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Administration of the Behavioral Pediatrics Feeding Assessment Scale (BPFAS) to Parents of High-Risk Infants: How to Best Identify Those at Risk for Feeding Difficulties

Monica Evans
Georgia State University

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This thesis, ADMINISTRATION OF THE BEHAVIORAL PEDIATRICS FEEDING ASSESSMENT SCALE (BPFAS) TO PARENTS OF HIGH-RISK INFANTS: HOW TO BEST IDENTIFY THOSE AT RISK FOR FEEDING DIFFICULTIES, by Monica V. Evans was prepared under the direction of the Master's Thesis Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Master of Science in the Byrdine F. Lewis School of Nursing and Health Professions, Georgia State University. The Master's Thesis Advisory Committee, as representatives of the faculty, certify that this thesis has met all standards of excellence and scholarship as determined by the faculty.

Anita M. Nucci, Ph.D, MPH RD, LD
Committee Chair

Sheena L. Carter, Ph.D
Committee Member

Sarah T. Henes, Ph.D, RD, LDN
Committee Member

Date

AUTHOR'S STATEMENT

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Monica V. Evans
3890 Carlton Drive
Atlanta, GA 30341

The director of this thesis is:

Anita M. Nucci, PhD, MPH, RD, LD
Assistant Professor and Division Head
Byrdine F. Lewis School of Nursing and Health Professionals
Georgia State University
Atlanta, Georgia 30302

VITA

Monica V. Evans

ADDRESS: 3890 Carlton Drive
Atlanta, GA 30341

EDUCATION: M.S. 2012 Georgia State University
Health Sciences

B.A. 2006 University of North Carolina at Chapel Hill
Psychology

PROFESSIONAL EXPERIENCE:

- Fitness Instructor 2011-present
Adrenaline Fitness, Atlanta, GA
- Esthetician 2007-2011
Natural Body Spa & Shoppe, Atlanta, GA

PROFESSIONAL SOCIETIES AND ORGANIZATIONS:

- Student Representative, Georgia Dietetic Foundation 2011-present
- Sports, Cardiovascular, and Wellness Nutrition Practice Group 2011-present
- Academy of Nutrition and Dietetics 2010-present
- Georgia Academy of Nutrition and Dietetics 2010-present

PRESENTATIONS AND PUBLICATIONS:

- Poster Presentation “Administration of the Behavioral Pediatrics Feeding Assessment Scale (BPFAS) to Parents of High-risk Infants: How to Best Identify Those at Risk for Feeding Difficulties”, Georgia Academy of Nutrition and Dietetics 2012

ABSTRACT

ADMINISTRATION OF THE BEHAVIORAL PEDIATRICS FEEDING ASSESSMENT SCALE (BPFAS) TO PARENTS OF HIGH-RISK INFANTS: HOW TO BEST IDENTIFY THOSE AT RISK FOR FEEDING DIFFICULTIES

by
Monica V. Evans

Purpose: The purpose of this study was to determine the efficacy of the Behavioral Pediatrics Feeding Assessment Scale (BPFAS) in identifying children at risk for feeding difficulties when given to parents in an interview format versus without assistance.

Methods: Parents/guardians of clinic patients who gave consent were randomized to receive the BPFAS either by interview or without assistance. Demographic and anthropometric data as well as nutrition referral status were documented during the clinic visit. Mean BPFAS scores were compared by survey administration method and nutrition referral status using the t-test. The analysis was also conducted by age (≤ 1.5 years, > 1.5 year) and weight status ($< 25^{\text{th}}$ percentile, 25-75th percentile, $> 75^{\text{th}}$ percentile) subgroups. The association between survey administration method as well as nutrition referral status and referral score category (≤ 84 or > 84) was determined using the Chi-square test. The relationship between nutrition referral status and the response to each BPFAS question was also examined using the Chi-Square test.

Results: Thirty subjects from Emory Developmental Progress Clinic (Emory DPC) participated in the study (mean age 71 weeks \pm 26.9, mean gestational age 29 weeks \pm 4.4, 56.7% African American, 36.7% Caucasian, 3.3% Asian, 3.3% Other). No difference in mean BPFAS score or referral score category by survey administration method was found in the total cohort. However, a higher BPFAS score was observed for

children >1.5 years of age who were referred for nutrition intervention vs. not referred (82.4 vs. 58.6, respectively; $p=0.035$). There was also a significant association between the number of patients referred for nutrition intervention vs. not referred and referral score (11 vs. 19, respectively; $p=0.041$). No difference in the ability of the BPFAS to determine nutritional risk was observed by weight status. There was also no association between responses to individual BPFAS survey questions and nutrition referral status.

Conclusions: There was no difference in the BPFAS total score obtained when administered in an interview format versus self-completed by the family. There was also no difference in the effectiveness of the BPFAS in identifying children with feeding difficulties based on method of administration (interview versus no interview).

Evaluation of other feeding assessment surveys or the in-house development of a screening tool may be better alternatives for the Emory DPC.

