MANDATORY SCREENING OF NEWBORN INFANTS FOR INBORN ERRORS OF METABOLISM

Chapter 1

Section 1. Authority.

The statutory authority for these regulations is contained in W.S. 35-4-801 and 35-4-802. The Statute and Regulations are administered by the Wyoming Department of Health.

Section 2. Purpose and Applicability.

(a) This chapter defines the process for the mandatory newborn metabolic screening for infants.

(b) The Department may issue materials to providers and/or other affected parties to interpret the provisions of this Chapter. Such materials shall be consistent with and reflect the rules and regulations contained within this Chapter. The provisions contained in the materials shall be subordinate to the provisions of this Chapter.

Section 3. General Provisions.

Except as otherwise specified, the terminology used in this Chapter is the standard terminology and has the standard meaning used in accounting and healthcare, including newborn metabolic and hearing screening.

Section 4. Definitions.

The following definitions shall apply in the interpretation and enforcement of these Rules. Where the context in which words are used in these Rules indicates that such is the intent, words in singular number shall include the plural and vice versa. Specific genetic and metabolic tests to be done in Wyoming as by the committee designated in W.S. 35-4-801, Section (b), are as follows and include their respective American College of Medical Genetics and Genomics Code in parentheses:

(a) "Classic Phenylketonuria (PKU)." Classsic Phenylketonuria is a disorder of amino acid metabolism in which an enzyme defect results in increased levels of phenylalanine. If not identified and left untreated, it may lead to mental retardation and seizures.

(b) "Primary Congenital Hypothyroidism (CH)." Primary Congenital Hypothyroidism is a disease characterized by a congenital deficiency or absence of

thyroid hormone (thyroxine) which, if not identified and left untreated, may lead to mental and growth retardation.

(c) "Classic Galactosemia (GALT)." Classic Galactosemia is a disease of galactose metabolism which, if not identified and left untreated, will lead to failure to thrive, vomiting, liver failure, cataracts, mental retardation and possibly death.

(d) "Cystic Fibrosis (CF)." Cystic Fibrosis is a genetic disorder in which mutations alter the structure, function, or production of a transmembrane chloride channel protein which in turn can affect the function of the lungs, upper respiratory tract, gastrointestinal tract, pancreas, liver, sweat glands, and genitourinary tract. Early diagnosis and treatment results in improved outcomes for affected patients.

(e) "Biotinidase Deficiency (BIOT)." Biotinidase Deficiency is a metabolic disease that results in an inability to recycle and conserve the vitamin biotin which, if not identified and left untreated, may lead to mental retardation, seizures, hearing loss, and dermatitis.

(f) "Propionic Acidemia (PROP)." Propionic acidemia is a disorder of amino acid metabolism in which an enzyme defect results in increased propionic acid. If not identified and left untreated, it can result in failure to thrive, metabolic acidosis, vomiting, dehydration, hyperammonemia, mental retardation and possibly death.

(g) "Methylmalonic Acidemia (Methylmalonyl-CoA Mutase) (MUT)." Methylmalonic acidemia is a disorder of amino acid metabolism in which various related enzyme defects result in increased methylmalonic acid. If not identified and left untreated, it can result in failure to thrive, metabolic acidosis, dehydration, hyperammonemia, hypoglycemia, mental retardation and possibly death.

(h) "Methylmalonic Acidemia (Cobalamin Disorders) (Cbl A, B)." Methylmalonic acidemia is a disorder of vitamin B12 (cobalamin) and amino acid metabolism in which an enzyme defect results in increased methylmalonic acid and homocystine. If not identified and left untreated, it can result in failure to thrive, metabolic acidosis, seizures, anemia, mental retardation and possibly death.

(i) "Isovaleric Acidemia (IVA)." Isovaleric acidemia is a disorder of amino acid metabolism in which an enzyme defect results in elevations of leucine and isovaleric acid. If not identified and left untreated, it can cause failure to thrive, metabolic acidosis, dehydration, hyperammonemia, hypoglycemia, mental retardation, and possibly death.

(j) "3-Methylcrotonyl-CoA Carboxylase Deficiency (3-MCC)." 3-methylcrotonyl-CoA carboxylase deficiency (also known as 3-MCC deficiency) is a disorder of amino acid metabolism in which an enzyme defect results in an inability to

metabolize leucine. If not identified and left untreated, it can lead to vomiting, metabolic acidosis, apnea, hyptonia, seizures, and hypoglycemia.

(k) "3-Hydroxy-3-Methylglutaric Aciduria (HMG)." 3-hydroxy-3-methylglutaryl-CoA lyase deficiency (also known as HMG-CoA lyase deficiency) is a disorder of organic acid metabolism in which an enzyme defect results in elevation of leucine in the blood and impaired production of ketones. If not identified and left untreated, it can result in mental retardation, metabolic acidosis, hypoglycemia, hyperammonemia, seizures, coma and death.

