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DISSERTATION

Titel der Dissertation

„Miktionszystourethrographie bei 2-8jährigen Kindern:
Zum Einfluss des Verhaltens von im
Untersuchungsraum anwesenden Erwachsenen auf
die kindliche Stressbelastung“

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Zusammenfassung

Die Miktionszystourethrographie (MCU) ist ein in der Kinderradiologie häufig eingesetztes routinemäßiges Diagnoseverfahren des harnableitenden Systems, das aufgrund seines invasiven Charakters mit einer erheblichen Stressbelastung des Kindes wie auch der Eltern einhergehen kann (Agrawalla, Pearce, & Goodman, 2004; Phillips, Watson, & Collier, 1996; Rao, Kennedy, Cohen, & Rosenberg, 2012). Die MCU gilt in der Medizin als Goldstandard zur Diagnose eines Vesicoureteralen Reflux (= Rückfluss des Harns in die Harnleiter bzw. das Nierenhohlraumssystem), der zu einer dauerhaften Schädigung der Nieren führen kann und deshalb rechtzeitig diagnostiziert und behandelt werden muss (vgl. Bundy, 2007; Prasad & Cheng, 2012; Rao et al., 2012; Verrier-Jones, 1999; Williams, Fletcher, Alexander, & Craig, 2008). Ein einmal diagnostizierter Vesicoureteraler Reflux erfordert im Durchschnitt vier MCU-Nachkontrollen in Abständen von ca. einem Jahr (Shortliffe, 1997).

Die psychische Belastung der Kinder durch die MCU ist im klinischen Alltag zwar evident, wird aber in Anbetracht der medizinischen Notwendigkeit der Untersuchung oft zu wenig beachtet bzw. in ihrem Ausmaß unterschätzt. Aus Studien zu invasiven Untersuchungen wie Blutabnahmen, Lumbal- und Knochenmarkpunktionen ist bekannt, dass das Verhalten von im Untersuchungsraum anwesenden Erwachsenen (Eltern / medizinisches Personal) die Stressbelastung des Kindes beeinflussen kann (vgl. Blount et al., 1989; Varni, Blount, Waldron, & Smith, 1995). Entsprechende Studien in Bezug auf die MCU (Salmon & Pereira, 2002; Zelikovsky, Rodrigue, Gidycz, & Davis, 2000) sind rar und aufgrund relativ kleiner Stichprobenzahlen von eher explorativem Charakter. Die vorliegende kumulative Dissertation setzt sich aus drei Beiträgen zusammen und hat das Ziel, grundlegende Daten zum kindlichen Stresserleben sowie zum potentiell distressreduzierenden Einfluss des Verhaltens von im Untersuchungsraum anwesenden Erwachsenen unter besonderer Berücksichtigung der einzelnen Untersuchungsphasen der MCU zu erheben, um daraus Kriterien für eine erfolgreiche Untersuchungsvorbereitung und -unterstützung abzuleiten.

Beitrag 1 vergleicht die Stressbelastung von Kindern und begleitendem Elternteil bei erstmaliger und wiederholt durchgeführter MCU. Wesentlichstes Ergebnis ist, dass sich die kindliche Stressbelastung bei wiederholter MCU nicht von jener bei erstmaliger MCU unterscheidet, die elterliche Stressbelastung bei wiederholter MCU jedoch signifikant geringer ist.

Die Beiträge 2 und 3 beschäftigen sich spezifisch mit der Wirkung häufig gezeigter spontaner Erwachsenen-Verhaltensweisen im Verlauf der MCU. Beitrag 2 fokussiert auf das am häufigsten vorkommende Elternverhalten, die Beruhigung, und untersucht, inwieweit beruhigende Kommentare wie „Ist gleich vorbei“ oder „Ist ja gut“ bzw. Beruhigung mittels „Sch, sch“ in einer Phase der MCU den kindlichen Distress der nächsten Phase beeinflussen können. Hier zeigte sich vor allem, dass beruhigende Interventionen der Eltern nur in der weniger stressreichen Vorbereitungsphase eine Wirkung auf den weiteren Distressverlauf des Kindes haben, wobei Beruhigung mittels „Sch, sch“ den kindlichen Distress der Folgephase signifikant reduzierte, während beruhigende Kommentare diesen erhöhten.

Beitrag 3 geht detailliert auf den Verlauf des kindlichen Distress während der MCU ein und untersucht darüber hinaus die Beziehung von drei von Eltern wie medizinischem Personal häufig gebrauchten Verhaltensweisen, nämlich Ablenkung, Humor und Aufforderung zum Gebrauch von Copingstrategien, zum kindlichen Distress in den einzelnen Phasen der MCU. Aufgrund der häufigen Interaktionen von Eltern und medizinischem Personal in Bezug auf diese Verhaltensweisen wurden die Daten in Beitrag 3 für Eltern und medizinisches Personal gemeinsam ausgewertet. Die Ergebnisse zeigten, dass der kindliche Distress zwischen den einzelnen Phasen der MCU deutlich variiert und auch die Wirkung der Erwachsenen-Verhaltensweisen in den einzelnen MCU-Phasen eine unterschiedliche ist. Während Ablenkung und Humor in einzelnen Phasen mit einem reduzierten kindlichen Distress einhergingen, konnte für Aufforderungen zum Gebrauch von Copingstrategien kein signifikanter Effekt auf den kindlichen Distress nachgewiesen werden.

Die Ergebnisse aus den drei Beiträgen werden am Ende der vorliegenden Arbeit zusammenfassend in Hinblick auf praktische Empfehlungen für eine erfolgreiche Untersuchungsvorbereitung diskutiert.

Abstract

The voiding cystourethrogram (VCUG) is an invasive radiological procedure frequently performed in children that may involve high levels of physical and psychological distress for the child (Agrawalla, Pearce & Goodman, 2004; Phillips, Watson & Collier, 1996; Rao, J., Kennedy, S. E., Cohen, S. & Rosenberg, A.R., 2012). The VCUG is the standard method used to diagnose a vesicoureteral reflux in children (= retrograde flow of urine from the bladder toward the kidney), which may cause permanent damage to the kidneys and therefore requires early diagnosis and treatment (cf. Bundy, 2007; Prasad & Cheng, 2012; Rao et al., 2012; Verrier-Jones, 1999; Williams, Fletcher, Alexander, & Craig, 2008). From initial diagnosis of a vesicoureteral reflux to the successful completion of treatment, children must undergo an average of four VCUGs, usually carried out at intervals of one year (Shortliffe, 1997).

The procedure being medically necessary, the psychological stress of children undergoing VCUG - though evident in most cases – is often neglected or underestimated in everyday clinical routine. Various studies on invasive procedures such as venipunctures, lumbar punctures or bone marrow aspirations indicate that the behavior of adults (parents / medical staff) in the treatment room is likely to influence the child's distress behavior (cf. Blount et al., 1989; Varni, Blount, Waldron, & Smith, 1995). Regarding VCUG corresponding studies are rare and - due to small sample sizes - primarily exploratory in nature (Salmon & Pereira, 2002; Zelikovsky, Rodrigue, Gidycz, & Davis, 2000). The dissertation presented here consists of three articles, which are geared at the collection of scientific data on child distress as well as on the impact of adult behavior on child distress during the different phases of the VCUG. Based on the results, criteria for effective procedure preparation and support are formulated.

