HHS Public Access

Author manuscript

*Pediatrics*. Author manuscript; available in PMC 2016 July 11.

Published in final edited form as:

*Pediatrics*. 2016 January ; 137(Suppl 1): S8–15. doi:10.1542/peds.2015-3731D.

# Whole-Genome Screening of Newborns? The Constitutional Boundaries of State Newborn Screening Programs

**Jaime S. King, PhD, JD**[a,b] and **Monica E. Smith, JD**[b]

[a]Hastings College of the Law, University of California, San Francisco, California

[b]UCSF/UC Hastings Consortium for Law, Science and Health Policy, San Francisco, California

## Abstract

State newborn screening (NBS) programs routinely screen nearly all of the 4 million newborns in the United States each year for ~30 primary conditions and a number of secondary conditions. NBS could be on the cusp of an unprecedented expansion as a result of advances in whole-genome sequencing (WGS). As WGS becomes cheaper and easier and as our knowledge and understanding of human genetics expand, the question of whether WGS has a role to play in state NBS programs becomes increasingly relevant and complex. As geneticists and state public health officials begin to contemplate the technical and procedural details of whether WGS could benefit existing NBS programs, this is an opportune time to revisit the legal framework of state NBS programs. In this article, we examine the constitutional underpinnings of state-mandated NBS and explore the range of current state statutes and regulations that govern the programs. We consider the legal refinements that will be needed to keep state NBS programs within constitutional bounds, focusing on 2 areas of concern: consent procedures and the criteria used to select new conditions for NBS panels. We conclude by providing options for states to consider when contemplating the use of WGS for NBS.

Praised as one of the most successful public health efforts of the 21st century, state newborn screening (NBS) programs routinely screen nearly all of the 4 million newborns in the United States each year for hereditary and congenital diseases. Originally established in 1963 to screen for phenylketonuria (PKU), the programs have expanded their scope substantially over the last 50 years. State NBS programs now analyze newborns' blood for ~30 primary conditions and ≥25 secondary conditions detectable in the process of confirming primary conditions. Improvements in genetic testing technology and in our understanding of the etiology of heritable disorders have contributed significantly to this expansion.

Address correspondence to Jaime S. King, PhD, JD, UC Hastings College of the Law, 200 McAllister St, San Francisco, CA 94102. kingja@uchastings.edu.

Dr King conceptualized the constitutional study, drafted portions of the initial manuscript, and critically reviewed and revised the manuscript; Ms Smith collected and analyzed state law data, drafted portions of the initial manuscript, and reviewed the manuscript; and both authors approved the final manuscript as submitted.

**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**POTENTIAL CONFLICT OF INTEREST:** The authors have indicated they have no potential conflicts of interest to disclose.

NBS could be on the cusp of an unprecedented expansion as a result of advances in whole-genome sequencing (WGS). As WGS becomes cheaper and easier and as our knowledge and understanding of human genetics expands, the question of whether WGS has a role to play in state NBS programs becomes increasingly relevant and complex. To date, much of the discussion surrounding the use of WGS in NBS programs has focused on feasibility, cost, reporting requirements, and the appropriate role of WGS in screening protocols. Less attention has been paid to the legal framework that would allow state agencies to mandate testing for a broader range of conditions.[1–5]

As geneticists and state public health officials begin to contemplate the technical and procedural details of whether WGS could benefit existing NBS programs, this is an opportune time to revisit the legal framework of state NBS programs. This article examines their constitutional underpinnings, explores the range of current state statutes and regulations that govern the programs, and provides options for states to consider when contemplating the use of WGS for NBS.

