

Family Practice Grand Rounds

Failure to Thrive: A Case Study in Comprehensive Care

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Infants who fail to grow normally may occasionally have a serious organic disease; the majority, however, are suffering from inadequate caloric intake because of a disturbance of the infant-mother relationship. Diagnostic evaluation can usually be brief and institution of therapy often leads to dramatic improvement. This Grand Rounds illustrates the contribution each member of the health-care team can make in solving the immediate problem of failure to thrive and helping provide a wholesome environment for the child's future.

DR. DANIEL LEVINSON (*Associate Professor, Family and Community Medicine*): Our clinical case presentation today will be focused on "failure to thrive," a not uncommon pediatric condition whose immediate manifestation is the physical underdevelopment of an infant. As we will see, both the cause and the treatment of this condition go far beyond the traditional medical model of disease and require psychological and social insight in addition to conventional medical knowledge. The subtitle of this presentation is "A Case Study in Comprehensive Care." Comprehensive care, with its medical, psychological, and social perspectives requires teamwork and coordination of a variety of

health-care professionals within a well-organized health-care delivery system. It involves not only the immediately ill patient — in this case a young infant — but also the family and often the community. Comprehensive health care is an essential element in the definition of family practice.

To exemplify these points we have invited a number of the health-care professionals who participated in the diagnosis and treatment of this child's illness, and as you listen to the medical facts we hope you will also pay attention to the multidisciplinary "matrix" within which the problem was managed.

The patient lives in a rural area near Tucson. The Family Practice Clinic there is staffed by two family physicians and a nurse practitioner; the staff had delivered the baby and provided well-child care. When a problem they could not solve was identified, the staff requested help from Dr. Michael Kappy who visits the clinic weekly as a pediatric consultant. At this point I

will turn the conference over to Dr. Kappy.

DR. MICHAEL KAPPY (*Assistant Professor, Department of Family and Community Medicine and Department of Pediatrics*): The patient to be presented today is an example of a relatively common pediatric problem — a failure to maintain normal growth. In infants, this usually means a failure to gain adequate amounts of weight. This baby was not gaining weight well and the local physician asked for help in evaluating her. This case is an excellent example of a medical and social problem where no one person can provide all of the diagnosis and treatment, but rather where a concerted effort by several members of a team is required. I would like to begin by asking Dr. Sylvestre Quevedo to present the patient. Dr. Quevedo was on our in-patient service when the patient was admitted to the University of Arizona Medical Center for evaluation.

DR. SYLVESTRE QUEVEDO (*first-year family practice resident*): This was the first University of Arizona Medical Center admission for this patient, an eight-week-old, white female with poor weight gain since birth. The patient was the first child of a 23-year-old father and a 17-year-old mother from a small, rural community near Tucson. The mother was primigravida without prior medical problems, and had a normal pregnancy. The labor and delivery were spontaneous, at term, of 14 hours' duration, and normal in all respects. The patient's Apgar score was eight at one minute and nine at five minutes. The patient's birth weight was 2.91 kg (6 lb 6½ oz) and length was 19 inches. The infant was initially breast-fed without difficulty until two weeks of age when she became mildly jaundiced. Breast-feeding was discontinued and Enfamil with Iron formula begun. She was switched to plain Enfamil after two days of Enfamil with Iron because of constipation. The jaundice resolved over the course of the next week. The baby reportedly took 1½ to 3 oz per feeding, sometimes every four hours, but was often allowed to sleep for 12 hours at a time without a feeding. The mother reported that the baby had frequent postprandial regurgitation but no true vomiting. Stools were normal in consistency and averaged one to two a day. There was

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no history of diarrhea. The mother reported that the cry and level of activity of the infant were normal. There was no history of recurrent infection, fever, apnea, hyperirritability, seizures, or periods of unresponsiveness. According to developmental history taken from the parents, the baby was not able to raise her head up, follow objects with her eyes, or smile in response. The parents reported that this was a wanted child and that their only marital problems were financial.

On physical examination, the patient was found to be a poorly developed, poorly nourished, pale white female infant. However, she was in no acute distress. She was noted to be less alert than normal. Her length was 55.5 cm and her weight was 3.1 kg (6 lb 13 oz). Figure 1 shows the relationship of her admission length and weight (B) to their respective values at birth (A). As can be seen, her weight was the norm or 50th percentile of an infant at birth, whereas her length was at the 50th percentile for a one-month-old. Thus, her weight "age" was more reduced than her height or length "age." Her head circumference was 35.5 cm, which was only minimally reduced for age. The remainder of her physical examination was within normal limits for age except for generalized but symmetric diminution of muscle bulk and subcutaneous tissue in the extremities and pallor of the skin.