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ABBREVIATIONS

BPFAS	Behavioral Pediatrics Feeding Assessment Survey
NICU	Neonatal Intensive Care Unit
Emory DPC	Emory Developmental Progress Clinic
NEC	Necrotizing Enterocolitis
BDP	Bronchopulmonary Dysplasia
EFS	Early Feeding Skills
NOMAS	Neonatal Oral-Motor Assessment Scale
HIPAA	Health Insurance Portability and Accountability Act

CHAPTER 1

ADMINISTRATION OF THE BEHAVIORAL PEDIATRICS FEEDING ASSESSMENT SCALE (BPFAS) TO PARENTS OF HIGH-RISK INFANTS: HOW TO BEST IDENTIFY THOSE AT RISK FOR FEEDING DIFFICULTIES

Introduction

According to the American Academy of Pediatrics, high-risk neonates can be classified into 4 categories: 1) preterm infants; 2) infants with special health care needs or dependence on technology; 3) infants at risk due to family issues; and 4) infants with anticipated early death (1). High-risk neonates often require hospitalization in the neonatal intensive care unit (NICU), and once discharged from the hospital, careful planning by hospital staff is needed to ensure that infants are adequately followed (1). One such follow-up resource available for assessing developmental progress of high-risk infants is a multidisciplinary developmental progress care team. Multidisciplinary developmental progress care teams, such as the Emory Developmental Progress Clinic (Emory DPC) in Atlanta, Georgia, typically consist of developmental neonatologists/pediatricians, development psychologists, nurses, physical therapists, and social workers. A team of clinicians working together can better serve high-risk infants as they develop physically and neurologically by identifying deviances in developmental progress and then assisting in organizing required intervention programs (1,2).

In 2008, the rate of preterm birth in the United States was 12.3%, and the rate of low birthweight was 8.2% of all live births (3). In recent years, there has been a decrease in infant deaths from prematurity and preterm birth due to scientific advances in

obstetrics and neonatology (3). Infants born before 34 weeks gestation have more gastrointestinal and oral sensory issues; therefore, research on identifying feeding difficulties in preterm and low-birthweight infants is needed (4). If feeding problems can be identified early in life, consequent physiological and emotional complications may be prevented (5).

The staff at the Emory DPC began using the Behavioral Pediatrics Feeding Assessment Scale (BPFAS) (4) with the intention to improve the identification of preterm and/or at-risk children with feeding problems in the first year of life. During the first several weeks of using the instrument (July 12, 2010 – August 31, 2010), they discovered that greater than 50% of the surveys were unscorable because they were not completed accurately and/or completely. The purpose of this study is to determine the usefulness of administering the Behavioral Pediatrics Feeding Assessment Scale (BPFAS) in identifying children at risk for feeding difficulties when given to parents in an interview format by a graduate nutrition student versus without assistance.

We hypothesize that there will be a significant difference in the BPFAS total score obtained when administered in an interview format versus self-completed by the family. Additionally, we hypothesize that the interview method of administration of the BPFAS will be significantly more effective in identifying children with feeding issues than the method of administering the BPFAS without assistance. Lastly, we hypothesize that infants or children of Emory DPC subjects who are referred for a nutrition intervention are significantly more likely to have scored > 84 on the BPFAS.

CHAPTER II

Literature Review

Feeding Difficulties in Preterm and Low Birth Weight Infants

According to the March of Dimes, 1 in 8 babies born in Georgia in 2008 were preterm (less than 37 weeks gestation) and 1 in 10 babies were born with low birthweight (less than 2500 grams) (3). Premature birth is not a direct cause of long-term feeding disorders (6), but with decreasing gestational age comes an increase in morbidities and illnesses, such as necrotizing enterocolitis (NEC), neurological abnormalities, and bronchopulmonary dysplasia (BDP) (3). These complications subsequently cause an increased risk of feeding difficulties in preterm infants. (5).

NEC is seen more often in premature neonates than in term neonates, and one of its early gastrointestinal symptoms is feeding intolerance (7). Neurological abnormalities such as intraventricular hemorrhages and periventricular leukomalacia can effect long-term development and overall feeding success of an infant (6). Bronchopulmonary Dysplasia (BPD), a chronic lung disease, occurs in preterm infants with underdeveloped lungs and an insufficient amount of lung surfactant (6). Infants with BPD often require oxygen and mechanical ventilation (8). Consequently, research shows that infants with BPD require more frequent rest breaks during feeding due to their inability to rhythmically breathe. They also have longer swallows without breathing during feeding than children without the disorder (9). Indeed, a study by Burklow et al. (2002) found that preterm infants were more likely than full term infants to have difficulties with their

first solid feeding, and this relationship was predicted more by those who required ventilation than prematurity factors by themselves (10).

With regard to feeding difficulties and low birthweight, in a study conducted by Rommel et al. (2003), children with feeding issues were found to be at a significantly lower birthweight for their gestational age (11). Moreover, medical feeding problems were significantly correlated to birthweight but not to gestational age (11), suggesting that perhaps infants at a significantly lower birthweight for their gestational age are experiencing feeding difficulties as a result of intrauterine growth retardation (11).

Identification of preterm infants with poor oral-motor function at the time of hospital discharge is an important factor in determining if an infant will require additional feeding services (5). Early oral feeding skills require an infant to coordinate a number of oral-motor skills in order to consume an adequate number of calories to grow (12). Furthermore, infants must remain engaged in the task of feeding, coordinate their breaths with swallows to prevent apnea and aspiration of fluids, and also control the depth of breath and how frequently they breathe while eating (12). Unfortunately, research has found that infants who are identified as normal feeders upon discharge from the NICU can begin showing feeding difficulties at 6 months to 1 year later (13).