## CONSTITUTIONAL FOUNDATIONS OF STATE NBS PROGRAMS

The state power to conduct public health programs, such as NBS, derives from 2 sources. First, under the Constitution, the Tenth Amendment reserves for the states the “police power.” This power allows states to implement programs to protect “the health, safety, morals and general welfare.”[6] Second, a longstanding common law doctrine called *parens patriae* permits states to make decisions for the health and well-being of citizens who cannot speak on their own behalf. This power is often used to protect children and the mentally incapacitated.[7] State-mandated NBS involves both health and children, so the police power and the *parens patriae* power work in combination to justify the state’s ability to require screening.[8]

These 2 powers are not absolute, however. Any attempt by the government to mandate a medical procedure must be weighed against the individual’s constitutionally protected interests in personal autonomy and bodily integrity. The Supreme Court has repeatedly acknowledged that the Fourteenth Amendment protects an adult individual’s right to refuse unwanted medical interventions. The government can infringe on this fundamental right only if it has a compelling interest.[9,10] Furthermore, the Fourteenth Amendment protects parents’ fundamental right to make decisions about their minor child’s welfare,[11–13] including consenting to their medical treatment.

If a parent objects to state-imposed NBS, both the parent and the state would have strong constitutionally protected interests to support their claim. In a conflict, a court would have to balance these opposing interests to decide whether the state can mandate screening over parents’ objections. The parents could argue that the Fourteenth Amendment protects their right to refuse NBS on behalf of their child, based on the child’s right to bodily integrity and their right to make decisions on behalf of their child. But, “parents’ decision making for children does not have the same constitutional authority and protection against state intervention as does a competent adult’s personal health care decision making.”[8] The Supreme Court has repeatedly held that the state authority to regulate children’s lives far

exceeds its authority to regulate the lives of adults. Furthermore, the state's police and *parens patriae* powers give the state substantial authority in matters relating to the health and well-being of children. Indeed, parental discretion is not unlimited, especially when it is used in ways that may endanger the child.[8,14] Typically, states have been granted the opportunity to intervene when the parents' decisions put the child at substantial risk of serious harm or illness.[15] As a result, states have the ability to mandate NBS over parent objection only in instances where the screening will protect the child from serious harm.[16–18]

Although the constitutional requirements to mandate screening have not shifted significantly since NBS programs began, the factors deemed relevant to screening and the entities assessing which conditions should be included in state NBS programs have evolved substantially. NBS programs initially targeted a small set of genetic and metabolic conditions for which failure to make a timely diagnosis was associated with a high probability of serious, preventable harm to the child. In such cases, the balance of state and individual interests weighed heavily in favor of permitting states to require screening for all newborns. Furthermore, treatment was available to cure or stop the progression of the disease for each of the initially selected severe childhood disorders. PKU is a classic example of a condition that justifies screening: It is not clinically detectable until it has caused irreversible harm, including severe mental retardation; treatment is simple (dietary management) and can prevent or mitigate symptoms; and the test is reliable, inexpensive, and minimally invasive and can be conducted early.[19,20] The conditions screened for in the early years of NBS all shared these characteristics.

In the last 50 years, state NBS programs have grown substantially, both in the number of conditions screened for and their characteristics. A variety of forces drove this expansion. First, the development of tandem mass spectrometry allowed laboratories to simultaneously target several conditions, affordably and efficiently, by using the same dried blood spot used to test for PKU. Second, organizations such as Easter Seals and disease-specific patient advocacy groups, such as Hunter's Hope Foundation, which advocated for Krabbe screening in New York, convinced state legislatures to mandate screening for specific conditions. Finally, the biggest single expansion in state screening panels came with the 2005 publication of a report by the American College of Medical Genetics and Genomics (ACMG) recommending a uniform screening panel.[21] Ultimately adopted by the secretary of health and human services as a national standard for state programs, the recommended uniform screening panel (RUSP) originally consisted of 29 primary targets and 25 secondary conditions likely to be discovered during diagnostic confirmation of core test results.