Article 1 examines whether stress levels in children and their accompanying parents differ during a first-time and a repeated VCUG. Results showed that the stress levels of children undergoing a repeated VCUG do not differ from those of

children undergoing a VCUG for the first-time, but parental stress levels were significantly lower during repeated VCUGs.

Articles 2 and 3 focus on the effect of some frequently occurring adult behavior styles on child distress during VCUG. Article 2 investigates whether common parental soothing behavior (reassuring comments like “It’s almost over.” or “You’re O.K.” and soothing by “sh, sh”) in one phase of the procedure influences the child’s distress of the following phase. It was shown that parental reassuring comments during the anticipatory phase significantly increase the child’s distress of the following phase, while parental “sh, sh” significantly reduces it. Both parental behaviors showed no significant effect on the child’s distress of the following phase when applied during the procedure itself.

Article 3 investigates the course of child distress and the relationship between three naturally occurring adult behavior styles, that is, distraction, humor and commands to use coping strategies, and child distress during the different phases of the VCUG. Because of frequent interactions between parents and medical staff with regard to these behavior styles, data of parents and medical staff were analysed together in this study. Results showed that child distress varies significantly across the phases of the VCUG. The effect of adult behavior on child distress also differed depending on the VCUG phase. Distraction and humor were associated with a decrease in child distress in some phases, while for commands to use coping strategies no association could be established with child distress.

Finally, the results of the three articles are summarized and discussed with regard to practical implications for an effective procedure preparation and support.

Liste der Beiträge

BEITRAG 1:

Völkl-Kernstock, S., Felber, M., Schabmann, A., Inschlag, N., Karesch, L., Ponocny-Seliger, E. & Friedrich, M. H. (2008). Comparing stress levels in children aged 2-8 years and in their accompanying parents during first-time versus repeated voiding cystourethrograms. *Wiener Klinische Wochenschrift*, 120, 414-421. doi: 10.1007/s00508-008-1001-x

BEITRAG 2:

Felber, M., Schabmann, A., Inschlag, N., Karesch, L., Ponocny-Seliger, E., Friedrich, M. H., & Völkl-Kernstock, S. (2011). Effects of parental soothing behavior on stress levels of 2-8 year old children during voiding cystourethrograms by phase of procedure. *Journal of Clinical Psychology in Medical Settings*, 18, 400-409. doi: 10.1007/s10880-011-9260-5

BEITRAG 3:

Felber, M., Schabmann, A., Schmiedek, F., Friedrich, M., & Völkl-Kernstock, S. (2014). Effects of spontaneous adult behavior on distress levels of 2- to 8-year-olds during voiding cystourethrograms. *Children's Health Care*, 43, 273-292. doi: 10.1080/02739615.2013.865186

Die drei Beiträge entstanden im Rahmen eines vom Jubiläumsfond der Österreichischen Nationalbank geförderten Projekts der Universitätsklinik für Psychiatrie des Kindes- und Jugendalters des AKH Wien. Die einzelnen Autoren waren daran wie folgt beteiligt:

Beitrag 1:

- | | |
|---------------------|---|
| M. Felber: | Projektplanung, Datenerhebung, Auswertung, Verfassen und Korrektur des Artikels |
| S. Völkl-Kernstock: | Unterstützung bei Projektplanung und –realisierung sowie bei der Finalisierung des Artikels |

A. Schabmann: Betreuung der Dissertation und Unterstützung bei diversen Fragen, u.a. zu Datenauswertung, Artikelerstellung und -korrektur

N. Inschlag: Mithilfe bei der Datenerhebung

L. Karesch: Mithilfe bei der Datenerhebung

E. Ponocny-Seliger: Beratung bzgl. Beantwortung von Reviewer-Fragen, insbesondere zur statistischen Analyse

M. Friedrich: Projektleitung

Beitrag 2:

M. Felber: Projektplanung, Datenerhebung, Auswertung, Verfassen und Korrektur des Artikels

A. Schabmann: Betreuung der Dissertation und Unterstützung bei diversen Fragen, u.a. zu Datenauswertung, Artikelerstellung und -korrektur

N. Inschlag: Mithilfe bei der Datenerhebung

L. Karesch: Mithilfe bei der Datenerhebung

E. Ponocny-Seliger: Beratung bzgl. Beantwortung von Reviewer-Fragen, insbesondere zur statistischen Analyse

M. Friedrich: Projektleitung

S. Völkl-Kernstock: Unterstützung bei Projektplanung und –realisierung

Beitrag 3:

M. Felber: Projektplanung, Datenerhebung, Auswertung, Verfassen und Korrektur des Beitrags

A. Schabmann: Betreuung der Dissertation und Unterstützung bei diversen Fragen, u.a. zu Datenauswertung, Artikelerstellung und -korrektur

M. Friedrich: Projektleitung

F. Schmiedek: Beratung bzgl. hlm-Auswertung

S. Völkl-Kernstock: Unterstützung bei Projektplanung und –realisierung

1 Theoretischer Rahmen

1.1 Miktionszystourethrographie und Vesicoureteraler Reflux

Die Miktionszystourethrographie (MCU) ist eine im Kindesalter häufig durchgeführte radiologische Untersuchung des harnableitenden Systems. Sie gilt als Standardmethode zur Diagnose eines Vesicoureteraler Reflux (vgl. Bundy, 2007; Prasad & Cheng, 2012; Rao et al., 2012). Bei einem Vesicoureteraler Reflux (VUR) liegt ein Rückfluss des Harns aus der Blase in die Harnleiter bzw. in das Nierenhohlraumssystem vor. Es wird zwischen primärem (angeborenen) und sekundärem (erworbenen) Reflux sowie verschiedenen Reflux-Graden unterschieden (vgl. Avni, Hall, Damry, & Schurmans, 2001; Bundy, 2007; Lebowitz, Olbing, Parkkulainen, Smellie, & Tamminen-Möbius, 1985; Williams et al., 2008).

Ein VUR kann eine schwerwiegende, dauerhafte Schädigung der Nieren zur Folge haben und muss deshalb sorgfältig diagnostiziert und behandelt werden (Oak, Kulkarni, & Chaubal, 1999; Verrier-Jones, 1999; Williams et al., 2008). Nach Decter (2001) zählt der VUR vom Säuglings- bis ins Jugendalter zu einer der häufigsten Erkrankungen des harnableitenden Systems. Die genaue Prävalenz des VUR ist unbekannt, dürfte aber zwischen ein und zwei Prozent der kindlichen Gesamtpopulation ausmachen (vgl. Avni et al., 2001; Verrier-Jones, 1999; Williams et al., 2008). Säuglinge und kleine Kinder sind aufgrund häufig wiederkehrender Infektionen besonders gefährdet. Ein VUR findet sich bei 0-2 Jährigen doppelt so häufig wie bei 3-6 Jährigen bzw. dreimal so häufig wie bei 7-11 Jährigen und bei Mädchen häufiger als bei Buben (Chand, Rhoades, Poe, Kraus, & Strife, 2003; Marild & Jodal, 1998; Decter, 2001).