Laboratory work: Her admission complete blood count showed a hematocrit reading of 32.5 percent, a hemoglobin of 11.0 gm per deciliter and a white blood cell count of 13,100/cu mm with a normal differential. Her red blood cell indices were normal. Her urinalysis was normal, including a test for phenylketonuria. Chest x-ray was likewise normal.

In summary, this was a child born to young parents, with only .18 kg (6½ oz) weight gain since birth. She had a history of irregular feeding times, but no vomiting or diarrhea. The physical examination showed her to be moderately pale and undernourished but without identifiable abnormalities. Her weight was more reduced for age than her length, and her head size was near normal. Her development was slow for age, particularly her failure to show a smile in response to attention. Our initial im-

pression was that her relative failure to gain weight since birth was due to inadequate caloric intake, and her delayed milestones due to decreased environmental stimulation.

DR. KAPPY: The next phase of the patient's course was a brief observation in the hospital, and Karen Hoefle (pediatric nurse) will report on her hospital course.

KAREN HOEFLE, RN (*Pediatric Nurse, Inpatient Service*): We see many children on the Pediatric ward with the diagnosis of failure to thrive. One of the most common causes of failure to thrive is young and inexperienced parents. It was obvious from the beginning that that was indeed the case with this patient. The plan that we established for her observation was nursing care oriented — we fed her every three hours, aiming for a total of 24 oz in a 24-hour period. That is a large amount for a two-month-old, but we were trying to provide for some catch-up growth which she very much needed. She was fed Enfamil 20 with Iron in the hospital. We weighed her twice a day and we started her on a calorie count. Most important, we observed the parents and their interactions with the child, especially at feeding time, since that was felt to be an essential part of the problem.

We instructed the parents in two ways. First, we used ourselves as examples. The parents of children like this tend to observe the nursing staff very carefully. They watch the way we hold the infants, what we do with them, how we feed them, and we try very hard to provide the "tender loving care" and cuddling that the parents should be doing themselves. After it was determined what the parents' needs were, we did a second type of teaching. Specific information about infant care and feeding was given to the parents after it was determined what kind of information they lacked. Our teaching was very gentle and non-threatening in order to avoid evoking any guilt feelings on the part of the parents. We were trying to reassure the mother that she would indeed be able to mother her own child by the time she took the baby home. A social service consultation and a dietary consultation were ordered, and those will both be commented on later.

During the patient's hospital course we had several interesting observations

of her parents. It was noted that the only time the parents really had any contact with the baby at all was at feeding time, when they would pick her up, feed her, hold her, and then put her right back to bed. They really didn't provide any stimulation other than that. The father interacted rarely with the baby; it was all "Mom's thing." So our focal point for education became the mother. She lacked very basic knowledge about child care and she needed very specific guidelines on what to do with a two-month-old, how to hold the baby, how to provide stimulation, and so on. She really didn't seem to understand the importance of body contact and touching.

By the end of the first day, it was obvious that the baby was a normal two-month-old in terms of feeding. She had a voracious appetite, a strong suck, was eager to feed and, in fact, ate very rapidly and did a lot of air swallowing. She continued to spit up during her hospital stay as she had done at home, but at the end of a couple of days we solved that problem by burping her more frequently. We passed this hint on to the mother. When we fed the baby, we held her and cuddled her and talked to her softly, and did all the mothering things that need to be done with a two-month-old. The baby responded well both to holding and touching. She fed in a very relaxed manner and took her feedings easily. She even began cooing and smiling by the end of the first day, which was remarkable. It became obvious to us that there wasn't really a feeding problem with the child, and that if there was a problem it was the relationship between the parents and the child. As a result of the feeding regimen in the hospital, the baby had a remarkable hospital course. She took in an average of 20 to 25 oz of formula a day and gained between 50 and 100 gm a day. Figure 1, letter "C" illustrates the .29 kg (10 oz) weight gain that was achieved in the hospital after four days.

DR. KAPPY: Thank you very much, Karen. Next we are going to have comments from Ms. June Schuman, who did social counseling with this family, and then from Ms. Julie Blazovich, who provided nutritional consultation.

