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Analysis of Child and Adult Behavioral Variations by Phase of Medical Procedure

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This study examined the behavioral variations of pediatric oncology patients, their parents, and the medical staff across phases of medical procedures. Child coping and distress behaviors, as well as the behaviors of the adults, were considered. Results indicated differences in both level and type of child distress, with distress peaking during the bone marrow aspiration. During the early phases, more anticipatory distress was observed, while later the distress was more demonstrative. The type, but not the level, of child coping varied by phase. During the early, nonpainful phases, more verbal coping (nonprocedural talk and humor by the child) was used, whereas during the later painful phases, there was more audible deep breathing. Certain adult behaviors were shown to be highly correlated with phase-specific coping by the child, whereas other adult behaviors were highly correlated with child distress throughout the procedure.

Pediatric oncology patients undergo painful bone marrow aspirations (BMAs) and lumbar puncture (LP) procedures during treatment. They may exhibit behaviors indicative of distress before, during, and after the experience. An important aspect in the understanding and treatment of distress is how children's distress and coping, and the behavior of adults, vary with the phases of the medical procedure. Children's level and type of distress may vary depending upon whether they are anticipating, or actually experiencing, the painful medical stimulation. Also, the behaviors of adults who are with the child, which may serve as antecedents for distress or coping, probably vary according to phase. Similarly, the use and effectiveness of different coping tech-

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niques may be dependent on the different demands placed upon the child during successive phases of the medical procedure. Assessment instruments designed to measure distress, such as the Procedure Behavior Rating Scale (PBRS; Katz, Kellerman, & Siegel, 1980), the Procedure Behavior Check List (PBCL; LeBaron & Zeltzer, 1984), and the Observation Scale of Behavioral Distress (OSBD; Jay, Ozolins, Elliot, & Caldwell, 1983), have divided BMAs and LPs into various phases, or time periods (see Table 1).

Thus far, two studies have examined variations in distress across phases. Katz et al. (1980), using the PBRS, found that distress behaviors were lowest during the child's approach to the treatment room, increased during preparation for the BMA, and occurred at the highest rate during the painful procedures. All of the painful procedures were combined into phase three, not allowing conclusions to be drawn regarding the differences between the administration of the anesthetic, the lumbar puncture, and the bone marrow aspiration. During the postprocedure phase, children showed less distress than in the immediately preceding phase, but more distress than in the initial approach to the treatment room. In their revision of the scale, the PBRS-R (Katz, Kellerman, & Siegel, 1982), the final phase was eliminated.

Using the PBCL, LeBaron and Zeltzer (1984) found fluctuating combinations of pain and anxiety during the medical procedure. Anxiety tended to be more consistently represented, and pain peaked only at certain times during the procedure. The highest correlations between distress scores and pain (observer-rated and self-reported) were during the second, most painful phase of the BMA. The highest correlation between PBCL scores and observer-rated anxiety was during the first, anticipatory phase.

Also used to study the factors influencing child distress, the Child-Adult Medical Procedure Interaction Scale (CAMPIS) was developed to code interactions in the pediatric treatment room (Blount et al., 1989). The CAMPIS allows categorization of the subject, speaker, phase of the medical procedure, and adult or child vocal content. The possible speakers include the child, resident, nurse, mother, and father. Numerous vocal content categories were used: 16 for child behaviors and 19 for adult behaviors. The verbal events (Bakeman & Gottman, 1986) were coded continuously as they occurred throughout the medical procedures. The child content codes were based primarily on the child pain assessment and treatment literature, as well as on the experimenters' observations during the medical procedures. The child vocal distress codes were partially derived from the work of Jay et al. (1983), and some of the adult content codes were derived from the work of Hops, Wills, Patterson, and Weiss (1972). Several child coping behaviors were also included (Audible Deep Breathing, Nonprocedural Talk by the child, Humor by the child, and Making Coping Statements).

The CAMPIS Phases 1–9 included 3 min of preprocedure time in the treatment room, the soaping before the BMA, the administration of a local anesthetic, the BMA, a postBMA/preLP pause, soaping, administration of another local anesthetic, the LP, and a 2 min postprocedure period, respectively. In the initial investigation using the CAMPIS (Blount et al., 1989), data were analyzed using the entire medical procedure rather than assessing

for different interactional patterns associated with different phases. The results of sequential analyses indicated that adults' Reassuring Comments, Giving Control to the child, Apologies to the child, Empathetic Statements, and Criticism of the child typically preceded child distress. Also, child distress was usually followed by Reassuring Comments, which did not appear to alleviate the distress. Child coping, on the other hand, was most likely to be preceded by adult coaching of the child to use coping behaviors. Coaching most often preceded child Audible Deep Breathing and Making Coping Statements. Child coping was also likely to be preceded by Nonprocedural Talk, and Humor to the child. These adult behaviors seemed to distract the child by encouraging him or her to engage in Nonprocedural Talk and occasionally Humor.

