

CASE REPORT

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Does the Expert Witness Fit the Crime? Injury to a Child by Starvation—A Dietitian’s Testimony

ABSTRACT: After the death of their four-month-old infant, the parents were charged with injury to a child by starvation. The medical examiner documented blunt force trauma and severe malnutrition at autopsy, but the cause of death was undetermined. The legal team hired a neonatal dietitian who was able to determine that impaired growth only occurred when the infant was in the care of his parents. This information, along with other testimony, established that the lack of nutrition compromised this infant’s ability to grow and develop normally, and thus contributed to the infant’s death. A jury found the father guilty of injury to a child with intent, and was sentenced to 50 years in prison. The mother agreed to a plea bargain serving 25 years. The purpose of this report is to offer insight, information, and facts from this case for the benefit of others.

KEYWORDS: forensic science, expert witness, dietitian, starvation, malnutrition, injury to a child, neglect

The medical and legal professions possess a language unique to their discipline, neither of which is fully understood by the other, and specifically not by the general public. The goal of the expert witness, in conjunction with counsel, is to bridge this gap of information. As expert witnesses become more common, it may be beneficial for the legal team to seek expert witnesses whose disciplines “fit” the uniqueness of each case.

The purpose of this report is not to propose a blueprint for future expert testimony, but to gain insight, information, and facts from this case for the benefit of others. The dietitian’s report was compiled from hospital records, the autopsy report, the depositions from employees at the Women, Infant & Children’s government program (WIC), and the references listed.

Case History

The victim was born at 29 weeks gestation weighing 1426 g (3 lb 2.3 oz.) and 36.8 cm (14.5 in.), which is appropriate for gestational age. Perinatal diagnoses included prematurity, respiratory distress, neonatal sepsis, jaundice, apnea and bradycardia. He lost 14% of birth weight, and regained this on day of life (DOL) 16, which is typical for a premature infant. He established the ability to suck adequate amounts of formula from a bottle while hospitalized. His 36 days in the neonatal intensive care unit (NICU) were uneventful. He was discharged from the NICU weighing 2102 g (4 lb 10 oz.), under his parent’s care with appointments for WIC and pediatrician follow-up care. On his doctor’s visit at DOL 59, he weighed 2268 g (5 lb). On DOL 65, he was admitted to an area hospital. The infant’s diagnoses were a broken femur and diaper rash with ulcerations. The infant’s admission weight was 2240 g (4 lb 15 oz.) and was discharged at a weight of 2293 (5 lb 1 oz.) on DOL 67. The local police

and Children’s Protective Services investigated, but he was returned to the custody of his parents. At 122 DOL, weighing 2722 g (6 lb), the first formula voucher was issued at the WIC clinic. Although the formula voucher was approved on DOL 38, it could not be given to the mother until she brought the infant to WIC clinic for evaluations. At 129 DOL, the infant’s death weight was 2382 g (5 lb 6 oz.).

Autopsy Findings

The medical examiner’s autopsy revealed malnutrition, based on the infant’s weight below the 5th percentile on gestation-adjusted age growth charts, cachectic physical appearance of the infant, absence of subcutaneous and visceral fat, absence of food within the stomach and 30 mL of fecal material found within the terminal ileum and colon, and stress involution of the thymus. Postmortem studies did not support malnutrition as the actual cause of death. There was evidence of blunt force trauma with extensive bruising to the left side of the face. Radiographs identified healed rib fractures on the left side, and a healing fracture of the left femur. Examination also found evidence of a severe diaper rash with actual loss of skin over the buttocks and scrotal sac. The uncircumcised penis was crusted shut and rendering it impossible for the infant to urinate through this obstruction. There were no medical diseases found, based on gross and microscopic examination. Toxicological analysis on postmortem blood and metabolic screens were negative. Based on vitreous electrolyte panel there was no evidence of dehydration. The infant had a normal serum albumin. The cause of death is undetermined (1).