(l) "Holocarboxylase Synthase Deficiency (MCD)." Holocarboxylase synthetase deficiency is a disorder of biotin vitamin metabolism in which an enzyme defect results in impaired biotin function leading to abnormal metabolism of amino acids, carbohydrates and lipids. If not identified and left untreated, infants develop metabolic acidosis, seizures, dermatitis, hearing loss, coma, mental retardation and possibly death.

(m) "β-Ketothiolase Deficiency (βKT)." Beta-ketothiolase deficiency is a disorder of organic acid metabolism in which an enzyme defect results in the accumulation of isoleucine and related metabolites. If not identified and left untreated, metabolic crisis may occur with coma or death, mental retardation, cardiac abnormalities and other physical problems.

(n) "Glutaric Acidemia Type I (GA1)." Glutaric acidemia type I is a disorder of organic acid metabolism in which an enzyme defect results in increased glutaric acid and its metabolites. If not identified and left untreated children develop metabolic acidosis, failure to thrive, mental retardation and sudden onset of seizures, spasticity and movement problems.

(o) "Carnitine Uptake Defect/Carnitine Transport Defect (CUD)." Primary carnitine deficiency is a disorder of fatty acid metabolism in which there is a defect in the transport of carnitine into the tissues. This prevents fatty acid metabolism and limits energy production. If not identified and left untreated, patients develop cardiomyopathy, fasting hypoglycemia and muscle disease.

(p) "Medium-Chain Acyl-CoA Dehydrogenase Deficiency (MCAD)." Medium-chain acyl-CoA dehydrogenase (MCAD) deficiency is a disorder of fatty acid metabolism that results in an inability to metabolize medium-chain fatty acids which, if not identified and left untreated, under conditions of fasting may lead to hypoglycemia, seizures, developmental disability and/or sudden death.

(q) "Very Long-Chain Acyl-CoA Dehydrogenase Deficiency (VLCAD)." Very long-chain acyl-CoA dehydrogenase (VLCAD) deficiency is a disorder of fatty acid metabolism in which an enzyme defect results in an inability to degrade long-chain fatty acids. If not identified and left untreated, it may lead to fasting hypoglycemia, liver disease, seizures, skeletal myopathy, cardiomyopathy and sudden death.

(r) "Long Chain L-3 Hydroxyacyl-CoA Dehydrogenase Deficiency (LCHAD)." Long-chain 3-hydroxyacyl-CoA dehydrogenase (LCHAD) deficiency is a disorder of fatty acid metabolism in which an enzyme defect results in metabolic derangement during periods of illness or prolonged fasting. If not identified and left untreated, it can result in failure to thrive, hypoglycemia, liver disease, cardiomyopathy and possibly death.

(s) "Trifunctional Protein Deficiency (TFP)." Trifunctional protein deficiency, also known as mitochondrial trifunctional protein deficiency, is a disorder of fatty acid metabolism in which a genetic defect results in deficiency of 3 enzymes that act sequentially in fatty acid degradation. During periods of illness and fasting, if not identified and left untreated, children can develop hypoglycemia, failure to thrive, cardiomyopathy, liver disease and death.

(t) "Argininosuccinic Aciduria (ASA)." Argininosuccinic aciduria is a disorder of amino acid metabolism in which an enzyme defect in the urea cycle results in elevated ammonia and citrulline. If not identified and left untreated, infants develop failure to thrive, seizures, mental retardation, hyperammonemia, lethargy, coma, and death.

(u) "Citrullinemia, Type I (CIT)." Citrullinemia is a disorder of amino acid metabolism in which an enzyme defect in the urea cycle results in hyperammonemia and elevated citrulline. If not identified and left untreated, infants develop failure to thrive, vomiting, seizures, mental retardation, hyperammonemia lethargy, coma, and death.

(v) "Maple Syrup Urine Disease (MSUD)." Maple syrup urine disease is a disorder of amino acid metabolism in which an enzyme defect allows leucine, isoleucine and valine to accumulate to toxic levels. If not identified and left untreated, it can progress to mental retardation, failure to thrive, seizures, coma, cerebral edema and possibly death.

(w) "Homocystinuria (HCY)." Homocystinuria is a disorder of amino acid metabolism in which an enzyme defect results in increased methionine and homocystine. If not identified and left untreated, children can develop mental retardation, vision problems, skeletal abnormalities and strokes.

(x) "Tyrosinemia, Type I (TYR I)." Tyrosinemia is a disorder of amino acid metabolism in which various related enzyme defects result in elevation of tyrosine. Effects of untreated disease may include failure to thrive, liver failure, skin and eye lesions, developmental delay or mental retardation.