JOAN SCHUMAN, MSW (*pediatric social worker*): When no organic basis can be found for retarded growth and

development, the physician must suspect that the mother has in some way neglected her baby. At that time, a social work consultation should be initiated. It was at such a time that I was called in on this case. The goal was to find the cause of the parents' inadequate nurturing and, on the basis of this information, to include both mother and father in the treatment process. The patient under discussion was seen by me after referral by Dr. Kappy, who felt that the etiology of this baby's failure to thrive was more likely to be maternal deprivation than an organic problem.

I interviewed the mother on the day following the baby's admission to the hospital. The father did not accompany the mother to the hospital for this initial session. The mother was extremely cooperative and seemed eager to see a social worker. Physically, she appeared to be her stated age of 17. She was blonde, with a fair complexion, and looked rather fragile. She seemed to welcome the chance to discuss her feelings, and I gathered that she had little opportunity to do this elsewhere. Her affect was generally controlled and unspontaneous. It was my impression, however, that this control was almost necessary so that she could deal with the constant demands which were present in her life. Although an adolescent, she felt not only that she had to function in the relatively new roles of wife and mother, but also that she had to do so flawlessly.

A brief history of the mother's background and family will point out several characteristics which indicate this to be a very "high-risk" situation. The mother is the eldest of five children of an upper middle-class family; her father was a business executive who had very high expectations for all his children, and especially for her. He wanted her to go to college and have a career. She described a very close relationship with him, always striving to please and excel, very different from her relationship with her mother, whom she describes as being somewhat cold and rejecting.

In 1970, when she was 12, her father retired because of a heart condition, and the family moved to Tucson. Although she felt uncomfortable about the move, she did well academically in the local schools, and had aspirations to become a physician.

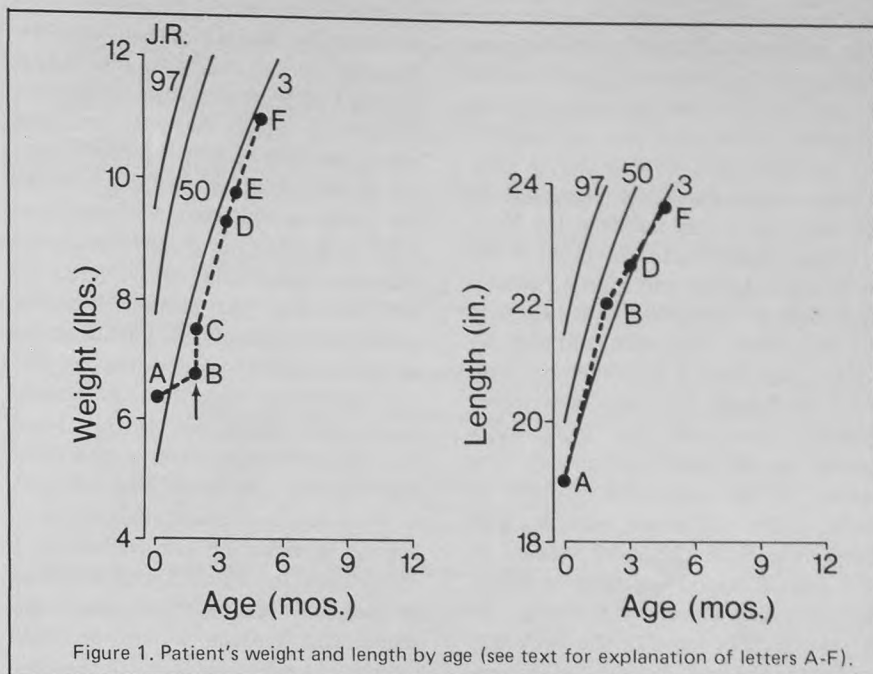


Figure 1. Patient's weight and length by age (see text for explanation of letters A-F).

She did volunteer work at a hospital in Tucson where she met her husband who was a patient. She was 14 at the time, and he was 19. When she was 15 her father died, and although this was a staggering loss for her, as she described it, she never grieved for him — she says she was never able to do this. The situation at home was psychologically grim: there were four younger children, her mother was overwhelmed by the situation, and seemed even more rejecting than previously. The young couple had been dating, and six months after the father's death the marriage took place, no doubt precipitated by the arid family situation — it seemed the logical thing to do. After a brief and unsuccessful move to another city they returned to Arizona where the husband was to secure job training. The wife denies the existence of any marital problems except financial ones. She is very dependent emotionally upon her husband, and says that he is very helpful to her. I saw them together briefly, and it was my impression that he related very easily, openly, and supportively to her.