Parent Perceptions and Actions

Understandably, many parents of children who are born prematurely and experience other health complications are particularly concerned when their child experiences feeding difficulties (6). According to a questionnaire administered by Cerro et al. (2002), parents of preterm children were more likely to describe their child as being

a poor feeder as an infant and also to perceive their toddler's growth, health and weight as less favorable when compared to parents of a full-term child (14). Unfortunately, excessive concern and altered perception of feeding can lead to the adoption of maladaptive feeding practices, including coaxing, attending to non-eating feeding behaviors, and force-feeding. (6). Forcada-Guex et al. (2006) found that for preterm infants in a dyad of a controlling mother and a compulsive-compliant infant, as defined by the Care Index (Crittenden, 1988), significantly more mother-perceived behavioral problems were indicated and more feeding problems were present than in full-term control infants (15). These infants also had significantly more feeding problems than infants in a sensitive mother and cooperative-responsive infant dyad (15). While mothers' main goal of feeding may be intake, feeding is a co-regulated process that is more successful when flexible and guided by cues from the infant (16).

Silberstein et al. (2009) followed low-risk premature infants and their mothers during the first year of life to determine if the relationship between infant and mother could be a factor in the development of feeding difficulties (17). The researchers categorized infants as either "difficult feeders" or "nondifficult feeders" based on a standardized mother-reported feeding difficulty score as well as a standardized observed feeding difficulty score (17). They found that mothers of infants in the "difficult feeders" group tended to spend more time looking away from the baby and towards the bottle than did mothers of infants in the "nondifficult feeders" group (17). They also found that mothers were more intrusive, and the infants were less involved and more withdrawn in the "difficult feeders" group (17). The researchers concluded that 5 factors were independently predictive of feeding problems at the end of year 1 (17). They were: 1) less

affectionate touch by the mother during nonfeeding “play” interactions; 2) less adaptation by the mother during feeding interactions; 3) lower psychomotor skills of the infant at 4 months; 4) more intrusive behavior by the mother; and 5) less infant involvement during feeding at year 1 (17). These findings suggest that mothers of premature infants should be educated on the importance of touch and gaze while feeding, and the risks associated with intrusive behaviors prior to hospital discharge as a way to prevent feeding problems (17).

Feeding Assessment Tools

A review by Howe et al. (2008) examined the psychometric characteristics of neonatal feeding assessment tools. The researchers concentrated on tools that could be conducted in a clinical center without additional equipment, included a list of infant feeding behaviors, and were tested on human beings (18). From these criteria, they found seven neonatal feeding assessment tools, among them being the Early Feeding Skills (EFS) by Thoyre, Shaker, and Pridham (2005) and the Neonatal Oral-Motor Assessment Scale (NOMAS) by Braun & Palmer (1986).

The EFS is a 36-item checklist that examines oral feeding readiness, oral feeding skill, and oral feeding recovery (12,18). The authors believe that early feeding skills may differ from feeding to feeding or even within a single feeding, and therefore these skills should be expressed within a range (12). The assessment is observational, and can be used from initiation of oral feeding until maturation of oral feeding (12). Oral feeding skills are scored based on a whole feeding and describe the degree of ability and/or inability of the infant to perform a particular skill throughout the observation (12). Caregivers are able to follow skill development, design interventions, and evaluate the

interventions based on the checklist (12). The EFS is used for bottle-feeding behaviors only and has been found to have acceptable inter- and intra-rater reliability and acceptable content validity (18).

The NOMAS is used to examine oral-motor skills of neonates who exhibit reflexive sucking (19). The assessment is a visual observation method performed by a trained clinician (18,20), and consists of a 28-item checklist that divides a neonate's oral-motor feeding patterns into normal, disorganized, or dysfunctional. According to Howe et al. (2008), the NOMAS has two advantages over the seven other neonatal feeding assessment tools, including the EFS. First, the NOMAS has been looked at by researchers more extensively, and has more consistency in psychometric properties (18). Also, the NOMAS is more flexible, in that it can be used with either breast or bottle-feeding and can also be used with preterm or full-term babies (18). However, the NOMAS should not be used to assess any other facet of feeding other than oral-motor skills (18).

The BPFAS, the assessment tool being used in the current study, is a 35 item scale developed by Crist and Napier-Phillips in 2001 (4) (Appendix A). In their initial study of this parent survey tool, Crist and Napier-Phillips used the BPFAS to compare feeding and mealtime behavior of healthy, normally-developing children with two different groups of children referred for feeding problems (4). Of the two groups with feeding problems, one had medical issues related to feeding while the other did not have feeding-related medical issues (4). The BPFAS was administered to parents of all three groups and the results were compared. The researchers found that for the groups referred

for feeding problems, the frequency and problem scores were more than 2 standard deviations above the means of the normally-developing group (4).

The clinicians at Emory DPC chose to use the BPFAS as a feeding assessment tool because it has been shown to accurately identify feeding issues in children with a range of medical conditions including cystic fibrosis and diabetes, as well as children with oral aversion and those requiring gastrostomy tube feedings (4). It also incorporates the caregiver's feelings about their child's feeding behaviors and is validated for use in a similar age group as those patients seen at Emory DPC (4).