In summary, assessment research in pediatric pain has increased available knowledge of the factors that may influence the levels of distress that children experience. However, there is a paucity of data regarding the effects of the different demands placed upon the child that vary according to medical phase. It appears that distress increases from just prior to the medical procedures until the conclusion of the BMA, whereupon distress returns to near preBMA levels (Katz et al., 1980; LeBaron & Zeltzer, 1984). Also, there is some indication that distress displayed during the prepainful phases is due to anxiety, whereas the distress displayed during the injections and BMAs is due to pain (LeBaron & Zeltzer, 1984). There is a pressing need to better understand the impact of the phase of the medical procedure, not only on the level and type of child distress, but also on the level and type of child coping behaviors. In addition, the influence of adults' behaviors on children's behaviors prior to and during painful events is only starting to be appreciated (Blount et al., 1989; Bush, Melamed, Sheras, & Greenbaum, 1986). Understanding the likely impact on children of phase and adults' behaviors during the different phases increases the probability of designing maximally therapeutic, phase-specific treatment regimens for parents and children.

The current research extends the analysis of the data originally presented by Blount et al. (1989) by examining the effects of the phases of the medical procedures. We expected distress to increase through the BMA and decrease slightly during the LP, and then decrease to near baseline levels after the conclusion of the medical procedure. We also expected that the type of distress would vary with the phase of the procedure, with more apprehensive distress occurring during the anticipatory phase, and more demonstrative types of distress occurring during the painful phases. We also expected differences in both the level and types of coping emitted during different phases. This dynamic view of child coping reflects our belief that children attempt to adjust their coping behaviors according to the changing demands associated with the different phases of the medical procedure. This view is consistent with Lazarus and Folkman's (1984) definition: *"We define coping as constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands* [italics added] that are appraised as taxing or exceeding the resources of the person" (p. 141). We expected children to be distracted by engaging in Nonprocedural Talk and occasionally Humor during the early, prepainful phases. During the most painful phases, we expected the children to be en-

TABLE 1
DISTRESS ASSESSMENT INSTRUMENTS IN PEDIATRIC ONCOLOGY: PHASES OF MEDICAL PROCEDURES

Procedure behavior rating scale revised (PBRS-R; Katz, Kellerman, & Siegel, 1982)	Observation scale of behavioral distress (OSBD; Jay, Ozolins, Elliot, & Caldwell, 1983)	Procedure behavior checklist (PBCL; LeBaron & Zeltzer, 1984)	Child-adult medical procedure interaction scale (CAMPIS; Blount et al., 1989)*
Phase I: Child enters room.	Phase 1: The first 3 min in the treatment room.	Time 1: From when the child entered the treatment room until the aspiration site was cleansed.	Phase 1: Procedures 3 min prior to notification of betadine (cold soap).
	Phase 2: From when the physician entered the room until Phase 3.		Phase 2: First notification of cold soap until first notification of anesthetic.
Phase II: Pre-numb swab, anesthetic.	Phase 3: From the cleansing of the aspiration site through the actual BMA.	Time 2: From when the local anesthetic was administered to when the bone marrow needle was withdrawn.	Phase 3: First notification of anesthetic until first notification of BMA.
			Phase 4: First notification of BMA until actual end of BMA.
			Phase 5: End of BMA until first notification of cleansing for LP.
Phase III: Actual procedure until needle is out.	Phase 4: From the removal of the needle until 1½ min after the procedure.	Time 3: From the postprocedure cleansing until the child left the treatment room.	Phase 6: Notification of soap until notification of anesthetic for LP.
			Phase 7: Notification of anesthetic until LP.
			Phase 8: Notification of LP until end of LP.
			Phase 9: End of LP until 2 min later.

gaged in Audible Deep Breathing more than Nonprocedural Talk. Prior to painful events, most children are able to perform the level of cognitive processing necessary to engage in distracting conversation (e.g., McCaul & Malott, 1984). However, acute pain may limit children's ability to engage in a higher level of cognitive processing. As such, simple coping behaviors, such as engaging in Audible Deep Breathing, should be preferred.