Häufigste Auslöser für einen (sekundären) VUR sind Harnwegsinfektionen, die gerade bei kleinen Kindern gehäuft vorkommen (Shaikh, Morone, Bost, & Farrell, 2008; Jadresić, 2010). Während Harnwegsinfektionen neonatal bei Mädchen seltener auftreten als bei Buben, wird das Erkrankungsrisiko von Mädchen im

Vorschulalter als vier bis zehn mal höher eingestuft als jenes von Buben (vgl. Kamtsiuris, Atzpodien, Ellert, Schlack, & Schlaud, 2007; Manski, 2015; Wagenlehner, Schiefer, & Weidner, 2007). Zum Risiko eines VUR nach einer Harnwegsinfektion finden sich in der Literatur Angaben zwischen 18 und 34% (Finnell, Carroll, & Downs, 2011; Peters et al., 2010). Häufigster Zuweisungsgrund für eine MCU ist der Ausschluss eines VUR bei Zustand eines gesicherten Harnwegsinfekts bzw. entsprechende Nachkontrollen bei bereits diagnostiziertem Reflux. Von der ursprünglichen Diagnose eines VUR bis hin zur erfolgreichen Beendigung der Behandlung muss sich ein Kind im Durchschnitt in etwa vier MCUs unterziehen, in der Regel in Abständen von ca. einem Jahr (Shortliffe, 1997).

1.2 Ablauf der MCU

Im Folgenden soll der Ablauf der MCU, wie er in den an der vorliegenden Untersuchung beteiligten Spitälern durchgeführt wurde, kurz beschrieben werden (vgl. hierzu auch Agrawalla et al., 2004; Darge & Riedmiller, 2004; Fischman & Friedland, 1986; Fotter, 2001; Rao et al., 2012). Für die MCU ist es erforderlich, dass das Kind von zwei ihm vertrauten erwachsenen Personen, in der Regel den Eltern oder einem Elternteil und einer weiteren dem Kind nahestehenden Person¹, zur Untersuchung begleitet wird. Dies ist notwendig, weil das Kind bei der Untersuchung still in Rückenlage liegen und gegebenenfalls von den Eltern gehalten werden muss. Vor der Untersuchung sollte das Kind seine Blase entleeren und sich vollständig entkleiden.

Bei der MCU werden Katheterisierungs-, Füllungs- und Miktionsphase unterschieden. Vor der eigentlichen Untersuchung steht eine Vorbereitungsphase, welche beginnt, sobald Kind und Eltern das Untersuchungszimmer betreten. Das Kind wird aufgefordert, sich auf den Behandlungstisch zu legen, bzw. wird es von

¹ Im Folgenden wird für die Begleitpersonen vereinfachend die Bezeichnung „Eltern“ gewählt.

den Eltern auf diesen gesetzt. Sodann wird dem Kind der Ablauf der Untersuchung kurz erklärt. Die Vorbereitungsphase dauert in der Regel nur wenige Minuten. Die eigentliche Untersuchung beginnt mit der Reinigung und Desinfektion des Genitalbereichs des Kindes, was gleichzeitig den Anfang der Katheterisierungsphase markiert. Nach erfolgter Desinfektion wird ein transurethraler Katheter gesetzt. Durch die Zuhilfenahme einer desinfizierenden Gleitsalbe soll dabei eine Überreizung der Harnröhrenschleimhaut verhindert werden. Während der Kathetersetzung wird etwaiger sich noch in der Blase befindlicher Restharn entleert. Nachdem die Kathetersetzung abgeschlossen ist, wird das Ende des Katheters mittels Klebeband am Oberschenkel des Kindes befestigt. Die Dauer der Katheterisierungsphase ist wesentlich abhängig von der Kooperation des Kindes und etwaigen Schwierigkeiten bei der Kathetersetzung. Die Füllungsphase beginnt unmittelbar nach Applikation des Klebebandes. Es wird nun über den Katheter jodhaltiges, auf Körpertemperatur erwärmtes Kontrastmittel in die Harnblase des Kindes appliziert. Während der Füllung werden Röntgenaufnahmen von Harnblase, Harnleiter und dem Nierenhohlraumssystem durchgeführt. Nachdem die Blase des Kindes vollständig mit Kontrastmittel gefüllt ist, werden erneut Röntgenaufnahmen gemacht, diesmal jedoch in Seitenlage des Kindes. Die Füllungsphase endet, nachdem die Aufnahmen in Seitenlage abgeschlossen sind. Die Füllungsphase ist die längste Phase. Ihre Dauer hängt (neben technischen Details wie Tropfgeschwindigkeit und Kathetergröße) von der Größe der kindlichen Harnblase ab und ist bei älteren Kinder von längerer Dauer als bei jüngeren. Sobald die Aufnahmen in Seitenlage abgeschlossen sind, wird das Kind aufgefordert, zu urinieren. Dies kennzeichnet den Beginn der Miktionsphase. Das Kind soll dabei am Behandlungstisch liegend in eine Schale (Mädchen) bzw. eine Harnflasche (Buben) urinieren. Während und nach der Urination wird erneut unter Durchleuchtungskontrolle geprüft, ob Kontrastmittel retrograd in die Harnleiter bzw. das Nierenhohlraumssystem aufsteigt. Der Katheter kann vor oder nach der Urination des Kindes entfernt werden. Die MCU endet, sobald das Kind uriniert hat und vom Behandlungstisch gehoben wurde. Die Dauer der Miktionsphase hängt wesentlich davon ab, wie leicht das Kind seine Scham überwindet und mit der Miktion beginnt.

1.3 Kindliche Stressbelastung durch die MCU

Aufgrund ihres invasiven Charakters kann die MCU mit einer hohen Stressbelastung der Kinder einhergehen (Agrawalla et al., 2004; Rao et al., 2012). Phillips et al. (1996) konnten zeigen, dass die Stressbelastung der Kinder bei einer MCU im Vergleich zu anderen urologisch-radiologischen Untersuchungen deutlich erhöht ist. Im Gegensatz zu anderen invasiven medizinischen Eingriffen kann die MCU für Kinder nicht nur schmerzhaft und angstmachend sein, oft stellt sie für das Kind auch ein peinliches und mit Scham besetztes Ereignis dar, das sich insbesondere bei wiederholter Durchführung negativ auf das sich entwickelnde Selbstkonzept des Kindes auswirken kann (vgl. Stashinko & Goldberger, 1998). Stashinko und Goldberger (1998) beschreiben folgende, für das Kind belastende Aspekte der MCU: Der abgedunkelte Raum; die sich auf das Kind absenkende Röntgenmaschine; die Tatsache, dass ein Fremder den Genitalbereich des Kindes untersucht, einen Fremdkörper (Katheter) in seinen Körper einführt und ihm dadurch Schmerzen zufügt (Kathetersisierungsphase); das unangenehme Gefühl der sich füllenden Blase (Füllungssphase); die Peinlichkeit, nackt am Untersuchungstisch zu liegen und schließlich vor allen Anwesenden urinieren zu müssen (Miktionsphase); sowie die Tatsache, dass die Eltern dies alles mit ansehen, ohne etwas dagegen zu unternehmen. Ergänzend zu Stashinko und Goldberger (1998) sei noch auf den inneren Konflikt jüngerer Kinder mit eben erst bewältigter Sauberkeitserziehung hingewiesen, der durch die Aufforderung, liegend am Tisch zu urinieren, entstehen kann (vgl. Fischman & Friedland, 1986).