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CHAPTER III

Manuscript in style of Journal

1 **AUTHOR'S PAGE**

2 Administration of the Behavioral Pediatrics Feeding Assessment Scale (BPFAS) to
3 Parents of High-risk Infants: How to Best Identify Those at Risk for Feeding Difficulties

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8 Monica Victoria Evans, MS, RD, LD; 3890 Carlton Drive, Atlanta, GA 30341; Phone:
9 (336) 817-2788; monica.olejarczyk@gmail.com

10 Sheena L. Carter, PhD; Assistant Professor Neonatology; Department of Pediatrics,
11 Emory University School of Medicine; 2015 Uppergate Dr. NE, Atlanta, GA 30322;
12 Phone: (404) 778-1451; scart01@emory.edu

13 Sarah T. Henes, PhD, RD, LDN; Assistant Professor; Byrdine F. Lewis School of
14 Nursing and Health Professionals, Georgia State University; P.O. Box 3995, Atlanta,
15 Georgia 30302-3995; Phone: (404) 413-1241; Fax: (404) 413-1228; shenes@gsu.edu

16 Anita M. Nucci, PhD, MPH, RD, LD; Assistant Professor and Division Head; Byrdine F.
17 Lewis School of Nursing and Health Professionals, Georgia State University; P.O. Box
18 3995, Atlanta, Georgia 30302-3995; Phone: (404) 413-1234; Fax: (404) 413-1228;
19 anucci@gsu.edu

20 ABSTRACT

21 The purpose of this study was to determine the efficacy of the Behavioral Pediatrics
22 Feeding Assessment Scale (BPFAS) in identifying children at risk for feeding
23 difficulties when given to parents in an interview format versus without assistance.
24 Parents/guardians of clinic patients were randomized to receive the BPFAS either by
25 interview or without assistance. Demographic and anthropometric data as well as
26 nutrition referral status were documented during the clinic visit. The survey was
27 scored using a computer-based program. Mean BPFAS scores were compared by
28 survey administration method and nutrition referral status using the t-test. The
29 analysis was also conducted by age (≤ 1.5 years, > 1.5 year) and weight status ($< 25^{\text{th}}$
30 percentile, 25-75th percentile, $> 75^{\text{th}}$ percentile) subgroups. The association between
31 survey administration method as well as nutrition referral status and referral score
32 category (≤ 84 or > 84) was determined using the Chi-square test. The relationship
33 between nutrition referral status and the response to each BPFAS question was also
34 examined using the Chi-Square test. Thirty subjects from Emory DPC participated in
35 the study (mean age 71 weeks \pm 26.9, mean gestational age 29 weeks \pm 4.4, 56.7%
36 African American, 36.7% Caucasian, 3.3% Asian, 3.3% Other). No difference in
37 mean BPFAS score or referral score category by survey administration method was
38 found in the total cohort. However, a higher BPFAS score was observed for children
39 > 1.5 years of age who were referred for nutrition intervention vs. not referred (95.33
40 vs. 62.5, respectively; $p=0.004$). There was also a significant association between the
41 number of patients referred for nutrition intervention vs. not referred and referral

42 score (11 vs. 19, respectively; $p=0.041$). No difference in the ability of the BPFAS to
43 determine nutritional risk was observed by weight status. There was also no
44 association between responses to individual BPFAS survey questions and nutrition
45 referral status. In conclusion, there was no difference in the BPFAS total score
46 obtained when administered in an interview format versus self-completed by the
47 family. There was also no difference in the effectiveness of the BPFAS in identifying
48 children with feeding difficulties based on method of administration (interview versus
49 no interview). Evaluation of other feeding assessment surveys or the in-house
50 development of a screening tool may be better alternatives for the Emory DPC.

51 The Administration of the Behavioral Pediatrics Feeding Assessment Scale (BPFAS) to
52 Parents of High-risk Infants: How to Best Identify Those at Risk for Feeding Difficulties

53 **INTRODUCTION**

54 According to the American Academy of Pediatrics, high-risk neonates can be
55 classified into 4 categories: 1) preterm infants; 2) infants with special health care needs or
56 dependence on technology; 3) infants at risk due to family issues; and 4) infants with
57 anticipated early death (1). High-risk neonates often require hospitalization in the
58 neonatal intensive care unit (NICU), and once discharged from the hospital, careful
59 planning by hospital staff is needed to ensure that infants are adequately followed (1).
60 One such follow-up resource available for assessing developmental progress of high-risk
61 infants is a multidisciplinary developmental progress care team. Multidisciplinary
62 developmental progress care teams, such as the Emory Developmental Progress Clinic
63 (Emory DPC) in Atlanta, Georgia, typically consist of developmental
64 neonatologists/pediatricians, development psychologists, nurses, physical therapists, and
65 social workers. A team of clinicians working together can better serve high-risk infants
66 as they develop physically and neurologically by identifying deviances in developmental
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69 low birthweight was 8.2% of all live births (3). In recent years, there has been a decrease
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71 obstetrics and neonatology (3). Infants born before 34 weeks gestation have more

72 gastrointestinal and oral sensory issues; therefore, research on identifying feeding
73 difficulties in preterm and low-birthweight infants is needed (4). If feeding problems can
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76 The staff at the Emory DPC began using the Behavioral Pediatrics Feeding
77 Assessment Scale (BPFAS) (4) with the intention to improve the identification of preterm
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83 identifying children at risk for feeding difficulties when given to parents in an interview
84 format by a graduate nutrition student versus without assistance.

