. DOI: 10.1542/peds.111.4.777.
10. Pallotto I, Lantos J. Treatment Decisions for Babies with Trisomy 13 and 18. *HEC Forum* 2017;29(3):213–222. DOI:10.1007/s10730-017-9319-2.
11. Janvier A, Farlow B, Wilfond B. The Experience of Families with Children with Trisomy 13 and Trisomy 18 in Social Networks. *Pediatrics* 2012;130(2): 293–298. DOI: 10.1542/peds.2012-0151.
12. Graham EM, Bradley SM, Shiralil GS, et al. Pediatric Cardiac Care Consortium. Effectiveness of Cardiac Surgery in Trisomies 13 and 18 (from the Pediatric Cardiac Care Consortium). *Am J Cardiol* 2004;15;93(6):801–803. DOI: 10.1016/j.amjcard.2003.12.012.
13. Kaneko Y, Kobayashi J, Achiwa I, et al. Cardiac surgery in patients with trisomy 18. *Pediatr Cardiol* 2009;30(6):729–734. DOI: 10.1007/s00246-009-9427-0
14. Maeda J, Yamagishi H, Furutani Y, et al. The impact of cardiac surgery in patients with trisomy 18 and trisomy 13 in Japan. *Am J Med Genet Part A* 2011;155: 2641–2646. DOI: 10.1002/ajmg.a.34285.
15. Costello JP, Weiderhold A, Louis C, et al. A Contemporary, Single-Institutional Experience of Surgical Versus Expectant Management of Congenital Heart Disease in Trisomy 13 and 18 Patients. *Pediatr Cardiol* 2015;36:987–992. DOI: 10.1007/s00246-015-1109-5.

16. Nishi E, Takamizawa S, Iio K, Yamada Y, et al. Surgical intervention for esophageal atresia in patients with trisomy 18. *Am J Med Genet A* 2014;164A(2):324–330. DOI: 10.1002/ajmg.a.36294.
17. Carvajal HG, Callahan CP, Miller JR, et al. Cardiac Surgery in Trisomy 13 and 18: A Guide to Clinical Decision-Making. *Pediatr Cardiol* 2020; 41:1319–1333. DOI: 10.1007/s00246-020-02444-6.
18. Meyer RE, Liu G, Gilboa SM, et al. National Birth Defects Prevention Network. Survival of Children with Trisomy 13 and Trisomy 18: A Multi-state Population-based Study. *Am J Med Genet A* 2016;170A(4): 825–837. DOI: 10.1002/ajmg.a.37495.
19. Gary L Albrecht, Patrick J Devlieger. The Disability Paradox: High Quality of Life Against all Odds. *Soc Sci Med* 1999;48(8):977–988. DOI: 10.1016/S0277-9536(98)00411-0.
20. Ubel PA, Loewenstein G, Schwarz N, et al. Misimagining the Unimaginable: The Disability Paradox and Health Care Decision Making. *Health Psychol* 2005;24(Suppl 4):S57–S62. DOI: 10.1037/0278-6133.24.4.S57.
21. Shelly A, Davis E, Waters E, et al. The Relationship between Quality of Life and Functioning for Children with Cerebral Palsy. *Dev Med Child Neurol* 2008;50(3):199–203. DOI: 10.1111/j.1469-8749.2008.02031.x.
22. Carey JC. Perspectives on the Care and Management of Infants with Trisomy 18 and Trisomy 13: Striving for Balance. *Curr Opin Pediatr* 2012;24(6):672–678. DOI: 10.1097/MOP.0b013e3283595031.
23. Liang CA, Braddock BA, Heithaus JL, et al. Reported Communication Ability of Persons with Trisomy 18 and Trisomy 13. *Dev Neurorehabil* 2015;18(5):322–329. DOI: 10.3109/17518423.2013.847980.
24. Braddock B, McDaniel J, et al. Communication Ability in Persons with Trisomy 18 and Trisomy 13. *Augment Altern Commun* 2012;28(4): 266–277. DOI: 10.3109/07434618.2012.706637.
25. Bruns J. Erring on the Side of Life: Children with Rarer Trisomy Conditions, Medical Interventions and Quality of Life. *Genet Disor Genet Rep* 2013;2:1. DOI: 10.4172/2324-9331.1000103.
26. Arthur J, Gupta D. You Can Carry the Torch Now: A Qualitative Analysis of Parents' Experiences Caring for a Child with Trisomy 13 or 18. *HEC Forum* 2017;29(3):223–240. DOI: 10.1007/s10730-017-9324-5.
27. Janvier A, Watkins A. Medical Interventions for Children with Trisomy 13 and Trisomy 18: What is the Value of a Short Disabled Life? *Acta Paediatr* 2013;102(12):1112–1117. DOI: 10.1111/apa.12424.
28. Weaver M, Birge N, Hsu H, et al. Mixed Method Study of Quality of Life for Children with Trisomy 18 and 13 after Cardiac Surgery. *Cardiol Young* 2020;30(2):231–237. DOI: 10.1017/S1047951120000013.
29. Kett J. Who is the Next Baby Doe? From Trisomy 21 to Trisomy 13 and 18 and Beyond. *Pediatrics* 2020;146(Suppl 1):S9–S12. DOI: 10.1542/peds.2020-0818D.