In selecting the primary targets, the ACMG committee evaluated each of 84 candidate disorders against criteria pertaining to characteristics of the condition, the screening test for the condition, and available treatments. The scoring system favored conditions that were not likely to be detected clinically, for which early intervention was necessary to avoid serious harm, and that were inexpensive and simple to screen for, among other criteria.[21] The scoring system worked to justify screening for each condition on the panel based on the potential benefit to a child who received a positive diagnosis. However, the committee also strongly weighted the ability to screen for a condition via multiplex technology (ie, tandem

mass spectrometry). The inclusion of multiplex capability in the initial selection criteria set an undesirable precedent for future evaluation because it is not related to the child's benefit or the state interests that support use of the police or *parens patriae* powers.[22] Technological feasibility and cost-effectiveness should be considered only after sufficient patient benefit has been established.

In 2008, the Newborn Screening Saves Lives Act transferred governance of the RUSP to the Advisory Committee on Heritable Diseases in Newborns and Children,[23] and since that time the committee has recommended inclusion of only 4 additional conditions.[24] The committee recently augmented its criteria to take account of states' readiness to implement new tests. Under the new criteria, the committee first weighs the net benefits of screening by analyzing the importance of the health outcomes to the population affected, the estimated health benefits that could result from testing, the possible harms associated with testing for the condition, and the efficacy and effectiveness of testing and follow-up as compared with usual clinical practice.[25] Only after the committee has determined that screening for a particular condition will provide high or moderate certainty of significant benefit for newborns will feasibility and state readiness factor into a decision to recommend a condition to the RUSP. As a result, the committee's new decision matrix appropriately addresses the constitutionally relevant factors before any consideration of implementation. Although the committee recommends conditions for inclusion in the RUSP from a national perspective, decisions about what conditions are screened for and NBS implementation occur entirely at the state level.

## STATE IMPLEMENTATION OF NBS PROGRAMS

Laws governing NBS vary widely from state to state in several areas that will prove important especially in the context of WGS. First, states differ significantly in terms of their requirements for informed consent, the opportunity for parents to decline screening, and available exemptions (Table 1). Although all states allow medical exceptions to screening, little consensus exists on other exemptions. In 3 states, screening is mandatory, and the law does not permit parents to opt out for personal or religious reasons. In 30 states, parents may opt out only on the basis of religion. Among states that permit only religious objections, the degree of proof parents must provide to validate their religious beliefs ranges from a sworn affidavit to a simple signature on a form. Some states require that parents be practicing members of an established church whose tenets forbid NBS. Fifteen states honor "personal" or philosophical objections in addition to religious objections. Several states, such as Arizona, California, and Delaware, make NBS an explicit exception to state laws generally requiring informed consent of patients or their parents for all medical procedures. Only 2 states, Maryland and Wyoming, expressly require the parents' informed consent to conduct screening. Overall, the state laws reflect a general consensus that the conditions tested for in the existing NBS programs do not require parental consent.

Furthermore, states do not require the public health agencies to provide parents with much information about NBS. Although most states have laws requiring NBS programs to provide some information to parents, few laws specify the information requirements in any depth. A handful of states require that parents receive information before the specimen is taken.

Among states that require information to be given beforehand, some also require programs to inform parents of their right to object, or at least give them a reasonable opportunity to object, whereas others have no such requirement.

Beyond informed consent, the criteria states use for adding new conditions and tests to screening programs are highly relevant to the potential integration of WGS into NBS. A random sample of 24 states reveals wide variation (Table 2). Some states provide no criteria at all in their laws and regulations. Among states that do, no one set of criteria appears repeatedly. State laws often require that new conditions be severe or serious and treatable. They sometimes require a cost–benefit analysis. A few states mandate conformance with a uniform panel such as the RUSP or another set of recommendations from a professional body.

As for the screening tests, states may require that proposed tests be reliable, accurate, efficient, or consistent with accepted medical practices. A few states require new tests to be pilot-tested or already implemented in another jurisdiction. However, several states have no criteria in law pertaining to new test technologies.