85 We hypothesize that there will be a significant difference in the BPFAS total
86 score obtained when administered in an interview format versus self-completed by the
87 family. Additionally, we hypothesize that the interview method of administration of the
88 BPFAS will be significantly more effective in identifying children with feeding issues
89 than the method of administering the BPFAS without assistance. Lastly, we hypothesize
90 that infants or children of Emory DPC subjects who are referred for a nutrition
91 intervention are significantly more likely to have scored > 84 on the BPFAS.

92 **METHODS**

93 **Study Design**

94 The research design was a randomized trial. After giving consent, the
95 parent/guardian of the clinic patient was assigned to complete the BPFAS either by
96 interview from a graduate student or without assistance based on a randomization order
97 as determined by the urn method. The graduate nutrition student completed a
98 demographics and anthropometrics sheet (Appendix B) for each patient and also
99 documented if the child was referred for nutrition intervention at their clinic visit.
100 Nutrition interventions included: sending the parent/guardian home with a nutrition-
101 related handout, a referral to a speech therapist or other oral-motor specialist, or a diet
102 modification. If a demographic and anthropometric sheet could not be completed during
103 the clinic day, the missing pieces of information were collected at a later time.

104 The study was approved by the Institutional Review Boards of Georgia State
105 University and Emory University. An informed consent and a HIPAA authorization form
106 were signed by each subject prior to participating in the study. Each participant was
107 given a copy of their signed consent and HIPAA form for their records. If the patient's
108 appointment concluded prior to the graduate student giving the subject a copy of the
109 consent forms, the consent forms were mailed to them with the assistance of the nurse
110 practitioner. The completed BFPAS report was stapled to a copy of both consent forms
111 and kept in the medical chart.

112

113

114 **Subjects**

115 The population for this study was the parent/guardian of infants 9 months of age
116 to age 3 corrected, who came for an appointment at the Emory DPC during the data
117 collection period of February 2012 to May 2012. Parents/guardians under the age of 18
118 were excluded.

119 **Data Collection**

120 If the subject was randomized to be given the BPFAS by interview, the graduate
121 student read the survey directions and questions exactly as they appeared on the survey.
122 If the BPFAS was given without assistance, the survey directions were read exactly as
123 they appeared of the survey and then the subject was left to complete the survey.
124 Regardless of the method of administration, the graduate student verified that all
125 questions on the assessment were answered to ensure that all assessments are scoreable.
126 Weight (kilograms) was measured with a digital medical scale. Height (centimeters) was
127 determined using a stadiometer. Infants and toddlers (newborn to 18 months) had their
128 weight and length measured using a digital infant scale and recumbent length board.

129 *The BPFAS*

130 The first 25 items of the BPFAS address the child's behavior and the last 10 items
131 address the parent's feelings about the child's behavior or the parent's strategies for
132 coping with their child's feeding problems (4). Each item consists of a descriptive
133 behavioral phrase that the parent rates on a five-point Likert scale based on how often the
134 behavior occurs (4). After rating the behavior, the parent is asked to indicate if that
135 behavior is a problem for them by circling "yes" or "no."(4)

136 The BPFAS was scored using a computer based scoring program created by the
137 assessment developer. The scoring program totals the Likert scale responses for the child
138 and parent sections, as well as generates four separate scores: child behavior frequency,
139 parent behavior frequency, child behavior problems, and parent behavior problems
140 (Appendix C). The frequency scores reflect how often a behavior occurs, and the problem
141 score represents the number of problematic feeding behaviors. Higher scores for both
142 frequency and problems are an indication of worse mealtime functioning (4, 21). Only
143 the total survey score was evaluated in this study. A score sheet was printed out for each
144 child (Appendix D) and was stapled to the demographics sheet. The BPFAS report,
145 along with a copy of the signed consent forms, was kept in the patient's medical chart.

146 *Data Analyses*

147 The demographic and anthropometric data were analyzed using frequency
148 statistics. The mean calculated questionnaire scores were compared by survey
149 administration method and nutrition referral status (referred for nutrition intervention or
150 not referred) using the t-test. Similar analysis were performed after division into
151 subgroups by age (9 months – 1.5 years and >1.5 years) and weight status as determined
152 using gender specific WHO/CDC growth charts for infants Birth to 24 months and 2 to
153 20 years (weight/length <25th percentile, 25th to 75th percentile and >75th percentile) (22).
154 The total frequency scores were divided into ≤ 84 and > 84 based on a cutoff established
155 by Crist et al. for warranted nutrition intervention (total frequency scores >84) (4). This
156 categorical variable was renamed "referral score." The association between referral score
157 by survey administration method and nutrition referral status was determined using the
158 Chi-square test. The association between nutrition referral status and responses to each

159 BPFAS question was determined using the Chi-Square test. All data analyses were
160 conducted using SPSS (version 18, SPSS, Inc; Chicago, IL). The p-value was set at
161 <0.05.

162 **RESULTS AND DISCUSSION**

163 A total of 30 parents/guardians of infants 9 months to 3 years corrected age
164 participated in the study. Of those parents/guardians approached to participate in the
165 study, only two declined to participate. Twenty-five subjects were mothers, three were
166 fathers, and the remaining two were an aunt and a grandfather. The aunt and grandfather
167 identified themselves as guardians. Fourteen parents/guardians were randomized to
168 complete the BPFAS by interview, and 16 were randomized to complete the assessment
169 without assistance. The demographic and anthropometric characteristics for all patients as
170 well as the patients divided into two groups based on survey administration method are
171 shown in Table 1. The majority of the total patient population was African American
172 and subdivided somewhat evenly by age group and weight status. The patients in the
173 interview group were significantly smaller than those in the no interview group (9.4 vs.
174 11.2 kg, $p=0.024$).