It should also be noted that children typically do not perform coping behaviors without prompting by adults (e.g., Dahlquist et al., 1986; Jay, Elliott, Katz, & Siegel, 1987). Without appropriate adult intervention, the most probable child behavior prior to and during a painful event is distress in some form. The probability of a child performing a particular coping behavior should be increased in the presence of specific prompts by adults. These hypotheses are based primarily on social learning theory and operant models. Given the findings in our earlier research using sequential analyses (Blount et al., 1989), and our expectations regarding child behavioral variations across phases, we expected adults' Nonprocedural Talk and Humor to the child (distraction) to occur more often during the earlier phases than the later painful ones. On the other hand, Commands to Use Coping Strategies (typically, "Breathe") should occur more often during the painful phases. We also expected that the degree to which adults engaged in coping promoting behaviors (Nonprocedural Talk and Humor to the child, and Commands to Use Coping Strategies) would correlate positively with the degree to which children used the corresponding coping behaviors (Nonprocedural Talk and Humor, and Deep Breathing, respectively) at that time, and would correlate negatively with child distress. Conversely, the adult behaviors that had been shown to be associated with child distress were expected to covary with child distress both within phase and during later phases. Finally, we expected both adults' and children's behaviors early in the procedures to correlate with their behaviors during later phases.

METHOD

Subjects

The subjects were 13 boys and 9 girls between the ages of 5 and 13 years (M = 117 months; SD = 39 months) who were diagnosed as having acute lymphocytic leukemia, the parent(s) of those children, and the medical staff who were present during the BMA and LP procedures. The medical staff included the resident who performed the procedure and at least one of two nurses. Eight of the children received only the BMA and 14 received both the BMA and LP. The mean length of the treatment was 22 min (SD = 10 min). Seven of the children were treated on an outpatient basis. The children were at various stages in the progression and treatment of the disease. The mean length of time since their initial diagnosis was 40 months (SD = 52 months). Neither the children nor the parents had received any systematic, formal training in coping procedures. All procedures took place in a hospital treatment room. Informed consent was obtained from the parent(s) and assent was obtained from the child.

The first author and/or a research assistant were present in the treatment room, but did not interact with the children or adults during the procedures. Medical staff, parents, and children were asked to behave as usual. Since the research was conducted at a teaching hospital, it was not uncommon to have additional personnel present during medical procedures.

Measurement

Audiotapes were made of the BMA/LP treatment procedures. Recording started 3 min prior to the application of Betadine and ended 2 min after completion of the final medical procedure. From these audiotapes, transcripts were made of the verbal interactions that occurred during the treatment. The transcripts and audiotapes were coded using the Child-Adult Medical Procedure Interaction Scale (CAMPIS; Blount et al., 1989). The child coping behaviors included Nonprocedural Talk by the child and Humor by the child (both of which indicate distraction from the medical procedure), Audible Deep Breathing, and Making Coping Statements. These behaviors are commonly considered to be indicative of coping (e.g., Jay, 1988; McCaul & Malott, 1984). It should be noted that the coping procedures indicated above were used even though the subjects were not trained in their use. It is possible that the children or adults were exposed to these procedures through childbirth classes, stress management classes, or the media.

Based upon the results of the sequential analysis research conducted earlier (Blount et al., 1989), the original adult CAMPIS codes were combined for purposes of this investigation into three code groupings: Adult Neutral, Coping Promoting, and Distress Promoting. The child codes were combined into Coping, Distress, and Child Neutral, on empirical and conceptual bases. This recombination of the 32 CAMPIS codes into 6 code groupings comprises the CAMPIS-R (see Tables 1 and 2). Complete copies of the CAMPIS and CAMPIS-R are available upon request.

Dependent Variables

The proportions of child Coping behaviors and the two subtypes of child Coping, Verbal Coping (Nonprocedural Talk and Humor by the child) and Audible Deep Breathing, as well as the proportion of child Distress (all child distress behaviors) and the two subtypes of Distress, Apprehensive Distress (seeking Emotional Support, Information Seeking and Verbal Fear) and Demonstrative Distress (Crying, Screaming, expressing Verbal Emotion, Verbal Pain, and Verbal Resistance), were used in this investigation. Making Coping Statements was omitted from the Coping subtype of Verbal Coping because it occurred only 17 times in the data base. The proportions of each of these variables were determined by dividing the number of occurrences of each by the total number of child behaviors emitted per phase. The proportions of two subtypes of adult Coping Promoting behaviors (Nonprocedural Talk + Humor to the child, and Commands to Use Coping Strategies) as well as Distress Promoting behaviors, were selected for inclusion in this investigation (see Table 2). The proportions were determined by dividing the number of occur-