Es ist anzunehmen, dass die Belastung der Kinder durch die MCU über einen längeren Zeitraum hinweg persistiert. Merritt, Ornstein, und Spicker (1994) konnten zeigen, dass die MCU nach sechs Wochen selbst von kleineren Kindern noch immer detailgenau erinnert wird (vgl. hierzu auch Quas et al., 1999; Salmon, McGuigan, & Pereira, 2006). Phillips et al. (1996) befragten Eltern eine Woche nach der MCU ihres Kindes nach in der Zwischenzeit aufgetretenen Verhaltensänderungen. 45% der Eltern berichteten über Verhaltensänderungen des Kindes wie Schlafstörungen, Rückzug, Bettnässen u.a. in der Woche nach der

MCU. Goske et al. (2002) fanden bei einer Stichprobe von 24 Kindern einen tendenziellen Anstieg von aggressivem Verhalten nach der MCU. Stashinko und Goldberger (1998) berichten Einzelfälle von Kindern, die gemäss Elternberichten in Folge der MCU Symptome ähnlich einer posttraumatischen Belastungsstörung aufwiesen (Wiederholte Nachahmung der MCU im Spiel; Schwierigkeiten, über die Untersuchung zu reden bzw. der Wunsch, jegliche Erinnerungen an die Untersuchung auszuschalten; plötzliche und andauernde Veränderungen im Verhalten und der Anpassung der Kinder; Generalisierung der Angst auf andere medizinische Situationen, vor denen das Kind zuvor keine Angst hatte).

Insgesamt ist zu bedenken, dass frühzeitige negative Erfahrungen durch ängstigende Untersuchungen im Kindesalter v.a. bei wiederholter Durchführung die Gefahr mit sich bringen, auf andere medizinische Situationen generalisiert zu werden und zu Vermeidungsverhalten bzw. dysfunktionalen Kognitionen zu führen, die sich noch im Erwachsenenleben negativ auf das Gesundheitsverhalten der Betroffenen auswirken können (vgl. Pate, Blount, Cohen, & Smith, 1996; Rao et al., 2012). Maßnahmen, die dazu beitragen, die kindliche Stressbelastung bei der MCU zu reduzieren, haben deshalb nicht nur einen unmittelbaren, sondern auch einen längerfristigen Effekt auf die Gesundheit / das Wohlbefinden des betroffenen Individuums und sind dringend erforderlich (vgl. Phillips et al., 1998; Robinson et al., 1999; Zelikovsky et al., 2000).

1.4. Elterliche Stressbelastung durch die MCU

Auch von den Eltern kann die MCU ihres Kindes als sehr belastend erlebt werden (vgl. Agrawalla et al., 2004; Phillips et al., 1996; Rao et al., 2012). Die Einführung des Katheters in die Harnröhre erfordert eine - von Kind und Eltern möglicherweise als intrusiv erlebte - Manipulation an den Genitalien des Kindes, der das Kind hilflos ausgeliefert ist. Aus dieser Perspektive nimmt es nicht Wunder, dass auf Seiten der Eltern Ängste bezüglich der Auswirkungen der Untersuchung auf das

sexuelle Selbsterleben des Kindes bzw. dessen zukünftiger Sexualentwicklung entstehen können (vgl. Rao et al., 2012).

Darüber hinaus fühlen sich Eltern häufig hilflos angesichts der Ängste und Schmerzen des Kindes (vgl. Zelikovsky, Rodrigue & Gidycz, 2001). Interessanterweise ist die von den Eltern antizipierte kindliche Stressbelastung signifikant höher als die von den Eltern während der MCU an den Kindern tatsächlich beobachtete, ebenso wie sich die von den Eltern antizipierte eigene Angst als signifikant höher erwiesen hat als die von ihnen in der Folge tatsächlich empfundene (Srivastava, Betts, Rosenberg, & Kainer, 2001; Soltis & Shelestak, 2011). Die Ergebnisse dieser Studien lassen vermuten, dass die elterliche Stressbelastung bei wiederholter MCU möglicherweise geringer sein könnte als bei erstmaliger MCU. Entsprechende Studien liegen bisher allerdings nicht vor.

1.5. Einflussfaktoren der kindlichen Stressbelastung bei der MCU

Nach Rudolph, Dennig, und Weisz (1995) wird das kindliche Distressverhalten bei medizinischen Untersuchungen / Eingriffen von personen- und situations-spezifischen Moderatorvariablen beeinflusst. Wichtige personenspezifische Moderatorvariablen sind Alter, Geschlecht sowie vorhergehende Untersuchungserfahrungen. Als wichtige situationsspezifische Moderatorvariablen werden im Modell von Rudolph et al. (1995) die Art des Stressors (bezogen auf die vorliegende Arbeit die MCU als invasive medizinische Untersuchung), die Untersuchungsphase (hier die einzelnen Untersuchungsphasen der MCU) sowie der Einfluss der Eltern angeführt. In Anlehnung an Varni et al. (1995) wurde das Modell von Rudolph et al. (1995) in der folgenden Abbildung dahingehend modifiziert, dass statt dem alleinigen Einfluss der Eltern der Einfluss von Eltern und medizinischem Personal (= Einfluss Erwachsener) berücksichtigt wurde.

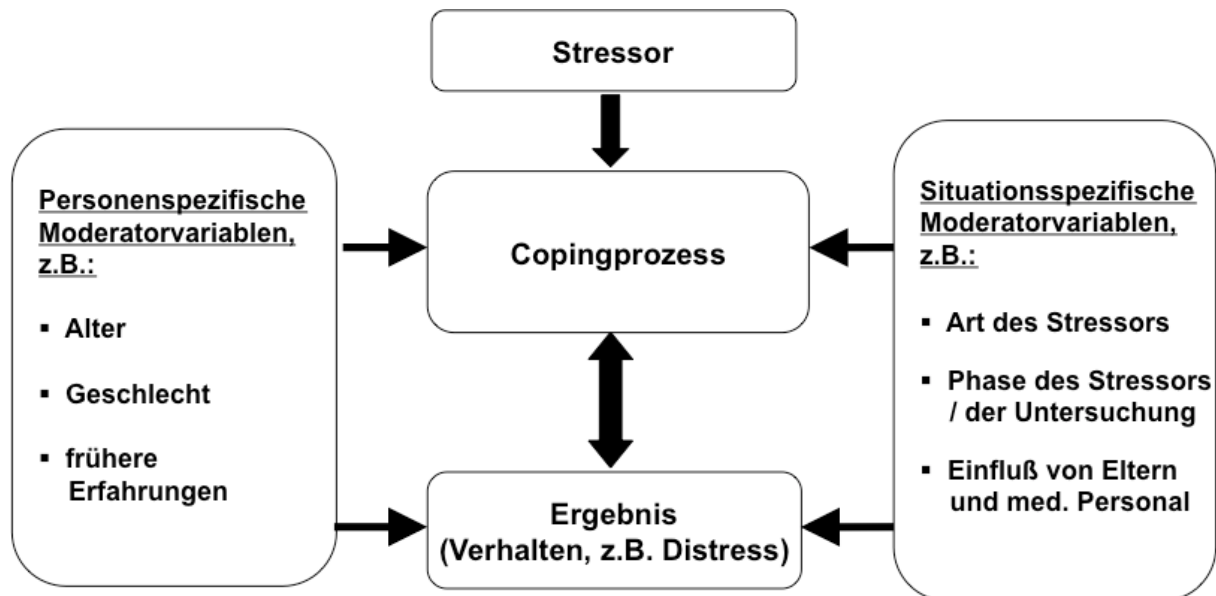


Abb. 1: Modell des kindlichen Verhaltens bei medizinischen Untersuchungen / Eingriffen, modifiziert nach Rudolph et al. (1995)