Description of Terms

- Malnutrition—in an infant is most commonly associated with abnormally low weight.
- Failure to thrive—is a term applied mainly to individuals less than three years of age who gain weight inadequately. Failure

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Received 24 Feb. 2003; and in revised form 18 May 2003; accepted 11 Aug. 2003; published 17 Dec. 2003.

to thrive implies that the growth failure results from inadequate caloric intake with or without an underlying disease or abnormality.

- The result of failure to thrive is malnutrition, regardless of the cause.
- Primary malnutrition, in industrialized countries, is usually caused from over dilution of formulas, feeding homemade formulas of inappropriate composition, feeding milk-free diets low in protein, prolonged breast feeding without adequate supplementation, or parental neglect (2).
- According to Meade and Brissie, any caloric intake below what is needed for normal growth and development resulting in both physical and mental retardation is considered child abuse (3).

Key Abnormal Findings

- This infant gained weight an average of 33.65 g/day from age 16 days to 36 days, while hospitalized. Average growth for a premature infant is 20–35 g/day (4).
- This infant subsequently gained weight an average of 3.7 g/day once in the care of his parents from age 38 days through 128 days.

Nutritional Analysis of this Case

1. There are three types of malnutrition: marasmus, kwashiorkor, and a combination of these. This infant manifested signs and symptoms of marasmus type malnutrition. These signs and symptoms include: 1) extreme body wasting; 2) weight for length is less than 70% of normal, 3) length for age is below the 5th percentile, and 4) normal serum protein concentrations.
2. This infant suffered from severe malnutrition, based on Waterlow classification, a widely adopted classification used by health professionals (5), see Table 1. Severe malnutrition is defined as a weight of less than 70% of expected “weight for length.” Thus, for a male at 53 cm (21 in.), expected weight (50th percentile) is 3974 g (8 lb 12 oz.) (2).

$$\begin{aligned} & (\text{Death weight}) \div (\text{Expected weight}) \\ & = \text{percent of expected weight for current length} \\ & 2438 \text{ g} \div 3974 \text{ g} = 61.3\% \text{ of expected weight} \end{aligned}$$

TABLE 1—Waterlow classification of malnutrition.*

% of Expected Weight for Length	Degree of Malnutrition
90% or more	Normal, no malnutrition
80–89%	Mild malnutrition
70–79%	Moderate malnutrition
70 or less	Severe malnutrition

* Waterlow JC. Classification and definition of protein caloric malnutrition. *British Med J* 1972;(3):566–9.

3. Meade and Brissie developed a math formula which converts lost weight and calories to “days infant was starved”. The range of days is due to calculating minimum and maximum weights and calories needed. According to this calculation, this infant’s loss of calories was equal to 13–19 days of starvation. The actual death weight was noted as 2438 g (5 lb 6 oz.). This method does not indicate this infant received nothing for 13–19 days, but it allows the general public a number to consider degree of deprivation in terms of days versus calories (3). Since human metabolism adapts to starvation by decreasing both calorie and water requirements, it is likely that the actual number of days without adequate food was substantially greater than the number calculated, see Table 2.
4. Using the maximum amount of calories required (6), this infant needed *only* two 8 oz. bottles daily, of standard infant formula, to provide adequate calories for growth. This is based on death weight of 2438 g and 130 calories/kg/day.

$$\begin{aligned} & 2.438 \times 130 = 316.8 \text{ calories per day needed} \\ & 316.8 \div 0.66 \text{ calories/mL} = 480 \text{ mL of formula needed} \\ & 480 \text{ mL} \div 30 \text{ mL per ounce} = 16 \text{ oz. or } 2\text{--}8 \text{ oz. bottles daily} \end{aligned}$$

Dietitian’s Conclusion of this Case

While the cause of death was undetermined, the medical examiner and the dietitian both concluded severe malnutrition. The growth, or lack thereof, confirms severe malnutrition. During starvation, the human body will utilize fat to sustain life. This explains the ME findings of “absence of subcutaneous fat”. Also, there was no evidence of any type of illness or intolerance to formula that would compromise this infant’s ability to absorb nutrients normally. In fact, there is sufficient evidence supporting this infant’s ability to thrive when given adequate nutrition. Based on this information, this infant suffered malnutrition due to inadequate intake of formula. According to the growth patterns, the intake was insufficient over a period of time resulting in the severe malnutrition. However, the growth patterns also indicate that during the last 7 days of life, formula intake must have been minimal and resulted in a sharp decrease (10.4%) in weight. Since dehydration was not found by the medical examiner the weight loss cannot be attributed to fluid loss.