Regarding the pregnancy and birth, the mother says that the pregnancy was planned. Both parents attended Lamaze natural childbirth classes, which indicates that both felt involved in the whole process. Delivery was conducted without anesthesia, and there were no complications, as Dr.

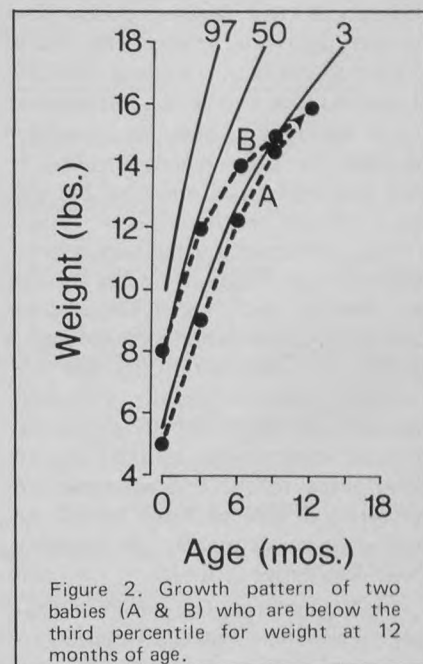


Figure 2. Growth pattern of two babies (A & B) who are below the third percentile for weight at 12 months of age.

Quevedo mentioned.

The mother initially denied that the baby's birth caused the couple any unusual stress, but as we talked further she did recollect feeling some ambivalence about her growing responsibility for the baby. This naturally included some negative feelings, which she found hard to accept. Although there are always some normal negative feelings toward a new baby, the mother could never express these. She continued to make rigid demands on herself for perfection, which seemed to prevent her from seeking any kind of advice about child care. She was

seen regularly at the Family Practice Clinic. She was able to describe the baby's erratic feeding and sleeping patterns, which confused and angered her, as she likes to live by a very organized schedule. She remarked to me that she would not feed the baby until her house was totally clean in the morning — surely an unusual routine. The baby's "internal" schedule just did not mesh with this, and she described the child's behavior as "willful," as though the baby was intentionally preventing her from functioning in her own normal way. She seemed to be describing a child of three years, not two months. Her interaction with the baby seemed to be a virtual contest of wills in which the baby often seemed to "win." In the mother's perception the baby was stronger than she, would fall asleep, and would not feed properly. The mother then felt helpless and angry toward the child. As the baby failed to thrive and gain weight, she felt increasingly inadequate and subsequently rejected the baby, whose hospitalization was a final confirmation that she was a "rotten" mother.

The mother responded very well to support from me and from the nursing and medical staff, all of whom were careful to avoid implications of guilt. It was my impression that her life situation, rigid personality structure, ignorance about child-rearing, and unrealistic expectations of the baby all contributed to the existing situation, but she was able to make use of the supportive environment in changing these destructive attitudes.

I will enumerate the specific "high-risk" components of the situation so that you will be able to recognize them when you encounter them in practice — these problems are not rare. The mother was immature at the time of her marriage; although she had aspirations to be a physician she was a high-school dropout; she assumed two quite mature roles, wife and mother, almost simultaneously; she had few support systems such as family and friends in her home town, and hence felt very much alone; she was too perfectionistic to deal with her feelings appropriately, especially her mixed feelings about having a baby; she had quite unrealistic expectations of the baby, as though it was something to please her and her schedule, she also had unrealistic demands on herself, to

be a perfect mother without any experience or education in mothering. To meet all these demands would have required a saintly baby — her own infant was not entirely "normal," having erratic eating and sleeping patterns and some regurgitation. She could not cope with this; she simply could not manage appropriately. However, I do not feel that the mother had any serious or unusual psychopathology: she was merely responding to the rigidity of the high-risk factors mentioned and could not quickly learn new patterns when they were kindly but firmly taught by the hospital staff.