Mit Ausnahme von Beitrag 1, in dem auch Daten zur subjektiven Stressbelastung des Kindes erhoben werden, beschäftigt sich die vorliegende Arbeit ausschließlich mit dem beobachtbaren Distressverhalten des Kindes. Im Folgenden soll jeweils der Terminus „Distressverhalten“ (bzw. kurz „Distress“) verwendet werden, wenn ausschließlich das beobachtbare Distressverhalten des Kindes gemeint ist. In allen anderen Fällen soll weiterhin der allgemeine Terminus „Stressbelastung“ beibehalten werden.

Auch hinsichtlich des Einflusses Erwachsener, insbesondere der Eltern, auf das Distressverhalten des Kindes bei der MCU wird zwischen beobachtbarem Erwachsenenverhalten und nicht direkt beobachtbaren Variablen (wie z.B. Stressbelastung oder Ängstlichkeit der Erwachsenen) unterschieden.

1.5.1 Alter

Das Alter des Kindes stellt einen bedeutenden Einflussfaktor der kindlichen Stressbelastung dar: Innerhalb der Altersgruppe der Zwei- bis Siebenjährigen

erwies sich die Stressbelastung als umso höher, je jünger das Kind war (vgl. Phillips et al., 1996; Salmon & Pereira, 2002; Zelikovsky et al., 2000). Säuglinge bis zum Alter von einem Jahr scheinen dagegen weniger belastet durch die MCU. Robinson, Savage, Stewart, und Sweeney (1999) fanden einen hohen MCU-bedingten Distress am häufigsten in der Gruppe der Ein- bis Vierjährigen und am seltensten in der Gruppe der Kinder von unter einem Jahr. Diese empirisch gefundenen Daten lassen sich entwicklungspsychologisch auf vielfältige Weise untermauern. So schreiben Kinder unter 4 Jahren auch unbelebten Objekten (im Zusammenhang mit der MCU wäre hier z.B. an Röntgenmaschinen zu denken) Motive und internale Zustände zu (animistisches Denken nach Piaget, vgl. Piaget, 1975), wodurch diese als bedrohlicher erlebt werden. Zudem haben Kinder dieses Alters Schwierigkeiten, zwischen ihren eigenen Fantasien und Ängsten und der Realität zu unterscheiden (vgl. Montada, 1982). Sie können ihre Gefühle und Gedanken weniger gut verbalisieren und sind verbal-logischen Argumenten zur Beschwichtigung ihrer Ängste noch kaum zugänglich, weshalb sie bereits im Vorfeld der Untersuchung grössere Ängste entwickeln (vgl. Lander & Fowler-Kerry, 1991). Schliesslich gehören Ängste vor Verletzung der körperlichen Integrität zu den primären Befürchtungen von Vorschul- und Schulkindern im Zusammenhang mit medizinischen Erfahrungen (vgl. Broome & Hellier, 1987).

1.5.2. Geschlecht

Aufgrund des längeren Urethras ist davon auszugehen, dass die Stressbelastung durch die MCU, speziell während der Kathetersetzung, bei Buben höher ist als bei Mädchen. Die wenigen dazu existierenden Studien berichten allerdings von keinen signifikanten Unterschieden im Distressverhalten zwischen Mädchen und Buben (Oswald et al., 2002; Salmon & Pereira, 2002). Als mögliche Erklärung für diese doch recht unerwarteten Befunde kann vermutet werden, dass Buben ihre Stressbelastung weniger zeigen. Weiter dürfte die Tatsache, dass sich unter erhöhtem Stresserleben in der Wahrnehmung von kleinen Kindern Angst vor und tatsächlich erlebter Schmerz vermischen (vgl. Chen, Zeltzer, Craske, & Katz,

2000), dazu beitragen, dass Mädchen trotz vermuteter geringerer Belastung das gleiche Schmerzerleben und damit die gleiche Stressbelastung zeigen wie Buben.

1.5.3. Erfahrungen aus vorhergegangenen MCUs

Entgegen früheren Annahmen, dass schmerzhaftes medizinische Eingriffe von kleinen Kindern bald vergessen würden, ist heute klar belegt, dass auch jüngere Kinder über eine gute Erinnerung derselben verfügen (vgl. Chen et al., 2000). Merritt et al. (1994) konnten zeigen, dass die MCU nach sechs Wochen selbst von kleinen Kindern noch immer detailgenau erinnert wird (vgl. hierzu auch Quas et al., 1999; Salmon et al., 2006). Die Schmerzwahrnehmung kleiner Kinder wird neben dem realen Stressor stark von den kindlichen Ängsten beeinflusst (vgl. Chen, Zeltzer, Craske, & Katz, 1999). Die Erinnerung an schmerzhaftes oder stressreiche Prozeduren kann das kindliche Angsterleben bei Folgeprozeduren erhöhen (vgl. Ornstein, Manning, & Pelphrey, 1999; Chen et al., 1999), wodurch diese als schmerzvoller und damit stressreicher erlebt werden als vorhergehende (Chen et al., 2000; Kusch & Bode, 1994; Von Baeyer, Marche, Rocha, & Salmon, 2004).

Die Auswirkungen von wiederholt durchgeführten MCUs auf die kindliche Stressbelastung wurden bisher nur rudimentär und mit widersprüchlichen Ergebnissen untersucht. In einer Studie von Zelikovsky et al. (2000) wurden Kinder mit vorhergehender MCU-Erfahrung durch die Radiologen, nicht aber durch die Eltern als ängstlicher eingestuft als Kinder, die erstmalig zur MCU kamen. Weiters korrelierte die Anzahl vorhergehender MCUs negativ mit der Einschätzung der kindlichen Kooperationsbereitschaft durch die Radiologen. In einer Studie von Robinson et al. (1999) zeigten Kinder mit MCU-Erfahrung in der Einschätzung der Radiologen dagegen seltener hohe Stressbelastung als Kinder mit erstmaliger MCU, während Kinder mit MCU-Erfahrung in der Einschätzung der Eltern öfter hohe Stressbelastung aufwiesen als Kinder mit erstmaliger MCU.