175 For BPFAS scores, a total frequency score of greater than 84 was determined by
176 Crist (4) to be significantly greater than the mean, thereby warranting nutrition
177 intervention. The total frequency score incorporates the parent frequency score and the
178 child frequency score. The mean total frequency score for the cohort was 64.9 ± 16.7 ,
179 with only three patients scoring greater than 84. Notably, these three patients were born
180 at either 24 or 25 weeks gestation, and two of the three had a gastrostomy tube. Mean
181 BPFAS scores by survey administration method for the cohort and by age and weight

182 status are shown in Table 2. The mean scores by survey administration method were 64.6
183 ± 20.6 and 65.1 ± 13.0 for the interview and self-completed groups, respectively, and
184 were not significantly different.

185 Despite there being only three patients who scored greater than 84 on the
186 assessment, eleven of 30 patients were referred for nutrition intervention by the Emory
187 DPC staff. Five were given a diet modification, two were given outside referrals (GI and
188 speech therapy), and four were given a nutrition-related handout. The eight patients who
189 were did not score > 84 on the BPFAS but were referred for a nutrition intervention at
190 their clinic visit had an mean BPFAS score of 57. Mean BPFAS scores by survey
191 administration group and referral status are shown in Table 3. Patients age 1.5 years and
192 older, who were referred for nutrition intervention, had significantly higher total
193 frequency scores than those who were not referred for nutrition intervention (82.4 vs.
194 63.9, respectively; $p=0.035$). The tool was not shown to be effective in younger children
195 and was not affected by the weight status of the child.

196 Table 4 shows the associations between survey administration method and referral
197 status by referral score for the entire cohort. No association between survey
198 administration method and referral score (≤ 84 or > 84) was observed. However, there
199 was a significant association between referral for nutrition intervention and referral score
200 ($p=0.041$). No association was found between responses to individual BPFAS survey
201 questions and nutrition referral status.

202 *Study Limitations*

203 This study has several limitations. In addition to the small sample size, the
204 BPFAS was not designed to be read aloud, thereby making it difficult to administer the

205 survey tool in an interview fashion. The assessment also took a long time to complete
206 even though the survey questions were not comprehensive. When the assessment was
207 administered as an interview, parents often questioned how they should answer questions
208 about consuming fruits, vegetables, and meats if their child only consumed baby food. A
209 particularly problematic question was #25: “Has required supplemental tube feeds to
210 maintain proper nutritional status.” The question caused confusion because the child may
211 have required a tube feed in the NICU but no longer does. With so many uncertainties
212 arising during the interview format, it brings to question the number of uncertainties
213 experienced by parents/guardians completing the survey without assistance.

214 In terms of the comprehensiveness of the BPFAS, diagnosed and undiagnosed
215 aspiration problems, as well as thickened feeds are not addressed in the BPFAS. With
216 regard to timing, the BPFAS took a substantial amount of time to complete, especially
217 considering the frequent distractions from clinicians entering and exiting the exam room
218 and a young child (the patient) requiring constant monitoring. The Emory DPC is a very
219 busy clinic, with 3 to 4 appointments often occurring simultaneously. An extra ten
220 minutes added to an already extensive appointment caused some parents to become
221 anxious and eager to leave. Although parental reports of regularly-occurring feeding
222 behaviors can be more beneficial than observing one feeding session in a controlled
223 environment, when parents become anxious and/or frustrated, the potential for bias are
224 possible (23). Also noteworthy is the fact that the BPFAS was developed for use on
225 children who had already been referred for feeding problems, not as a screening tool.

226 Several other research studies have used the BPFAS as a study instrument;
227 however, all of them concentrated on measuring parental perception of their child’s

228 feeding problems, not identifying children at risk for feeding problems. Owen et al.
229 (2012) administered the BPFAS before and after a five session education intervention
230 focusing on modification of mealtime strategies for parents of children referred for
231 feeding problems. The goal of the intervention was to effectively educate parents so that
232 their child would develop valuable functional feeding skills (24). The researchers found
233 that after the education intervention, BPFAS scores for feeding difficulties and also
234 frequency of parental problems significantly decreased. Jones and Bryant-Waugh (2012)
235 had parents complete the parent section of the BPFAS at baseline and every week during
236 a six week intervention program aiming to improve parental concerns and maladaptive
237 feeding-related behaviors. They found a significant decrease in the severity and number
238 of parent-reported problematic child behaviors related to feeding from baseline to post
239 intervention (25). Patton et al. (2009) compared parent feeding strategies and parent-
240 reported mealtime behaviors in type 1 diabetic children on conventional therapy versus
241 an insulin pump. After analyzing BPFAS scores, the researchers found that parents of
242 children with an insulin pump reported significantly less parent and child mealtime
243 behavior problems than did parents whose children use conventional therapies (21).

244 **CONCLUSIONS**

245 There was no difference in the BPFAS total score obtained when administered in
246 an interview format versus self-completed by the family. There was also no difference in
247 the effectiveness of the BPFAS in identifying children with feeding difficulties based on
248 method of administration (interview versus no interview). Evaluation of other feeding
249 assessment surveys or the in-house development of a screening tool may be better
250 alternatives for the Emory DPC. A validated in-house created feeding assessment would

251 allow for flexibility in the types of questions asked, the format in which they are asked,
252 and in the amount of time it would take to complete the assessment. If the Emory DPC
253 did decide to continue using the BPFAS as a screening tool, it is recommended that they
254 consider decreasing the nutrition intervention cutoff score.