Also striking is the absence of certain criteria that are especially important in the arena of NBS, criteria that relate to the constitutional and ethical permissibility of screening newborns without consent. Rarely do state laws expressly require that a new condition be one that is not detectable in clinical practice, or that has an early onset, or that needs treatment during the asymptomatic or newborn phase. Instead, state legislatures often mandate a specific panel of conditions and delegate to a public agency the power to expand the panel, with little or no guidance as to disease characteristics.

A final area of concern is the absence of special criteria or reporting requirements for secondary findings. Of the states we sampled, only 1, Massachusetts, made a distinction in law between primary and secondary conditions. This distinction takes on special significance in the context of WGS. With current test methods, for the most part secondary conditions are true incidental findings; the state laboratory reports a result, such as an elevated level of a particular analyte, to the pediatrician of record, and a specialist then conducts confirmatory testing and diagnosis, which sometimes reveals a condition other than the primary target. These secondary conditions are medically actionable, and there is little question that families would want to know about them. However, WGS can produce far more potential incidental findings, requiring more discernment on the part of states as to what conditions should be targeted and reported.[1]

Current state laws perhaps provide adequate protections for the range of conditions and test methods used in NBS today. In the future, however, if WGS is implemented in NBS programs, states will need protocols for determining when parental consent is required and far more robust criteria for choosing appropriate screening targets from among the myriad conditions detectable by WGS.

## THE IMPLICATIONS OF WGS FOR NBS

Currently, WGS is significantly more expensive and time-consuming than present NBS methods. At some point in the future, as genetic testing becomes cheaper and faster, it may become more efficient and cost-effective than current methods. If that happens, WGS could be used to provide new parents with an expansive profile of their child's genetic characteristics and risks. State NBS programs considering adopting WGS must be cognizant of the constitutional boundaries of their authority to test newborns without parental consent.

With the promise of WGS comes an ever-growing tension between a state's ability to provide parents with potentially useful information soon after birth and its ability to mandate such screening. Along with immediately actionable results, WGS can find conditions that are not well understood, severe in prognosis, highly penetrant, and treatable in childhood. The state's interest in screening for such conditions is weak and unlikely to outweigh the strongly protected rights of parents to make decisions for their children and to protect their bodily integrity. Conducting mandatory screening, without informed consent, for numerous conditions that are insufficient to justify the state's intrusion on patient autonomy and parental rights will place state programs in untenable legal and ethical territory.

The constitution requires states to either make tests voluntary or justify mandating them. To incorporate WGS into mandatory NBS without running afoul of the constitution, states must be able to justify the screening in terms of the benefits to the child. The benefits must outweigh the risks. Even if WGS becomes cost-effective enough to be used routinely, it will still raise questions of accuracy and relevance to the child's health. The risk of performing WGS on an infant stems not from the blood draw but from the discovery of genetic information that is potentially inaccurate, misleading, limited in its utility, or simply undesired by the parent. Gene sequencing may turn out to be a more cost-effective way to screen for the ~30 primary targets on the current RUSP, but it will also produce much more information. State NBS programs that seek to use WGS must decide what to do with any information they obtain from WGS that is not related to the primary targets.

## OPTIONS FOR USING WGS

States will need criteria for determining which conditions can legally be targeted as part of the state's primary panel and which require some form of parental consent. Furthermore, they will need criteria to address variants of unknown significance found in target genes and variants of known significance in nontarget genes. Without obtaining informed consent, states can use WGS to target or confirm primary conditions. However, consent is necessary before any genes not associated with primary conditions are analyzed. Consent is also necessary before any results are reported to families other than conditions that are either properly on a state's primary panel or directly implicated by analyzing the gene for a primary condition. For instance, when a targeted gene sequence is probed for 1 mutation, another mutation of potential significance may be discovered. State programs should establish clear criteria for when a mutation discovered in such a manner should be reported.