1.5.4 Einfluss der Untersuchungsphase

Die einzelnen Untersuchungsphasen der MCU stellen das Kind vor recht unterschiedliche Herausforderungen (s. Abschnitt 1.2). In einer Studie von Butler, Symons, Henderson, Shortliffe, und Spiegel (2005) erwies sich die Katheterisierungsphase als für die Kinder am stressreichsten. Zelikovsky et al. (2000) fanden in etwa gleich hohe kindliche Distresswerte für Katheterisierungs- und Miktionsphase.

1.5.5 Einfluss des Erwachsenenverhaltens

Zum Einfluss des Verhaltens von im Untersuchungsraum anwesenden erwachsenen Personen (Eltern und medizinisches Personal) bei verschiedenen invasiven medizinischen Eingriffen an Kindern gibt es von der Arbeitsgruppe um Blount et al. (vgl. Blount et al., 1989, 1992, 1997; Blount, Bunke, Cohen, & Forbes, 2001; Blount, Sturges, & Powers, 1990) umfangreiche Studien. Um das Verhalten von Kindern und Erwachsenen bei medizinischen Eingriffen zu erfassen, entwickelte die Arbeitsgruppe eine standardisierte Beobachtungsskala („Child Adult Medical Procedure Interaction Scale-R, CAMPIS-R; Blount et al., 1997), die je drei übergeordnete Verhaltenskategorien für Kinder („Child Coping Behavior“, „Child Distress Behavior“, und „Child Neutral Behavior“) und Erwachsene („Adult Coping Promoting Behavior“, „Adult Distress Promoting Behavior“ und „Adult Neutral Behavior“) beinhaltet.

Im Folgenden seien zum besseren Verständnis der untenstehend dargestellten Literatur die wichtigsten dieser Kategorien näher beschrieben. Unter der Kategorie „Child Coping Behavior“ werden die kindlichen Verhaltensweisen „Nicht auf das medizinische Geschehen bezogene Rede“, „Humor“, „Hörbares lautes Atmen“ sowie „Coping Statements äussern“ (z.B. „Ich schaff das!“, „Nachher bekomme ich ein Eis.“) erfasst. Der Begriff des „Coping Behavior“ ist im CAMPIS-R somit sehr eng gefasst und fokussiert ausschliesslich auf im medizinischen Untersuchungssetting auftretende, der Bewältigung der Untersuchungssituation

dienliche und dem Beobachter einsehbare Verhaltensweisen des Kindes. Unter der Kategorie „Child Distress Behavior“ werden „Weinen“, „Schreien“ und „Suche nach emotionaler Unterstützung“ („Mami!“) sowie die seltener auftretenden kindlichen Verhaltensweisen „verbaler Schmerz“ („Au!“, „Das tut mir weh!“), „verbale Angst“ („Ich hab Angst!“), „verbaler Widerstand“ („Ich mag nicht!“, „Aufhören!“), „Verbale Emotion“ („Ich hasse das!“) sowie „Informationssuche“ („Wie lang dauert das noch?“) verstanden.

Die Erwachsenen-Kategorie „Coping Promoting Behavior“ umfasst die Verhaltensweisen „Nicht auf das medizinische Geschehen bezogene Rede zum Kind (Ablenkung)“, „Humor gegenüber dem Kind“ und „Aufforderung an das Kind zum Gebrauch von Copingstrategien“ (z.B.: „Atme tief durch“, „Denk dran, nachher darfst Du Dir etwas aussuchen!“).

Die Kategorie „Distress Promoting Behavior“ bezieht sich vor allem auf die sehr häufig vorkommenden beruhigenden Kommentare Erwachsener gegenüber dem Kind („reassuring comments“; vgl. Blount et al., 1989; Butler et al., 2005). Diese werden definiert als Bemerkungen, die darauf ausgerichtet sind, das Kind hinsichtlich seines Befindes („Ist ja gut“) bzw. dem Verlauf der Untersuchung („Ist ja gleich vorbei“) zu beruhigen. Neben den „reassuring comments“ werden auch die weniger oft gezeigten Verhaltensweisen „Mitleid“ („Ich weiß, das ist schwer.“), „Kritik“ („Bist Du aber heute schlechter Laune!“), „Entschuldigung“ („Es tut mir ja so leid, dass ich Dir nicht helfen kann.“) und „Dem Kind die Kontrolle übergeben“ („Bist Du bereit?“) unter dieser Kategorie subsummiert.

In Studien zu verschiedenen invasiven Eingriffen an Kindern wie Lumbalpunktionen, Knochenmarkpunktionen und Blutentnahmen konnte die Arbeitsgruppe um Blount et al. nachweisen, dass „Distress Promoting Behavior“ mit einer Zunahme des kindlichen Distressverhaltens einhergeht (Blount et al., 1997; Manimala, Blount, & Cohen, 2000), während „Coping Promoting Behavior“ das Copingverhalten der Kinder erhöht (Blount et al., 1989, 1990, 1997; Manimala

et al., 2000). Zelikovsky et al. (2001) und Salmon & Pereira (2002) konnten die oben genannten Zusammenhänge - wenn auch anhand relativ kleiner Stichproben (N = 32 bzw. 40) - auch für die MCU nachweisen. Blount et al. (1990) sowie Manne et al. (1992) konnten bei Knochenmark- und Lumbalpunktionen bzw. bei Venenpunktionen für „Coping Promoting Behavior“ zudem einen geringen distressreduzierenden Effekt nachweisen. In Verbindung mit spezifischem Training von Eltern und Kindern fanden Zelikovsky et al. (2001) auch für die MCU eine distressreduzierende Wirkung von „Coping Promoting Behavior“.

Von den einzelnen, zu den „Coping Promoting Behaviors“ zählenden Verhaltensweisen hat sich v.a. Ablenkung in zahlreichen Studien zu invasiven medizinischen Eingriffen wie Impfungen, Blutabnahmen, Lumbal- und Knochenmarkpunktionen als wirksam erwiesen, um den Distress bzw. Schmerz des Kindes zu mindern (vgl. Powers, 1999; Uman, Chambers, McGrath, & Kisely, 2008). Eccleston und Crombez (1999) postulieren, dass Ablenkung dann besonders effektiv ist, wenn sie starke positive Affekte hervorruft, die mit der stark negativ getönten Wahrnehmung von Schmerz / Distress schlecht vereinbar sind. In diesem Sinne sollte Humor als spezielle Form der Ablenkung besonders geeignet sein, die Distress- bzw. Schmerzwahrnehmung bei medizinischen Untersuchungen zu reduzieren.