TABLE 2
CAMPIS-R CODES AND OTHER CODE GROUPINGS USED IN THIS STUDY

CAMPIS-R	Additional groupings used in this study
ADULT VOCALIZATION	
Coping promoting	
Nonprocedural talk to child, Humor to child, Command to use coping strategy	Nonprocedural talk + Humor to the child
	Command to use coping Strategy
Distress promoting	
Reasuring comments, Criticism, apology, Giving Control to Child, Empathy	
Adult Neutral	
Humor to Adults, Nonprocedural Talk to Adults, Procedural Talk to Adults, Child's Condition Talk, Command for Procedural Activity, Praise, Notification of Procedure to Come, Behavioral Commands to Child, Checking Child's Status	
CHILD VOCALIZATION	
Coping	Verbal Coping
Audible Deep Breathing, Nonprocedural Talk by child, Humor by child, Makes Coping Statements	Nonprocedural Talk, Humor by the child
	Audible Deep Breathing
Distress	Apprehensive Distress
Cry, Scream, Verbal Resistance, Request Emotional Support, Verbal Fear, Verbal Pain, Verbal Emotion, Information Seeking	Request Emotional Support, Information Seeking, Verbal Fear
	Demonstrative Distress
Child Neutral	Cry, Scream, Verbal Resistance, Verbal Pain, Verbal Emotion
Child Informs About Status, Request Relief from Nonprocedural Discomfort, Assertive Procedural Verbalization	

Note. The code groupings that were used in this study are underlined. The CAMPIS-R adult codes were empirically derived from previous research (Blount et al., 1989). The CAMPIS-R child code groupings were empirically and conceptually derived. Each of the codes under the six CAMPIS-R codes are from the CAMPIS.

rences of each of these adult behaviors by the total number of adult behaviors emitted per phase. Proportions were selected as the units of analysis in order to more accurately reflect the types of vocalizations emitted by children and adults producing low, as well as high, numbers of vocalizations within any time period. Proportions provide a standard metric which is not dependent upon either the length of phases, the total number of vocalizations, or the rate of vocalizations produced.

Rater Training. A total of six undergraduate raters completed a 3-month training program. Initially, they studied the CAMPIS and the coding procedures. The raters then practiced coding sections of training transcripts, which had previously been coded by the first author and an assistant. The raters coded independently, with subsequent discussion of their responses. Upon meeting the criterion of 80% agreement with the training transcripts for three consecutive days, raters coded actual transcripts. When coding transcripts for data analysis, raters would initially code a transcript, then listen to the recording. Listening to the recordings was necessary because Humor and Criticism were partially defined by having elicited laughter and by harshness of voice tone, respectively.

Transcription and Coding. The transcripts were constructed by one of three undergraduates and one graduate student. Each transcript was reviewed by a minimum of three people prior to coding in order to assure that it accurately reflected the speaker, content, and sequence of the vocalizations. Occasionally, the content of vocalizations was not identifiable. This was indicated on the transcripts, and the unidentifiable vocalizations were coded as "Other."

Crying and Screaming occurred continuously during some periods. When this happened, they were arbitrarily transcribed and coded as every third content code during the period in which they occurred. The rationale for this was that particular cues would be related to both their beginning and duration. Crying and Screaming also could be coded simultaneously with other child content codes, if the vocalization also fit the definition for another code.

Reliability. Interrater reliability was assessed with the use of independent raters on 25% of each transcript, scoring either the first, second, third, or fourth quarter of the transcript. The quarter was randomly varied. Six raters coded the data, using different pairings of observers. Since the raters scored transcripts or tapes, it was not necessary for raters to code simultaneously. Reliability was calculated for each of the 35 individual CAMPIS codes using the formula for percentage agreement (e.g., Gelfand & Hartmann, 1984). Three behaviors were eliminated from further consideration because the percentage agreement was below 70% (Suggestions for Managing Child Behavior [40%]), Current General Status Comments [68%], and Child's General Condition Related Talk [67%]). The mean percentage agreement for the 32 remaining codes was 89%, with a range from 71% to 100%.

Data Analysis

Child behaviors. Differences in the proportions of child Distress among the nine phases of the medical procedure were examined using Friedman analysis

of variance (ANOVA) with Wilcoxon signed ranks tests used for planned comparisons of differences in levels between specific phases. Additional analyses were conducted to examine differences between the levels of the two subtypes of Distress, Apprehensive and Demonstrative, between phases 1 + 2 and phase 4. Phases 1 and 2 were combined because they preceded any painful stimulation, whereas phase 4, the BMA, generally has been considered to be the most painful phase (e.g., Jay et al., 1983). These data were analyzed first using a Friedman ANOVA, with Wilcoxon tests used for planned follow-up comparisons. Finally, Spearman rank order correlation coefficients were calculated to examine the covariations between Distress in phases 1 + 2 and Distress in phase 4, between Apprehensive Distress in phases 1 + 2 and Distress in phase 4, and between Demonstrative Distress in phases 1 + 2 and Distress in phase 4.