The following are 3 general options for the use of WGS in NBS programs: 1 without obtaining parental consent, 1 with an opt-in feature, and 1 that would require full consent.

### Option 1: Target or Confirm Only Primary Conditions, Discard Remaining Data

The first option states could pursue is to use WGS, without informed consent, to analyze the sequence for anomalies related to primary conditions on the screening panel, and then immediately discard the remaining sequence without analysis. States could use WGS as a first-tier or sole means of screening for primary conditions provided that it is a valid means of testing for those conditions. States could also use WGS as a second-tier test to confirm presumptive positive results obtained with other technologies. In this situation, public health agencies can screen without obtaining parental consent as long as the condition meets the legal criteria for being targeted by a screening program, and the laboratory analyzes only the appropriate genes and reports only the relevant results, ignoring and discarding all other data not uncovered by this process. Bypassing informed consent in this case should not breach constitutional protections because the state's intrusion on the child's autonomy and the parent's right to control the child's health care is justified by the nature of the primary conditions.

The second-tier use of genetic sequencing has a parallel in state programs today. The California Newborn Screening Program screens for cystic fibrosis via a mutation panel of 40 known disease-causing mutations. Cystic fibrosis is a recessive disorder, which requires 2 mutations for the disease phenotype to occur. When a newborn has ≥1 known disease-causing mutations, the entire gene is sequenced, which sometimes reveals variants of unknown significance that can lead to a referral for additional evaluation. In this manner, California uses DNA testing to identify second mutations and confirm a positive result before reporting results to the family. Although California does not sequence the whole-genome as part of this protocol, it could do so legally without obtaining consent provided that it does not analyze irrelevant genes and does not keep extraneous data without consent.

Of course, this option makes sense only if the cost and efficiency of WGS improve enough to place it on par with the cost of sequencing individual genes. Even then, to many doctors, parents, and policymakers it may seem like a waste of resources to sequence an entire genome only to look at a small portion of it and discard the rest. If WGS does become a feasible technology for NBS, some families will want information about a wide range of conditions beyond primary targets.

### Option 2: Target Only Primary Conditions and Give Parents the Option to Receive the Full Genomic Data in Raw Form

Instead of discarding the bulk of a newborn's sequenced genomic data, as was proposed in option 1, the state could also use WGS as a first- or second-tier screen and grant parents the ability to receive their child's raw sequence data. For parents who do not want a copy of their child's sequence, the state should screen for primary conditions, as it does now, and then discard the sequence. However, for parents who want to know about additional variants or have their child's sequenced genome transferred to their medical record for future use, states could enable parents to request the data. Providing the raw sequence data, in the

absence of analysis, would necessarily require the parents to seek the services of a provider who could analyze and interpret it, thereby minimizing the risk of revealing unwanted genomic information to the parents or child without their express consent. If NBS programs integrate WGS, consent for raw data may be the most plausible option.

Ideally, parents should be informed of the opportunity to obtain the raw sequence data from the state or have it transferred to their pediatrician as a standard part of prenatal care. In preparing expectant mothers for labor and delivery, obstetricians often include a discussion about hospital protocols and what to expect throughout the process. As part of that conversation, the obstetrician or someone from his or her office could provide pregnant women with information from the state about the NBS program and the opportunity to choose to receive a copy of the sequenced, but largely unanalyzed, genomic data. States may want to give parents a time line to request the data before discarding it, perhaps for up to 1 year. State programs that choose to offer genomic data to parents should consider including information on genetic counseling resources, key factors to consider in deciding whether to retain the data, and the procedures and deadlines for requesting the data. States could also create or recommend decision aids to assist parents in weighing their options.[26] For parents who do not receive this information during prenatal care, hospitals could provide such information before discharge, or pediatricians could provide it during the first year of pediatric care. This option retains parents' ability to learn about their child's genome on their own terms and avoids unnecessarily discarding a completed WGS.