255 Tables

256 Table 1. Characteristics of Emory DPC Patients

	Total N=30	BPFAS		Significance (p-value)
		Interview N=14	No Interview N=16	
Age in Weeks* (mean \pm SD)	71 \pm 26.9	64 \pm 28.9	77 \pm 24.3	0.186
Age Group* [n, (%)]				
\leq 1.5 years	14 (46.7)	9 (64.3)	5 (31.3)	0.07
>1.5 years	16 (53.3)	5 (35.7)	11 (68.8)	
Gestational Age in weeks (mean \pm SD)	29 \pm 4.4	28 \pm 4.7	29 \pm 4.2	0.54
Gender [n, (%)]				
Male	15 (50)	5 (35.7)	10 (62.5)	0.143
Female	15 (50)	9 (64.3)	6 (37.5)	
Race [n, (%)]				
Caucasian	11 (36.7)	4 (28.6)	7 (43.8)	0.431
African American	17 (56.7)	8 (57.1)	9 (56.3)	
Asian	1 (3.3)	1 (7.1)	0 (0)	
Other	1 (3.3)	1 (7.1)	0 (0)	
Weight in Kg (mean \pm SD)	10.4 \pm 2.2	9.4 \pm 1.7	11.2 \pm 2.4	0.024

Weight Status				
[n, (%)]	10 (33.3)	7 (50)	3 (18.8)	
<25 th %ile	12 (40)	6 (42.9)	6 (37.5)	0.05
25-75 th %ile	8 (26.7)	1 (7.1)	7 (43.8)	
>75 th %ile				
Length in cm				
(mean \pm SD)	78.8 \pm 8.3	75.8 \pm 6.8	81.4 \pm 8.7	0.062
Length Status [n, (%)]				
<25 th %ile	12 (40)	8 (57.1)	4 (25)	0.190
25-75 th %ile	11 (36.7)	4 (28.6)	7 (43.8)	
>75 th %ile	7 (23.3)	2 (14.3)	5 (31.3)	

257 *Corrected age

258 Table 2. Mean BPFAS Scores by Survey Administration Method for the Cohort and by
 259 Age and Weight Status

Total BPFAS Score (mean + SD)	N	Survey Administration Method		Significance (p-value)
		Interview N=14	No Interview N=16	
Total Cohort	30	64.6 ± 20.6	65.1 ± 13.0	0.947
Age Category				
≤1.5 years	14	59.4 ± 19.3	59.2 ± 4.1	0.979
>1.5 years	16	74 ± 21.7	67.7 ± 14.8	0.507
Weight Status				
<25 th	10	74.7 ± 24.6	71 ± 32.1	0.845
25 -75 th	12	54.8 ± 9.7	63.8 ± 6	0.083
>75 th	8	53 ± 0	63.6 ± 5	0.097

261 Table 3. Mean BPFAS Scores by Referral Status for the Cohort and by Age and Weight
 262 Status

Total BPFAS Score (mean + SD)	N	Referral Status		Significance (p-value)
		Yes N=11	No N=19	
Total Cohort	30	70.4 ± 24.8	61.7 ± 8.7	0.173
Age Category				
≤1.5 years	14	60.3 ± 21.3	58.6 ± 10.5	0.846
>1.5 years	16	82.4 ± 25.4	63.9 ± 6.8	0.035
Weight Status				
<25 th	10	78.7 ± 31.3	66 ± 12.3	0.469
25 -75 th	12	60.3 ± 11.4	59 ± 8.9	0.837
>75 th	8	60.5 ± 10.6	62.8 ± 5.1	0.668

263

264 Table 4. Associations between Survey Administration Method and Referral Status with
 265 Referral Score for the Total Cohort

	N	Referral Score Category		Significance (p-value)
		Negative (≤ 84) N=27	Positive (> 84) N=3	
Survey Administration Method [n, (%)]	14	12 (80)	2 (20)	0.586
Interview	16	15 (94)	1 (6)	
No Interview				
Nutrition Referral [n, (%)]				0.041
Referred	11	8 (73)	3 (27)	
Not Referred	19	19 (100)	0 (0)	

266

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- 332

333 Appendix A

Behavioral Pediatrics Feeding Assessment - Behavior Section

Child's Name: _____ Date of Birth: ___/___/___ Person Completing this Form _____

Directions: Below are a series of phrases that describe children's eating behaviors and parent's feelings about or strategies for dealing with these behaviors. Please: 1) circle the number describing how often the behavior currently occurs and 2) circle "yes" or "no" to indicate whether the behavior is currently a problem to you.