Parallel analyses were conducted for the child Coping behaviors. Differences in the proportions of Coping among the phases were assessed. In addition, the differences in the levels of the two subtypes of Coping behaviors, Verbal Coping and Audible Deep Breathing, in phases 1 + 2 and phase 4 were examined. Spearman correlation coefficients were calculated to examine the covariation between the overall level of Coping in phases 1 + 2 and phase 4.

Adult behaviors. Differences among the proportions of the two subtypes of Coping Promoting behaviors (Nonprocedural Talk + Humor to the child, and Commands to Use Coping Strategies) in phases 1 + 2 and phase 4 were first examined using a Friedman ANOVA, with Wilcoxon tests used for the four planned follow-up tests. Spearman correlations were calculated to examine covariations between the levels of adult Nonprocedural Talk + Humor to the child in phases 1 + 2 and Commands to Use Coping Strategies in phase 4. This was done in order to determine if there was a generalized skill adults used to promote coping by children, or if promoting coping was a situation-(phase-) specific behavior. Similarly, Spearman correlations were calculated to examine the covariation between adult Distress Promoting behaviors in phases 1 + 2 and phase 4.

Adult-child behaviors. Spearman correlations were calculated to examine the covariation between the following behaviors and phases: Adult Nonprocedural Talk + Humor in phases 1 + 2 with child Verbal Coping and Distress in phases 1 + 2, adult Nonprocedural Talk + Humor to child in phases 1 + 2 with child Breathing and Distress in phase 4; the levels of adult Commands to Use Coping Strategies in phase 4 with child Breathing and Distress in phase 4; the levels of adult Distress Promoting behaviors in phases 1 + 2 with child Distress in phases 1 + 2 and phase 4; and the level of Distress Promoting behaviors in phase 4 with Distress in phase 4.

RESULTS

Results for Child Distress Behaviors

The results of the Friedman ANOVA indicated that there was a significant effect of phase on level of Distress, $\chi_r^2 = 14.9$ ($df = 8, p < .06$), meaning that Distress varies as a function of the phase of the medical procedure. Wilcoxon

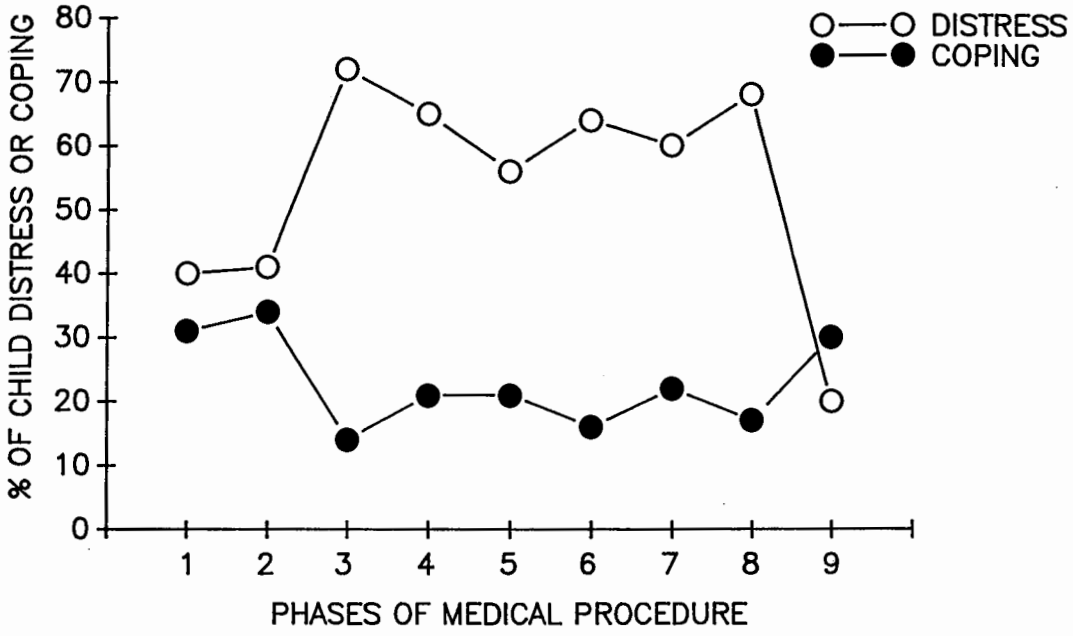

FIG. 1. Percentage of child Distress and Coping as a function of the phase of medical procedure. Significant differences in the levels of Distress were found between phases 2 and 3, and between phases 8 and 9.

signed ranks tests were used to conduct planned follow-up comparisons. There were two significant differences: There was an increase in Distress from the application of soap (Phase 2) to the administration of the local anesthetic (Phase 3) before the BMA ($p < .03$), and there was a decrease in Distress from the LP, Phase 8, to the postprocedure period, Phase 9 ($p < .006$).