(y) "Congenital Adrenal Hyperplasia (CAH)." Congenital adrenal hyperplasia (CAH) is a genetic disorder which results in the adrenal glands producing too little or no cortisol, insufficient aldosterone, and too much androgen. If not identified and

left untreated, this can result in classical salt-losing CAH or an adrenal crisis that can result in sudden death.

(z) "S, S Disease (Sickle Cell Anemia) (Hb SS)." Sickle cell anemia is a serious disease that happens when a person inherits two hemoglobin S genes. Under certain conditions, these red blood cells become sickle-shaped (banana shaped) and block circulation.

(aa) "S, βeta-Thalassemia (Hb S/ β Th)." SBeta 0 Thalassemia(SBZero Thal)/ SBeta plus Thalassemia(SB+Thal) These two forms of Sickle cell disease have very different symptoms. Sickle Beta 0 Thalassemia may be very severe and almost identical to sickle cell anemia. Sickle Beta + Thalassemia is often less severe as there is some normal hemoglobin in each red blood cell.

(bb) "S, C Disease (Hb S/C)." Hemoglobin SC is a form of sickle cell disease. This occurs when a child inherits the sickle gene from one parent and the c gene from the other. The anemia in this disease is often less than in people with Hb SS.

(cc) "Severe Combined Immunodeficiences (SCID)." Severe combined immunodeficiency is a group of disorders with several genetic causes. Children with SCID lack virtually all immune protection from bacteria, viruses, and fungi. They are prone to repeated and persistent infections.

(dd) Any other genetic metabolic disease for which testing may hereinafter be required on the basis of action taken by the designated committee.

Section 5. Consent for Screening.

Consent for screening can be from natural parents, either custodial parent, a sole guardian, single parent having custody, prospective adoptive parents or parent of whom the child's custody has been released. No test shall be performed until the written consent of the natural parents, the custodial parent, the guardian, or the adoptive parents is obtained. If any parent or guardian objects to the mandatory testing for a child, then the objections shall be in written form to exempt the child from such testing.

Section 6. Blood Collection.

(a) Best medical practice indicates that the optimal timing for newborn screening in full-term healthy infants is between twenty-four (24) and forty-eight (48) hours after birth. In early discharge, the blood should be collected as late as possible before discharge, but no later than forty-eight (48) hours after birth.

(b) Any newborn infants requiring exchange transfusions shall have the blood sample for these tests taken prior to the exchange transfusion whenever possible. If the transfusion is performed before a blood sample may be drawn, the specimen collector

shall indicate that the child has been transfused in the appropriate area on the collection card.

(c) The specimen shall consist of capillary blood collected by heel puncture or alternate method authorized by the regional laboratory, directly upon special blotter paper furnished by the Wyoming Department of Health Newborn Metabolic Screening program. All circles shall be saturated with blood from one side of the blotter only. The specimen collector will provide, on the provided collection card, all information requested. The specimens, after air drying, will be forwarded to the regional laboratory within twenty-four (24) hours of collection, or at the earliest opportunity, by first class mail, courier, or other expedited shipping method.

(d) If the child is not born in a hospital, the attending physician, midwife, or person attending the delivery shall collect the initial blood sample or arrange to have the blood sample taken by a physician, hospital personnel, or laboratory personnel.

(e) If the child is to be transferred to another hospital, the transferring hospital shall conduct the newborn screen prior to discharge, or make arrangements with the receiving hospital to conduct the screen. The transferring hospital shall notify the Wyoming Department of Health Newborn Metabolic Screening program that the infant has been transferred.

(f) Hospitals will record numbers of births and numbers of infants screened. The hospital record will include the number of infants not screened and the reason why the screening was not performed. Reports will be made to the Department of Health Newborn Metabolic Screening program on request, not less than once yearly.

(g) The Department of Health Newborn Metabolic Screening program will provide information brochures and consent forms twice yearly and upon request.

Section 7. Second Test.

Parents or other legal guardians of the newborn shall be advised of the necessity of the second newborn screening test. A second blood sample is recommended for all infants. A second screen is especially crucial if the initial screen was conducted prior to twenty-four (24) hours of age. A second blood sample should be collected when the infant is approximately ten (10) days to two (2) weeks of age, and may be collected at a hospital laboratory, physician's office, or by the physician or midwife who collected the initial sample.

Section 8. Fees.

The Wyoming Department of Health will assess all hospitals and all other collectors of initial screens a fee of $77.00 for each initial newborn metabolic screen. Payment is due within thirty (30) calendar days of the invoice date. Said amount is

assessed to cover the costs of metabolic screening including initial and second screens, initial confirmatory testing, genetic counseling, and educational programs, and functions. The fees collected also cover costs associated with handling of specimens, reimbursement of laboratory costs, and costs of providing other services necessary to maintain functionality and sustainability of this self-funded program. The Wyoming Department of Health, in consultation with the designated committee, may increase the above assessment, if it is determined that the costs of the program necessitate such increase, but in no instance may this fee be increased more than ten percent (10%).