### Option 3: Obtain Informed Consent and Offer Parents Both the Genomic Sequence and Analysis

Alternatively, some states contemplating the use of WGS in NBS may decide to integrate informed consent into the program, abandoning mandatory screening entirely or requiring screening only for primary conditions while requesting consent to report all other results. This approach acknowledges that many parents will want access to and control of their children's genomic data and that states may want to ensure the quality of analysis and interpretation provided to parents from its data.

However, obtaining a fully informed consent from parents for WGS analysis will prove challenging. Voluminous information about WGS and the targeted conditions would have to be condensed into easily comprehensible and digestible materials. Berg, Khoury, and Evans's[5] proposal to streamline informed consent and genetic counseling by classifying genetic conditions into "predetermined clinically relevant bins" could be adapted for use in NBS. Researchers at the University of North Carolina are already working to classify conditions according to characteristics relevant to consent, resulting in such groupings as severe early childhood disorders, late onset disorders, disorders with moderate mental or physical symptoms, and predispositions to certain diseases.[27] The process of defining the bins for NBS informed consent would benefit from the expertise and cooperation of professional societies, such as ACMG, the National Society of Genetic Counselors, and the American Academy of Pediatrics, as well as input from patient organizations regarding the most effective way of informing parents of their choices. Parents could receive standardized information on these panels of conditions, choose what genes should be analyzed and

reported, and decide what to do with the balance of raw data. Furthermore, decision aids are being developed to help inform parents during prenatal counseling.[28] Giving parents the relevant information and a range of options regarding genetic testing will protect their parental autonomy, child's bodily integrity, and the child's individual rights and preserve the constitutionality of the state program.

Providing for consent can help resolve more than just the constitutional problems. Many parents worry about retention and use of their children's genetic data obtained through NBS. By educating parents during the prenatal period about the use of WGS in NBS and giving them control over reporting, retention, and use of the newborn bloodspots, states can also retain the trust of their citizens and avoid at least some of the expected political opposition.[28]

Any of the 3 options for incorporating WGS into NBS would bolster the program's constitutionality. Option 1 would incorporate WGS but not offer parents access to any findings beyond conditions currently tested for through NBS. Therefore, states should use WGS in this way only if it proves more cost-effective or accurate than existing options. Options 2 and 3 would offer parents substantially more information but would also require the state to establish a consent process for obtaining either the raw sequence data or more specific findings. Establishing such a process will require substantial input from a range of interested parties and experts. Although many of these discussions are already under way, much of the most challenging work remains.

## CONCLUSIONS

In the future, as improvements in cost and efficiency make WGS more suitable for NBS, many families will no doubt want to take advantage of the rich information that WGS can provide. But integrating WGS into NBS programs raises substantial constitutional and statutory concerns that states must address. Depending on how it is used, WGS can generate numerous findings, only a small portion of which will be sufficiently important to justify mandatory testing and reporting. For any state choosing to incorporate WGS into its NBS program, transparency both in how it intends to use WGS and what it intends to do with the resulting sequence will be essential. State legislatures must set requirements for informed consent procedures that allow parents to meaningfully object or consent to DNA analysis and reporting of results. Given the dramatic number of incidental findings that could be revealed by WGS, it is crucial that states carefully distinguish between conditions that they can and cannot report on without parental consent. States must establish meaningful procedures to obtain informed consent from parents before revealing information beyond the primary conditions targeted by the NBS program. Without such protections, patients are at risk for experiencing harms that can result from receiving medical knowledge without sufficient context or support. Whether WGS becomes part of NBS, states need to clearly define and enforce criteria for determining which conditions will be targeted as part of the state NBS programs. State policymakers have a large role to play in the future of NBS, which will require them to carefully protect both the state's interests and the fundamental rights of all citizens living in their state.