In the second data analyses, the Friedman ANOVA comparing the proportions of Apprehensive and Demonstrative Distress during phases 1 + 2 and during phase 4 was significant, $\chi_r^2 = 24.4$ ($df = 3$, $p < .0001$). Wilcoxon signed ranks tests indicated that the proportion of Apprehensive Distress during early, nonpainful phases of the medical procedure (phases 1 + 2) was greater than the proportion of Apprehensive Distress during the later BMA, phase 4 ($p < .05$). The children's behaviors were coded as Apprehensive Distress a mean of 23% ($SD = 23\%$) of the time during the nonpainful phases, and 13% ($SD = 10\%$) during the BMA. The proportion of Demonstrative Distress was significantly greater during the painful BMA than during the early phases ($p < .002$). Demonstrative Distress comprised a mean of 54% ($SD = 27\%$) of children's behavior during the BMA and 27% ($SD = 22\%$) during the early nonpainful phases. The proportion of Demonstrative Distress was significantly greater than the proportion of Apprehensive Distress during the BMA ($p < .0002$). The proportions of the two types of distress did not differ significantly during the early phases ($p < .27$).

In the third analyses, Spearman rank correlation coefficients indicate that Distress in early phases was correlated with later Distress in the BMA, $r_s =$

.86 ($p < .0005$). A follow-up analysis indicated that early Apprehensive Distress was highly correlated with Distress in phase 4 ($r_s = .54, p < .02$). Early Demonstrative Distress was not significantly correlated with Distress during phase 4 ($r_s = .15, p < .27$).

Results for Child Coping Behaviors

The results of the Friedman ANOVA indicated that there was not a significant overall effect of phase on level of Coping ($p < .76$). Thus we cannot conclude from these data that the absolute level of coping varies as a function of the phase of the medical procedure. A Friedman ANOVA examining differences among Verbal Coping and Audible Deep Breathing in phases 1 + 2 and phase 4 was significant, $\chi_r^2 = 12.7$ ($df = 3, p < .005$). Specific comparisons using Wilcoxon signed ranks tests indicated that, as predicted, Verbal Coping during phases 1 + 2 occurred at a significantly higher proportion than Verbal Coping during the BMA ($p < .001$). Verbal Coping comprised a mean of 27% ($SD = 24\%$) of the children's behavior during the nonpainful phases and 3% ($SD = 8\%$) during the BMA. Also, Audible Deep Breathing occurred more frequently during the BMA than during early phases ($p < .02$). The children's behaviors were coded as Audible Deep Breathing a mean of 14% ($SD = 25\%$) of the time during the BMA; and 2% ($SD = 7\%$) during phases 1 + 2.

Verbal Coping in early phases occurred in a significantly greater proportion than Audible Deep Breathing in the early phases ($p < .002$). Deep Breathing occurred in a significantly higher proportion than Verbal Coping during the BMA ($p < .05$). In the third coping analysis, Spearman rank correlation coefficients indicated that child Coping (Coping Statements, Nonprocedural Talk, Audible Deep Breathing, and Humor) in the early phases was not significantly correlated with Coping during the BMA ($r_s = -.20, p < .20$).

Results for Adult to Adult Behaviors

A Friedman ANOVA examining differences among the combination of Nonprocedural Talk + Humor to the Child and Commands to Use Coping Strategies during phases 1 + 2 and phase 4 was significant $\chi_r^2 = 30.1$ ($df = 3, p < .00001$). The results of Wilcoxon signed ranks tests indicated that the proportion of adult Nonprocedural Talk + Humor directed to the child during the early phases was significantly greater than either their proportion during the BMA ($p < .0002$) or the proportion of Command to Use Coping Strategies during the early phases ($p < .0001$). The proportion of adult Commands to the Child to Use Coping Strategies during the BMA was greater than either its proportion during the early phases ($p < .00005$) or the proportion of adult Nonprocedural Talk + Humor to the child during the BMA ($p < .0001$). Nonprocedural Talk + Humor to the child comprised a mean of 15% ($SD = 13\%$) of adults' behavior during the early phases and 3% ($SD = 6\%$) during the BMA. Commands to Use Coping Strategies (mostly, "Breathe") comprised a mean of 18% ($SD = 9\%$) of adults' behavior during the BMA and 2% ($SD = 3\%$) during the early phases.