What kinds of educational and therapeutic intervention are available in a community for mothers with this kind of problem? Ideally, short-term counseling with a social worker or other interested health professional; this provides opportunities for a couple to ventilate and talk about ordinary negative feelings and frustrations which they may feel guilty about. Large communities usually have parenting groups or parent-effectiveness training groups, but these are not often available in small communities. There the burden usually falls on pediatricians or other physicians, or on public health nurses, visiting nurse organizations, etc. These professionals can easily organize informal mothers' groups to meet weekly to discuss the hazards (and joys) of parenting. When a professional is the chief source of information, it is important to realize that this will be taken as "Official Doctrine"; hence, it is imperative for the professional to be supportive rather than critical and to positively reinforce the things that the mother is doing right.

At the time of discharge, my recommendations were to send a public health nurse into the home to provide teaching and support, and continued medical supervision at the Family Practice Clinic in the home community.

JULIE BLAZOVICH, BS (*clinical dietician*): In this case, it seemed likely from Dr. Quevedo's admission note and also from nursing care observations that the patient's failure to gain weight was due at least in part to inadequate calorie intake secondary to the parents' poor understanding of an appropriate diet for their child. This idea was supported by the fact that she gained weight well when her cal-

orie and protein intake were demonstrably adequate during hospitalization.

Shortly before the patient was discharged from Arizona Medical Center both parents were interviewed to assess the need for dietary counseling in order to help promote continued good rate of weight gain in the baby at home. A diet history for the baby was obtained from the parents. During the interview it was apparent that the parents were concerned about providing the right kind of care, but that they were young and inexperienced and lacked good knowledge of what the baby should be eating. For instance, the parents were not familiar with the quantity of formula that should be taken at a feeding, nor the frequency of feedings. The parents also had questions about the introduction of solid foods and the use of fluids other than formula, such as water and jello-water. In addition, the parents related that the grandparents had been giving a considerable amount of conflicting advice concerning what the baby should be eating and why she was not gaining weight. The parents seemed confused by this outside information, which probably contributed to their feeling of inadequacy in caring for their daughter.

A normal diet for a two-month-old child was outlined. This outline included a typical daily feeding schedule of age-appropriate quantities of formula and other fluids, as well as approximate ages for introduction of solid foods. It was also explained to the parents that the information the grandparents had given, albeit with good intentions, was not always valid. The parents seemed receptive to this dietary counseling and less apprehensive about dealing with advice from the grandparents and other outside sources in the future. Besides dietary counseling, it seemed important to also give emotional support to the parents. This emotional support consisted of encouraging the parents not to feel guilty about the baby's slow weight gain. She was gaining weight in the hospital and would probably continue to do so. The emotional support also extended to assuring the parents that they would be receiving follow-up care for the child, so that the questions arising in the future would be answered.

DR. KAPPY: Thank you, Joan and

Julie. To begin our general discussion I think we should define "failure to thrive." Figure 2 shows the pattern of weight gain in two children, A and B, both of whom were found to weigh 7.04 kg (15½ lb) at 12 months of age and thus to lie below the third percentile. According to some published reports, both of these babies would be examples of failure to thrive. For Baby A, the birth weight was about 2.27 kg (5 lb), and serial measurements show a normal increment in weight since birth. The baby, however, remained at less than the third percentile. This baby does not exemplify failure to thrive. On the other hand, Baby B, who was born weighing 3.63 kg (8 lb), shows a steady departure from normal weight gain after age three months until the time of the 12-month visit. This baby does qualify as showing failure to thrive. In other words, failure to thrive is a *declination* from a normal growth rate; in the case of infants, a falling-off in the rate of weight gain. Although any normal child shows some normal variation in weight gain at one time or another, a persistent falling off so that percentile curves are crossed as seen in Baby B, is clearly a matter which requires investigation.

There are ample studies to show that uncorrected malnutrition in the first year of life may lead to permanent loss of intellectual function. Table 1 shows three basic patterns of body measurements seen in failure to thrive. The most common pattern is where the weight of the child is most affected, that is, the weight age is most reduced. The height or length age is less reduced and the head circumference is usually normal. This pattern is usually seen where there has been a net insufficiency of calories or malnutrition.

The most common cause of this is simply that the child is not getting enough to eat, due to parental insufficiency, ignorance, poverty, or neglect. Other conditions that result in insufficient nutrition are disorders of chewing and swallowing, easy fatigability during feeding, and conditions which are characterized by chronic vomiting or diarrhea.