## Acknowledgments

Research reported in this publication was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health under award U19HD077627. The authors thank Bob Currier, Barbara Koenig, Robert Nussbaum, Lois Weithorn, and Flavia Chen for their comments on earlier versions of this article.

## ABBREVIATIONS

| | |
|---|---|
| **ACMG** | American College of Medical Genetics and Genomics |
| **NBS** | newborn screening |
| **PKU** | phenylketonuria |
| **RUSP** | Recommended Uniform Screening Panel |
| **WGS** | whole-genome sequencing |

## REFERENCES

1. Botkin JR, Belmont JW, Berg JS, et al. Points to consider: ethical, legal, and psychosocial implications of genetic testing in children and adolescents. Am J Hum Genet. 2015; 97(1):6–21. [PubMed: 26140447]
2. Landau YE, Lichter-Konecki U, Levy HL. Genomics in newborn screening. J Pediatr. 2014; 164(1): 14–19. [PubMed: 23992678]
3. Ross LF, Saal HM, David KL, Anderson RR. American Academy of Pediatrics; American College of Medical Genetics and Genomics. Technical report: ethical and policy issues in genetic testing and screening of children [published correction appears in Genet Med. 2013;15(4):321]. Genet Med. 2013; 15(3):234–245. [PubMed: 23429433]
4. Green RC, Berg JS, Grody WW, et al. American College of Medical Genetics and Genomics. ACMG recommendations for reporting of incidental findings in clinical exome and genome sequencing. Genet Med. 2013; 15(7):565–574. [PubMed: 23788249]
5. Berg JS, Khoury MJ, Evans JP. Deploying whole genome sequencing in clinical practice and public health: meeting the challenge one bin at a time. Genet Med. 2011; 13(6):499–504. [PubMed: 21558861]
6. Jacobson v Massachusetts, 197 U.S. 11 (1905).
7. Clark NL. Parens patriae and a modest proposal for the twenty-first century: legal philosophy and a new look at children's welfare. Mich J Gend Law. 2000; 6:381–447.
8. Reiss DR, Weithorn LA. Responding to the childhood vaccination crisis: legal frameworks and tools in the context of parental vaccine refusal. Buffalo Law Rev. 2015; 63 [Accessed July 18, 2015] Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2574001.
9. Cruzan v. Dir, Missouri Dept of Health, 497 U.S. 261 (1990).
10. Planned Parenthood of Southeastern Pa v Casey, 505 U.S. 833 (1992).
11. Meyer v Nebraska, 262 U.S. 390 (1923).
12. Pierce v Society of Sisters, 268 U.S. 510 (1925).
13. Troxell v Granville, 530 U.S. 57 (2000).
14. Parham v JR, 442 U.S. 589 (1979).
15. Newmark v Williams, 588 A.2d 1108 (Del. 1991).
16. Douglas County v Anaya, 269 Neb. 552 (2005), cert. denied, 546 U.S. 826 (2005).
17. Spiering v Heineman, 448 F. Supp. 2d 1129 (D. Neb. 2006).
18. In re Anaya, 276 Neb. 825 (2008).

19. Holtzman, NA.; Watson, MS., editors. [Accessed July 18, 2015] Promoting safe and effective genetic testing in the united states: final report of the Task Force on Genetic Testing. 1997. Available at: www.genome.gov/10001733

20. Paul, D.; Brosco, J. The PKU Paradox. Baltimore, MD: Johns Hopkins University Press; 2013.

21. American College of Medical Genetics. [Accessed July 18, 2015] Newborn screening: toward a uniform screening panel and system. 2006. Available at: www.hrsa.gov/advisorycommittees/mchbadvisory/heritabledisorders/uniformscreening.pdf

22. President's Council on Bioethics. The Changing Moral Focus of Newborn Screening. Washington, DC: Government Printing Office; 2008.

23. 42 U.S.C. § 300b-8 to 300b-17 (2014).