Spearman rank correlation coefficients indicated that the proportion of adult Nonprocedural Talk + Humor directed to the child during the early phases

was not significantly correlated with the proportion of adult Commands to Use Coping Strategies during the BMA ($r_s = .15$, $p < .27$). However, the proportion of adult Distress Promoting behaviors during the early phases was significantly correlated with the proportion of those same behaviors during the BMA ($r_s = .64$, $p < .001$). Distress Promoting behaviors comprised a mean of 14% ($SD = 13\%$) of adults' vocal content during the early phases and 27% ($SD = 16\%$) during the later phases.

Results for Adult-Child Behavioral Relationships

The proportion of adult Nonprocedural Talk + Humor directed to the child during the early phases was significantly correlated with the proportion of Verbal Coping (Nonprocedural Talk + Humor by the child) during the early phases ($r_s = .74$, $p < .001$), but not with the proportion of Audible Deep Breathing by the child during the later BMA ($r_s = -.21$, $p < .16$). Also, the proportion of adult Nonprocedural Talk + Humor directed to the child during the early phases showed a small negative correlation with the proportion of child Distress during the early phases ($r_s = -.30$, $p < .10$), but was not related to Distress during the later BMA ($r_s = -.10$, $p < .34$). Adult Commands to Use Coping Strategies (mostly, "Breathe") in the BMA was significantly and positively correlated with Audible Deep Breathing by the child during the BMA ($r_s = .37$, $p < .05$), and significantly and negatively correlated with the proportion of child Distress during the BMA ($r_s = -.40$, $p < .03$).

The proportion of adult Distress Promoting behaviors during the early phases was significantly correlated with the proportion of child Distress during the early phases ($r_s = .40$, $p < .04$) and during the BMA ($r_s = .35$, $p < .07$). Also, the proportion of adult Distress Promoting behaviors during the BMA was significantly correlated with the proportion of Distress during that same phase ($r_s = .51$, $p < .007$).

DISCUSSION

This study indicates that the phase of the medical procedure is an important factor in attempting to understand the multitude of influences on child coping and distress. As such, phase characteristics should be considered when designing therapeutic intervention programs. Results of this study show phase-specific variations in the levels and types of child distress and in the types of child coping behaviors. They also indicate that there are phase-specific patterns in the levels of adult behaviors which previously have been shown to be associated with child coping and distress. Further, the levels of adult and child behaviors covary both within and between phases.

Differences across phases were found in the levels of the child distress, but not in the levels of child coping. Not surprisingly, and consistent with the findings of both Katz et al. (1980) and LeBaron and Zeltzer (1984), distress increased at the beginning of the painful procedure and decreased after the procedures were completed. Also, the children exhibited more Apprehensive Distress during the early, prepainful phases, and more Demonstrative Distress

during the painful BMA. In addition, the level of Apprehensive Distress early in the nonpainful phases explained 29% of the variance in distress displayed by the child during the rest of the procedure. Therefore, the initial level of distress is useful in predicting how the child is going to react to the painful parts of the procedure. This suggests that the display by children of a high proportion of anxious behaviors prior to the painful procedure should cue adults that the child is in need of therapeutic intervention then and during the painful procedures.

Although there were no differences in the levels of coping across phases, perhaps more importantly, there were differences in the pattern of coping behaviors. It would appear that the children, their parents, and the medical staff were interacting in such a way that the type of coping in which the child engaged (Verbal Coping or Audible Deep Breathing) matched the demands of the situation. In the early phases, Verbal Coping occurred at a high level, significantly more than Audible Deep Breathing. This is at a time when the child is anticipating the painful procedures to come. Verbal Coping may serve to distract the child and therefore reduce distress at that time. It was shown that Verbal Coping (Nonprocedural Talk and Humor) decreases as the procedure progresses. It is probably more difficult for the children to distract themselves in this way as the BMA becomes much more painful. Verbal Coping simply may not be a powerful enough coping procedure for use during the most painful phases. Active coping behaviors, such as Audible Deep Breathing, may be more effective for handling the most painful events. During the BMA, Audible Deep Breathing occurred at a proportion four times greater than Verbal Coping. These findings lend themselves directly to the development and assessment of treatment programs designed to accentuate the pattern of coping that occurs naturally. Enhancing simple, effective, preexisting methods of coping may be easier than training children and parents in new techniques.