The second general pattern that we see is when height and weight are reduced proportionately and the head circumference remains normal. This is frequently seen in genetic or endocrine

Table 1. Patterns of Body Measurements Seen in Failure to Thrive

Pattern I: Net Insufficiency of Foodstuffs: MOST COMMON TYPE

Weight age most reduced
 Height age slightly reduced
 Head circumference normal or slightly reduced, unless insufficiency is severe
 May be seen in:
 Disorders of intake, eg, feeding problems, neglect, poverty, congenital heart disease, choanal stenosis or atresias
 Disorders of chewing and swallowing, including CNS and GI anatomic defects
 Disorders of digestion and absorption, eg, cystic fibrosis, coeliac disease, chronic diarrhea

Pattern II: Disorders of Genetics and Metabolism

Weight and height age moderately reduced, but proportionately so
 Head circumference normal or slightly advanced for age
 May be seen in:
 Endocrine disorders, eg, hypopituitarism, hypothyroidism
 Disorders of bone and connective tissue metabolism
 Chromosome disorders, eg, Down's syndrome, Turner's syndrome

Pattern III: Disorders of the Central Nervous System

Weight and height age moderately reduced
 Head circumference moderately to severely reduced
 May be seen in:
 Congenital infections involving the CNS, eg, rubella, toxoplasmosis
 Primordial dwarfism: poor growth associated with congenital anomalies of the CNS, or as a result of intrauterine growth retardation
 Metabolic abnormalities of the CNS

Table 2. Possible Outcomes of Observational Hospitalization

- A. Hospitalization provided adequate intake and child gains:**
 probably disorder of parent-child interaction
 Plan: No further work-up medically
 Explore family situation with social worker, and/or visiting nurse, and counsel appropriately
- B. Hospitalization provides adequate intake, but child fails to gain significantly over 14 days:** Consider malabsorption, chronic infection, neoplasm, chronic allergies, etc
- | | |
|--|----------------------------------|
| 72-hr stool fat, stools
for ova and parasites | Search for infection or neoplasm |
| Xylose tolerance test | TB skin test, cocci skin test |
| Sweat chloride | Bone marrow |
| Liver function studies | Nasal smear for eosinophils |
- C. Hospitalization does not provide adequate intake:** One or more of the following tests may be appropriate in an individual situation:
 ENT evaluation for nose, palate, or swallowing abnormalities
 Esophagram, upper GI series
 Skull films, BUN, glucose, electrolytes, pH, pCO₂, urinary organic and amino acids: if vomiting
 Developmental testing for evidence of more general retardation
 Thyroid function tests
 Chest x-ray, EKG for evidence of cardiopulmonary pathology

disorders, and disorders of skeletal metabolism.

The third basic pattern is seen when not only height and weight are significantly reduced but the head circumference as well. This occurs in primary central nervous system defects, but may also be seen in severely malnourished children. In other words, a significantly reduced head circumference strongly suggests that the central nervous system is affected in the child.

What, then, does one do when presented with a baby who shows significantly decreased weight gain? I would like to re-emphasize the point that the majority of these babies suffer from nutritional or caloric insufficiency, and will gain weight on a demonstrably adequate caloric intake. The initial work-up of such a patient would involve a hospitalization for four days to two weeks depending on the age of the child. Most of these

admissions can be handled in the smallest community hospitals without performing special x-ray or laboratory tests. All one really needs is a nursing staff which can observe the interactions between the parents and the child, provide good feeding and mothering and a source of instruction for the parents as far as feeding and holding is concerned, and a nutritionist to evaluate the nutritional and caloric content of foods eaten in the hospital.

When the infant is two to three months of age, one usually sees the effects of nutritional rehabilitation within the first two or three days of hospitalization. Older infants, however, require more time. The work-up is usually limited to feeding at appropriate intervals for age (about every three or four hours for a two to six-month-old baby), in amounts calculated to provide for basal and growth requirements: approximately 110 calories per kg *ideal* body weight per day, or about 5 or 6 oz of standard milk formula (20 cal/oz) per kg/day. One counts calories ingested precisely in order to quantify caloric intake. The baby is observed for the presence of vomiting or diarrhea. One of the most crucial aspects of the hospitalization is the nurses' observations of the interactions between parent and child.

In addition to a period of observation and calorie counting, some routine laboratory studies are usually obtained. A complete blood count and a sedimentation rate are done to document possible anemia or chronic infection. A urinalysis is done to detect renal abnormalities or chronic urinary tract infection. If there is evidence of malabsorption or diarrhea, one should check the stools for low pH or excessive amounts of reducing substances, do a culture of the stool for bacterial pathogens, and examine the stools for ova and parasites.