It is the dietitian’s opinion that this infant was “semi-starved” up to 90 days of his life leading to severe malnutrition that compromised his ability for normal growth and development. In other words, this infant received inadequate amounts of food for approximately 90 days. This infant died 93 days after he was discharged from the NICU.

It is important to mention that this infant had an older sibling whose growth and development was normal. This fact would negate parental ignorance of normal infant feeding. In addition, the finding that this infant was only 61.3% of expected weight constituting

TABLE 2—Calculation parameters for “days infant was starved”.

	Minimum Range	Maximum Range
Average growth ⁽⁴⁾	20 g per day	35 g per day
Calories needed for normal growth and development ⁽⁶⁾	110 calories per kilograms	130 calories per kilograms
Calculated average daily calorie requirements	291 calories	449 calories
Calculated expected death weight	3866 g	5696 g
Calculated weight deficit	1428 g	3258 g
Calculated total calorie deficit	3784 calories	8633 calories
Calculated days of starvation	13	19

severe malnutrition as classified by Waterlow, the 13–19 “days starved” calculated by using the Meade and Brisse math formula, that this infant only needed two 8 oz. bottle of standard infant formula daily for normal growth, and the results of the autopsy report corroborate the conclusion that severe malnutrition and neglect occurred.

Discussion

While the literature is non-existent regarding a dietitian’s report and testimony in a criminal case, there are general recommendations on the role and responsibility of the medical expert witness. Basically, these witnesses must have scrupulous ethical conduct, provide objective information, and be well read and prepared for presentation of testimony. All statements and opinions should be based on scientific principles, and their testimony should not differ regardless of which side of the case it benefits. These articles also briefly describe the legal process in a criminal case of child abuse (7–9).

A dietitian’s expertise allows them to analyze growth and intake, including the actual, the ideal, and the difference between these parameters. The composition of the report was similar to the ME’s report, findings, analysis, and conclusion. A report involving technical information had to be created in lay terms. This was accomplished by using “word pictures.” For example, this infant needed *only* two 8 oz. bottles of formula for optimum growth, not 316 calories daily. Also, the use of tables and graphs appear to be more beneficial than a written description. The use of Babson/Benda Intrauterine and Postnatal Growth Chart (10) was effective for two reasons: 1) it is intended for premature infants delivered as early as 26 weeks gestation, and 2) it graphically portrayed key events of this infant’s life. This growth chart is widely accepted by health care professionals, for premature infants, and is available through Ross Laboratories (4). By including the category “description of terms,” this allowed concise explanation of malnutrition, failure to thrive, child abuse, and their intertwined relationship. Legally, the dietitian’s advantage was the ability to state a professional opinion of how this infant developed malnutrition.

Conclusion

In today’s technology and rapid improvement in medical procedures and information, a medical professional cannot completely

stay abreast of details far beyond their field of expertise. Therefore, the use of witnesses whose discipline corresponds more precisely with the case are beneficial to the legal professional in two ways: 1) it protects the team from inaccurate or obsolete information, and 2) it offers a more detailed viewpoint in the specific area of their discipline on the same case. Depending on the circumstances of each case, seeking an expert witness whose training and experience matches the case could aid the legal and forensic profession from relying on a witness whose expertise may be medical, but not specifically trained in a certain discipline.

Acknowledgments

The author wishes to acknowledge and thank Medical Examiner, Dr. Glen Groben, the Yoakum County, TX Criminal District Attorney, Richard Clark, and Lieutenant Charles Higgs of the Denver City, TX Police Department.

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