24. [Accessed July 18, 2015] Severe combined immunodeficiency (recommended and adopted by the Secretary in 2010), critical congenital heart disease (recommended in 2010, adopted in 2011), Pompe disease (recommended in 2013, adopted in 2015), and MPS I (alpha-L-iduronidase deficiency, recommended in 2015, not yet adopted as of this writing). Summary of Nominated Conditions to the Recommended Uniform Screening Panel (RUSP). Advisory Committee on Heritable Disorders in Newborns and Children website. Available at: www.hrsa.gov/advisorycommittees/mchbadvisory/heritabledisorders/nominatecondition/reviews/nominatedconditions.pdf

25. Kemper AR, Green NS, Calonge N, et al. Decision-making process for conditions nominated to the recommended uniform screening panel: statement of the US Department of Health and Human Services Secretary's Advisory Committee on Heritable Disorders in Newborns and Children. Genet Med. 2014; 16(2):183–187. [PubMed: 23907646]

26. O'Connor AM, Bennett CL, Stacey D, et al. Decision aids for people facing health treatment or screening decisions (review). 2009 [Accessed July 18, 2015] Available at: www.allhealth.org/briefingmaterials/Connor-DecisionAidsforPeople-1939.pdf.

27. Bailey DB Jr, Gehtland L. Newborn screening: evolving challenges in an era of rapid discovery. JAMA. 2015; 313(15):1511–1512. [PubMed: 25898043]

28. Lewis MH, Scheurer ME, Green RC, McGuire AL. Research results: preserving newborn blood samples. Sci Transl Med. 2012; 4(159):159cm12.

## TABLE 1

State Laws Governing Consent for NBS

| Consent Policies | Number of States | States |
|---|---|---|
| No exemption for religion or personal belief | 3 | AZ, NE, WV |
| Exemption for religion only | 30 | AL, CA, CO, CT, DE, GA, HI, ID, IL, IN, KS, KY, MA, ME, MO, MS, NJ, NY, OH, OK, OR, PA, RI, SC, TN, TX, VA, WA, WI, UT |
| Must be members of established church that forbids NBS | 9 | CO, DE, ID, KY, NY, OR, TN, TX, UT |
| Exemption for religion or for personal or philosophical belief | 15 | AK, AR, FL, IA, LA, MI, MN, MT, NC, ND, NH, NM, NV, SD, VT |
| Informed consent required before screening | 2 | MD, WY |
| Must inform parent of right to object | 3 | MD, MN, WA |
| Must give parent reasonable opportunity to object | 4 | MD, MN, NJ, WI |

This study examined statutes and regulations in each of the states. This chart does not reflect NBS program practices that deviate from state law. Additional research is needed to determine the extent to which laws reflect current practice.

**TABLE 2**

Examples of Criteria in State Law for Inclusion of Condition in NBS Panel

| Criterion | States |
|---|---|
| No criteria provided in law | AR, NE |
| Condition must be severe or serious | CA, CO, DE, GA, MA, MD, ME |
| Treatable, preventable, or ameliorable | CA, CO, GA, ID, KS, MA, ME |
| Cost–benefit analysis required | AZ, CO, MD, ME |
| Conformity with uniform panel or recommendations of a professional body | FL, GA, IA, KS, KY |
| Test must be reliable | AL, AR, CO, CT, MA |
| Test must be accurate | AL, CA |
| Test method must be efficient | AR, CO, IL |
| Test must be consistent with accepted medical practices | AK, CA, CO, FL, KS, MA |
| Pilot testing or use in another jurisdiction required before full implementation | CO, IL |
| No criteria in law for new test or technology | AZ, CT, DE, IA, ID, WA |

The 24 states sampled are AK, AL, AR, AZ, CA, CO, CT, DE, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, MA, MD, ME, NE, TN, and WA. This study examined statutes and regulations in each of the states. This chart does not reflect NBS program practices that deviate from state law. Additional research is needed to determine the extent to which laws reflect current practice.