Table 2 shows the possible outcomes of this period of observational hospitalization. The first outcome is that the baby has taken in a demonstrably adequate number of calories and gains weight over a few days. I think then that you have made a presumptive diagnosis that the baby was not getting enough to eat at home and there is really no need for further medical work-up. In such a case our

efforts would be directed toward counseling the parents, generally along with a social worker, a nutritionist, and a visiting nurse. Depending on the people who are available in a given community, a single individual may work with the physician to provide one or more of these functions. The physician should continue his or her involvement with the parents and the child during the ensuing period out of the hospital.

The second possible outcome of the hospitalization is that the baby takes in adequate calories but fails to gain after a period of up to 14 days. In this case we may be dealing with a malabsorption syndrome, a chronic infection, a neoplasm, a collagen disorder, a chronic allergy, etc. Further tests are warranted. A partial listing is given in Table 2, but even these must be tailored to the individual patient, based on clues derived from the history and the physical examination or preceding tests.

Lastly, the child may not take in an adequate number of calories in the hospital and thus does not gain weight. This child may have a disorder of chewing or swallowing, a central nervous system disorder, or a congenital cardiac problem which causes easy fatigability during feeding. If vomiting has been present, one should consider a congenital metabolic disorder, a congenital abnormality of the gastrointestinal or central nervous system, or a central nervous system tumor. In many instances, moderate or severe mental retardation leads to poor feeding ability and the infant will fail to grow. Some additional tests which may be appropriate are given in Table 2.

In closing I would like to say that most failure to thrive in infancy is due to a net insufficiency of calories, usually due to inadequate intake. Making the diagnosis is well within the capabilities of even the smallest community hospital with an adequate and sensitive nursing staff. Today's patient was discharged to the care of her parents, and she was followed in our Family Practice Clinic outside of Tucson, as well as by the visiting nurse in her county. Follow-up measurements in weight and length are shown as letters D-F in Figure 1, and indicate that the nutritional rehabilitation and

counseling were effective in re-establishing a normal growth pattern in the patient.

Question from the Audience:

DR. SAM MORTIMER: (*third-year pediatric resident*): How much weight should an infant gain per day if you want to evaluate the adequacy of his or her environment at home?

DR. KAPPY: Although there is considerable variation, the average infant gains about an ounce per day during the first six months of life. By plotting the infant's gain on a growth chart, one can readily ascertain if a significant deceleration has occurred.

Suggested Reading

1. Fiser R, Meredith PD, Elders MJ: The child who fails to grow. *Am Fam Physician* 11(6):108-115, 1975
2. Green M, Richmond J: *Pediatric Diagnosis*. Philadelphia, WB Saunders, 1962
3. Hannaway PJ: Failure to thrive — a study of 100 infants and children. *Clin Pediatr* 9:96-99, 1970
4. Hertzog ME, Birch HG, Richardson SA, et al: Early malnutrition and later intelligence. *Pediatrics* 49:814-824, 1972
5. Kohler EE, Good TA: The infant who fails to thrive. *Hospital Practice* 4(7):54-61, 1969
6. Krieger I: Food restriction as a form of child abuse. *Clin Pediatr* 13:127-133, 1974
7. Powell GF, Brasel JA, Blizzard RM: Emotional deprivation and growth retardation simulating idiopathic hypopituitarism. *N Engl J Med* 276:1271-1283, 1967
8. Root AW, Bongiovanni AM, Eberlein WR: Diagnosis and management of growth retardation. *J Pediatr* 78:737-753, 1971
9. Shaheen E, Alexander D, Truskowsky M, et al: Failure to thrive — a retrospective profile. *Clin Pediatr* 7:255-261, 1968
10. Silver H, Finkelstein M: Deprivation dwarfism. *J Pediatr* 70:317-324, 1967 — Good References
11. Watson EH, Lowry GH: *Growth and Development of Children*, ed 4. Chicago, Year Book Medical Publishers, 1962
12. Wilkins L: *The Diagnosis and Treatment of Endocrine Disorders in Childhood and Adolescence*. Springfield, Ill, Charles C Thomas, 1965
13. Gotlin RW, Mace JW: Diagnosis and management of short stature in childhood and adolescence. *Curr Probl Pediatr* 2(4,5):1-39, 1-36, 1972
14. Smith DW: Compendium on shortness of stature. *J Pediatr* 70:463-519, 1967