Wie bereits oben erwähnt, ist Beruhigung („reassuring comments“) unter den „Distress Promoting Behaviors“ die von Erwachsenen, insbesondere Eltern, am häufigsten eingesetzte Strategie (vgl. Blount et al., 1989; Dahlquist, Power, & Carlson, 1995). Der distressfördernde Effekt von beruhigenden Kommentaren wurde in zahlreichen Studien zu verschiedenen invasiven Eingriffen bei Kindern bestätigt (Blount et al., 1989, 1997; Dahlquist, Power, Cox, & Fernbach, 1994; Dahlquist et al., 1995; Gonzalez, Routh, & Armstrong, 1993; Salmon & Pereira, 2002). Gonzalez et al. (1993) nennen unterschiedliche Erklärungsmodelle für diesen Effekt. Beruhigung könne als diskriminativer Reiz fungieren, der schmerzvolle / unangenehme Situationen ankündigt. Weiter könne der ängstliche Ausdruck im Gesicht oder der Stimme des Erwachsenen über den Prozess des

„social referencing“ die kindliche Bewertung der Situation beeinflussen. Schliesslich könnten beruhigende Kommentare dazu dienen, die Eltern selbst zu beruhigen, d.h. sie spiegeln deren Angst wider, die vom Kind intuitiv wahrgenommen wird. Aufgrund des distresserhöhenden Effekts beruhigender Kommentare stellt sich die Frage nach anderen Möglichkeiten zur Beruhigung des Kindes. Hier ist v.a. an Beruhigung mittels „Sch, sch“ zu denken. Im CAMPIS-R wird „Sch, sch“ nicht als eigener Verhaltenscode geführt, sondern unter der Verhaltenskategorie „Verhaltensanweisungen an das Kind“ (z.B.: „Tu Deiner Mama nicht weh!“, „Komm, wisch Dir die Tränen ab!“, etc.) subsummiert, für die keine Auswirkungen auf den kindlichen Distress nachgewiesen werden konnten (Blount et al. 1989, 1997) und die deshalb der übergeordneten Skala „Adult Neutral Behavior“ zugerechnet wird. Für sich allein genommen wurde die Wirkung von „Sch, sch“ auf den kindlichen Distress bisher noch nicht untersucht. „Sch, sch“ vermittelt im Gegensatz zu beruhigenden Kommentaren keine verbale Information (z.B. „Ist ja gleich vorbei“), sondern kann eher als Ausdruck der emotionalen Präsenz der Eltern interpretiert werden. Lumley, Abeles, Melamed, Pistone, und Johnson (1990) sowie Bush, Melamed, Sheras, und Greenbaum (1986) konnten zeigen, dass ein geringes Ausmaß an emotionaler Anteilnahme der Eltern bei medizinischen Eingriffen an Kindern mit vermehrtem kindlichen Distressverhalten assoziiert war. Für „Sch, sch“ als Ausdruck der emotionalen Anteilnahme der Eltern kann somit ein distressreduzierender Effekt vermutet werden.

Studien zu verschiedenen invasiven Eingriffen bei Kindern legen nahe, dass der Einfluss des Erwachsenenverhaltens in Abhängigkeit von der Untersuchungsphase ein unterschiedlicher ist (Blount et al., 1990; Dahlquist et al., 1994, 1995; Manne et al., 1992). Hierbei dürfte der Einfluss des Erwachsenenverhaltens in den vorbereitenden Untersuchungsphasen ein grösserer sein als in den eigentlichen (prozeduralen) Untersuchungsphasen (vgl. Blount et al., 1990; Dahlquist et al., 1994, 1995). Darüber hinaus scheint die Wechselwirkung zwischen Untersuchungsphase und Erwachsenenverhalten auch von der Art der medizinischen Untersuchung abhängig zu sein. In der Studie von Blount et al. (1990) zu Lumbal- und Knochenmarkpunktionen bei krebskranken

Kindern gingen Ablenkung und Humor nur in den vorbereitenden Phasen mit einem reduzierten kindlichen Distress einher, nicht jedoch in den stressreicheren prozeduralen Untersuchungsphasen. Dies muss jedoch nicht in gleichem Maße für die MCU gelten. Kleiber und McCarthy (1999) untersuchten neun Kinder, die sich einer urethralen Katheterisierung unterziehen mussten. Letztere stellt wie weiter oben ausgeführt einen wesentlichen Bestandteil der MCU dar (s. Abschnitt 1.2). Kleiber und McCarthy (1999) konnten zeigen, dass verbale Ablenkung während der Katheterisierung mit verringertem kindlichen Distressverhalten assoziiert ist. Bezüglich Aufforderungen zum Gebrauch von Copingstrategien berichten Blount et al. (1990), dass diese nur in den prozeduralen, nicht aber in den vorbereitenden Untersuchungsphasen mit reduziertem kindlichen Distress einhergehen.

1.5.6 Einfluss nicht direkt beobachtbarer Elternvariablen

Als Beispiel nicht direkt beobachtbarer Elternvariablen wie Stressbelastung oder Angst sei hier näher auf den Einfluss elterlicher Angst eingegangen. Es ist bekannt, dass die Angst der Eltern das kindliche Stresserleben bei medizinischen Untersuchungen wie auch die Wirkung von Interventionsmaßnahmen, die die kindliche Stressbelastung reduzieren sollen, beeinflussen kann (vgl. Dahlquist & Pendley, 2005). So konnten Dahlquist & Pendley (2005) bei Injektionen an Kindern im Rahmen einer Chemotherapie zeigen, dass die Eltern jener Kinder, die von einer ablenkenden Interventionsmaßnahme nicht profitieren konnten, signifikant höhere Baseline-Angstwerte aufwiesen als jene von Kindern, deren Distress sich durch die Ablenkung verminderte.

Bezüglich der MCU erbrachte die Studie von Zelikovsky et al. (2001) ein interessantes Ergebnis. Obwohl sich kein Zusammenhang zwischen der Angst der Eltern vor der MCU ihres Kindes und dem Verhalten der Eltern während der MCU nachweisen ließ, konnte ein hoch signifikanter Zusammenhang zwischen der Angst der Eltern und dem kindlichen Distressverhalten während der MCU

aufgezeigt werden. Die eigene Befindlichkeit der Eltern hat somit auch bei der MCU einen Einfluss auf das Verhalten und die Befindlichkeit der Kinder.

1.6. Möglichkeiten der Reduktion der kindlichen Stressbelastung

Um die Stressbelastung der Kinder bei der MCU zu reduzieren, werden in der Literatur pharmakologische Maßnahmen, alternative Durchführungsvarianten wie die suprapubische Punktion (Oswald et al., 2002) sowie psychologische Interventionen diskutiert (vgl. Agrawalla et al., 2004; Herd, 2008; Rao et al., 2012). Pharmakologische Maßnahmen konzentrieren sich v.a. auf die Sedierung des Kindes während der MCU. Für eine vollständige Entleerung der Harnblase muss das Kind bei der MCU zu einem gewissen Grad bei Bewusstsein sein, weshalb nur eine schwache Sedierung, z.B. mittels Midazolam, durchgeführt werden kann (Herd, 2008). Diesbezüglich bestehen allerdings nach wie vor Bedenken, ob eine Sedierung des Kindes nicht die Genauigkeit der Refluxdiagnose beeinträchtigt (Herd, 2008), weshalb eine generelle Sedierung von Kindern bei der MCU noch immer von vielen Ärzten abgelehnt wird (vgl. Bates, 2012; Blumberg, 2012). Nach Herd (2008) stehen der konsequenten Einführung einer Sedierung der Kinder bei der MCU darüber hinaus der damit verbundene hohe zeitliche, personelle und finanzielle Aufwand sowie das Risiko von Nebenwirkungen entgegen.