The variations in adults' behavior across phases were similar to the variations in children's behaviors. Specifically, the behaviors that promoted child Verbal Coping (adult Nonprocedural Talk + Humor to the child) occurred much more often during the anticipatory phases of the medical procedure. These adult cues probably facilitate children's ability to distract themselves; it is easier to have a distracting conversation with someone to talk to. Further, the finding that Commands to Use Coping Strategies (typically, "Breathe") occurred more often during the painful BMA should not be surprising, given that children engage in Audible Deep Breathing more at that time. In previous analyses (Blount et al., 1989), Audible Deep Breathing seldom occurred without being preceded immediately by adults' Commands to Use Coping Strategies. The relationship between adults' use of phase-specific coping promoting behaviors and children's use of phase-specific coping behaviors is further indicated by the large positive correlations between the two that were obtained within phases.

The degree to which coping was phase-specific should be further elaborated. Although adult Nonprocedural Talk + Humor to the child was highly correlated with Child Verbal Coping during the early phases, and adults' Commands to Use Coping Strategies was highly correlated with child Audible Deep

Breathing during the later painful phase, early adult coping promoting behaviors did not correlate with later child Deep Breathing. That is, early adult behaviors associated with child coping (Verbal Coping) were not correlated with a different child coping behavior (Audible Deep Breathing) during a later phase. Therefore, it does not appear that adults promote the general phenomenon of child coping. Instead, they promote specific child coping behaviors that covary with the level of specific adult coping promoting behaviors.

These findings support a dynamic view of child coping, in which the child and adults may adjust their strategies in response to the varying demands of different medical phases. This might be thought of as a special case of a family system, rather than an individual, coping according to different stresses placed upon it. Further, adults' use of Nonprocedural Talk and Humor to the child during the early phases was not correlated with their use of Commands to Use Coping Strategies during the later painful BMA. Also, these findings are in agreement with the anecdotal observations by Jay and her colleagues (Jay et al., 1987; Jay et al., 1983), who observed that there is no generalization of children's use of cognitive-behavioral strategies during the medical procedure unless specific adult cues are provided. This suggests that adults should be taught how to better respond to the changing demands of a stressful situation by adjusting the prompts they provide children; ideally the children are also trained as to how to respond to those adult prompts.

In contrast to the phase-specific nature of adult coping promoting behaviors and child coping behaviors, the early adult distress promoting behaviors were highly correlated with later adult distress promoting behaviors and with child distress in the same and later phases. This suggests that adults' use of distress promoting behaviors should be replaced by those behaviors found to be associated with child coping.

Although this study provides a detailed analysis of the pattern of child and adult behavioral variations across phases of the medical procedure, it also has certain limitations. It was conducted with a relatively small number of subjects from one hospital; there may be different interactional patterns between adults and children in other pediatric treatment facilities. Also, the relatively small number of subjects may have resulted in fewer statistically significant analyses than if larger samples had been used. In addition, there was no control for the effects of age, sex, previous medical experience, or child and parental coping styles. Therefore, conclusions drawn from these data should be taken as general guidelines more than concrete indications of how any particular child, family, and staff will interact at particular times during the medical procedure. It should also be noted that the CAMPIS was used to code vocal, but not motoric, behaviors. Therefore, the influence of variations in the use of touch, eye contact, etc. on child distress and coping was not assessed. Research on the impact of these adult nonverbal behaviors would provide additional information on the impact of the social environment on children undergoing stressful procedures. Finally, it should be noted that the data used in this study were collected using naturalistic observation. As such, neither the results of the earlier sequential analyses research (Blount et al., 1989), nor the current results, can be interpreted as establishing a causal link between

any particular adult and child behavior. For this purpose, experimental investigations based upon these assessment studies are necessary.

What this study does, is further the understanding of the impact of phases of the medical procedure and the social environment on children's likelihood of displaying distress or coping behaviors. These results also lend themselves to the generation of hypotheses that have direct implications for future research. Specifically, researchers should train children how to use coping strategies that are appropriate to the changing demands during the medical procedure, and more effectively train adults to coach children. This approach differs from previous efforts to train parents and children prior to medical procedures (Peterson & Shigetomi, 1981; Pinto & Hollandsworth, 1989; Visintainer & Wolfer, 1975; Zastowny, Kirschenbaum, & Meng, 1986), which have not included phase-specific methods of coping.

These results provide empirically determined guidelines as to which behaviors untrained parents, staff, and children perform to promote child coping and reduce child distress. Other coping behaviors, such as hypnosis, might also be used more or less appropriately at particular points during the medical procedure.

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