	NEVER	SOMETIMES	ALWAYS	PROBLEM			
MY CHILD:				FOR YOU			
1. Eats fruits.	1	2	3	4	5	YES	NO
2. Has problems chewing food.	1	2	3	4	5	YES	NO
3. Enjoys eating.	1	2	3	4	5	YES	NO
4. Chokes or gags at mealtime.	1	2	3	4	5	YES	NO
5. Will try new foods.	1	2	3	4	5	YES	NO
6. Eats meat and/or fish.	1	2	3	4	5	YES	NO
7. Takes longer than 20 minutes to finish a meal.	1	2	3	4	5	YES	NO
8. Drinks milk.	1	2	3	4	5	YES	NO
9. Comes readily to mealtime.	1	2	3	4	5	YES	NO
10. Eats junky snack food but will not eat at mealtime.	1	2	3	4	5	YES	NO
11. Vomits just before, at, or just after mealtime.	1	2	3	4	5	YES	NO
12. Eats only ground, strained or soft food.	1	2	3	4	5	YES	NO
13. Gets up from table during meal.	1	2	3	4	5	YES	NO
14. Lets food sit in his/her mouth and does not swallow it.	1	2	3	4	5	YES	NO
15. Whines or cries at feeding time.	1	2	3	4	5	YES	NO
16. Eats vegetables.	1	2	3	4	5	YES	NO
17. Tantrums at mealtimes.	1	2	3	4	5	YES	NO
18. Eats starches (for example, potato noodles).	1	2	3	4	5	YES	NO
19. Has a poor appetite.	1	2	3	4	5	YES	NO
20. Spits out food.	1	2	3	4	5	YES	NO
21. Delays eating by talking.	1	2	3	4	5	YES	NO
22. Would rather drink than eat.	1	2	3	4	5	YES	NO
23. Refuses to eat meals but requests food immediately after the meal.	1	2	3	4	5	YES	NO
24. Tries to negotiate what s/he will eat and what s/he will not eat.	1	2	3	4	5	YES	NO
25. Has required supplemental tube feeds to maintain proper nutritional status.	1	2	3	4	5	YES	NO
PARENT:							
26. I get frustrated and/or anxious when feeding my child.	1	2	3	4	5	YES	NO
27. I coax my child to get him/her to take a bite.	1	2	3	4	5	YES	NO
28. I use threats to get my child to eat.	1	2	3	4	5	YES	NO
29. I feel confident my child gets enough to eat.	1	2	3	4	5	YES	NO
30. I feel confident in my ability to manage my child's behavior at mealtime.	1	2	3	4	5	YES	NO
31. If my child does not like what is being served, I make something else.	1	2	3	4	5	YES	NO
32. When my child has refused to eat, I have put the food in his/her mouth by force if necessary.	1	2	3	4	5	YES	NO
33. I disagree with other adults (for example, my spouse the child's grandparents) about how to feed my child.	1	2	3	4	5	YES	NO
34. I feel that my child's pattern hurts his/her general health.	1	2	3	4	5	YES	NO
35. I get so angry with my child at mealtimes that it takes me a while to calm down after the meal.	1	2	3	4	5	YES	NO

Appendix B

Demographics Sheet

Participant Number: _____

Date: _____

Date of Birth (month/day/year): _____

Gestational age (weeks): _____

Gender (circle one): Male Female

Ethnicity (circle one): Caucasian African American Hispanic Asian Other: _____

Anthropometrics over the past year

Date:	Date:	Date:
Weight (kg):	Weight (kg):	Weight (kg):
Length (cm):	Length (cm):	Length (cm):

Anthropometrics TODAY

Weight (kg): _____

Length (cm): _____

Was the child referred for nutrition intervention(s)? Yes/No

BPFAS completed by (circle one): Mother Father Other: _____

Demographics sheet completed by: _____

Appendix C

BEHAVIOURAL PEDIATRICS FEEDING ASSESSMENT SCORING FORM

1) Add together frequency scores for all questions

Box 1

2) Add together frequency scores for questions 1, 3, 5, 6, 8, 9, 16, 18, 29, 30

Box 2

$$3) \begin{array}{c} \boxed{} \\ \text{Box 1} \end{array} - \begin{array}{c} \boxed{} \\ \text{Box 2} \end{array} = \begin{array}{c} \boxed{} \\ \text{Box 3} \end{array}$$

$$4) 60 - \begin{array}{c} \boxed{} \\ \text{Box 2} \end{array} = \begin{array}{c} \boxed{} \\ \text{Box 4} \end{array}$$

$$5) \begin{array}{c} \boxed{} \\ \text{Box 3} \end{array} + \begin{array}{c} \boxed{} \\ \text{Box 4} \end{array} = \begin{array}{c} \boxed{} \\ \text{Total Frequency Score} \end{array}$$

6) Count number of "YES" problems circled on questionnaire = **Total Problem Score**If Total Frequency Score > 84 then it is *significantly higher than normative mean*If Total Problem Score > 9 then it is *significantly higher than normative mean*

Appendix D

BPFAS SUMMARY

Date: 02/21/2012 ID#: monica2

TOTAL FREQUENCY SCORE: 100 * Significantly higher than normative mean

TOTAL PROBLEM : 2

TOTAL CHILD FREQUENCY SCORE: 71 * Significantly higher than normative mean

TOTAL PARENT FREQUENCY SCORE: 29 * Significantly higher than normative mean

TOTAL CHILD PROBLEM : 2

TOTAL PARENT PROBLEM : 0

ITEMS OF POSSIBLE CONCERN:

- 3) enjoys eating
- 7) takes longer than 20 minutes
- 12) eats only ground, strained or soft food
- 13) gets up from table
- 15) whines or cries at feeding time
- 18) eats starches
- 27) I coax my child to get him/her to take a bite
- 28) I use threats to get my child to eat
- 30) I feel confident in my ability to manage my child's behaviour at mealtime
- 31) If my child does not like what is being served, I make something else
- 32) When my child has refused to eat, I have put the food in his/her mouth by force