An psychologischen Interventionen wurden bisher Hypnose (Butler et al., 2005), Coping-Skills-Training der Kinder verbunden mit Elternt raining (Zelikovsky et al., 2000), die Ausgabe eines Story-Booklets, teilweise verbunden mit therapeutischer Spielvorbereitung (Phillips, Watson, & MacKinlay, 1998) sowie das Abspielen von Video-Cartoons während der MCU (Salmon et al., 2006) untersucht. Wie in Abschnitt 1.5.5 beschrieben, stellt das Verhalten der Eltern während medizinischen Untersuchungen an Kindern einen wesentlichen Einflussfaktor der kindlichen Stressbelastung dar. Nach Rao et al. (2012) sollten Eltern deshalb aktiv in psychologische Interventionen zur Stressreduktion bei der MCU miteinbezogen werden. Im Gegensatz zur Sedierung sind psychologische Maßnahmen mit

deutlich geringeren Kosten verbunden (vgl. Rao et al., 2012) und bergen zudem kaum Risiken, weshalb sie nach Herd (2008) an erster Stelle Berücksichtigung finden sollten.

Die herkömmliche MCU geht mit einer nicht unerheblichen Strahlenbelastung des Kindes einher. Eine ungenügende Kooperation des Kindes infolge hoher Stressbelastung kann die Untersuchungsdauer und damit auch Dauer der Strahlenexposition deutlich verlängern (vgl. Rao et al., 2012). Abschliessend sei deshalb auf den wachsenden Trend hingewiesen, die herkömmliche MCU in gewissen Fällen durch alternative Methoden wie indirekte Radionuklid-Zystographie (IRC) oder Miktionsurosonographie (MUS) zu ersetzen, um die Strahlenbelastung zu reduzieren. Diese beiden Untersuchungsmethoden erfordern keine Kathetersetzung und sind deshalb auch psychisch weniger belastend für die Kinder. Sie ermöglichen allerdings eine weniger detailgenaue Darstellung des harnableitenden Systems, weshalb sie nur bedingt einsetzbar sind (vgl. Darge & Riedmiller, 2004; Elder, 2005; Herd, 2008; Oak et al., 1999; Prasad & Cheng, 2012).

2 Forschungsbedarf und Ziele der Dissertation

Bisher entwickelte psychologische Programme zur Reduktion der kindlichen Stressbelastung bei der MCU wie Hypnose des Kindes (Butler et al., 2005), therapeutische Spielvorbereitung (Phillips et al., 1998) oder Training des Kindes (Zelikovsky et al., 2000) erwiesen sich zwar als wirkungsvoll, erscheinen im klinischen Alltag jedoch als zu aufwendig, um dauerhaft und routinemässig auf kinderradiologischen Ambulanzen implementiert zu werden. Die aktive Einbeziehung von Eltern und medizinischem Personal zur Stressreduktion des Kindes während der MCU und die Modifikation von deren Verhalten durch gezielte Beratung und Information bieten sich deshalb als naheliegende und erfolgsversprechende Alternative an (vgl. Agrawalla et al., 2004; Rao et al., 2012).

Zur Entwicklung von entsprechenden Beratungsprogrammen bedarf es einer detaillierten Kenntnis des kindlichen Distressverlaufs während der MCU sowie wissenschaftlich fundierter Informationen darüber, welche Verhaltensweisen in welcher Phase der MCU geeignet sind, den kindlichen Distress zu reduzieren. Weiter sind Kenntnisse zum Einfluss vorhergehender MCUs auf den kindlichen Distress bzw. das Elternverhalten wünschenswert. In der bisherigen Literatur zur MCU lassen sich zu diesen Fragestellungen nur rudimentäre bzw. widersprüchliche Angaben finden. Bezüglich des Distressverlaufs ist bekannt, dass Katheterisierungs- und Miktionsphase für das Kind am stressreichsten sind (Butler et al., 2005; Zelikovsky et al., 2000; vgl. Kap. 1.5.4), genauere und altersbezogene Angaben zum Verlauf des kindlichen Distress über die vier Phasen der MCU hinweg liegen jedoch nicht vor. Die einzigen existierenden Studien zum Einfluss des Elternverhaltens auf den kindlichen Distress bei der MCU (Salmon & Pereira, 2002; Zelikovsky et al., 2001) erfassen übergeordnete Kategorien des Elternverhaltens („Coping Promoting Behavior“ und „Distress Promoting Behavior“, s. Kap. 1.5.5), ohne zwischen den einzelnen, diesen Skalen zugeordneten Verhaltensweisen zu differenzieren. Die Studie von Salmon & Pereira (2002) berichtet sämtliche Ergebnisse bezogen auf die gesamte Untersuchungsdauer der MCU. Zelikowsky et al. (2001) unterscheiden zwar

zwischen Katheterisierungs-, Füllungs- und Miktionsphase, die Vorbereitungsphase, die das Kind ja bereits im Beisein der Eltern im Untersuchungszimmer verbringt und in der Eltern wie auch medizinisches Personal bereits Einfluss auf die Stressbelastung des Kindes nehmen können, bleibt jedoch unberücksichtigt. Noch weitgehend unerforscht sind die Auswirkungen von wiederholt durchgeführten MCUs auf die kindliche Stressbelastung, die beiden diese Fragestellung tangierenden Untersuchungen (Robinson et al., 1999; Zelikovsky et al., 2000) gelangten zu widersprüchlichen Ergebnissen (vgl. Kap. 1.5.3).

Ziel der vorliegenden kumulativen Dissertation ist es, vertiefende Kenntnisse zu den oben skizzierten, erst wenig untersuchten Fragestellungen zu gewinnen, um daraus Kriterien für eine erfolgreiche Untersuchungsvorbereitung und -unterstützung abzuleiten. Der erste Beitrag beschäftigt sich mit der Frage, ob sich Unterschiede in der Stressbelastung von Kindern und Eltern bei erstmaliger und wiederholter MCU feststellen lassen und inwieweit etwaige Unterschiede in der Stressbelastung der Eltern bei erstmaliger und wiederholter MCU Auswirkungen auf deren Verhalten bzw. das Distressverhalten des Kindes während der MCU zeigen. Der zweite Beitrag fokussiert auf den phasenspezifischen Einfluss zweier von Eltern häufig eingesetzter Beruhigungsstrategien auf den kindlichen Distress, nämlich Beruhigung mittels beruhigender Kommentare sowie Beruhigung mittels „Sch, sch“. Der dritte Beitrag schließlich untersucht die Wirkung der Erwachsenenverhaltensweisen Ablenkung, Humor und Aufforderung zum Gebrauch von Copingstrategien, welche alle den „Coping Promoting Behaviors“ zugerechnet werden, in den vier Phasen der MCU. Darüber hinaus beinhaltet der dritte Beitrag eine genaue Analyse des kindlichen Distressverlaufs innerhalb der einzelnen Untersuchungsphasen der MCU unter Berücksichtigung des Alters des Kindes.

3 Beiträge

Die den Beiträgen zugrunde liegenden Daten wurden im Rahmen des Projekts „Miktionszystourethrographie bei 2-8jährigen Kindern“ der Universitätsklinik für Psychiatrie des Kindes- und Jugendalters der Medizinischen Universität Wien erhoben, welches vom Jubiläumsfonds der Österreichischen Nationalbank (Projektnummer: 10715) finanziert wurde.

BEITRAG 1

Vökl-Kernstock, S., Felber, M., Schabmann, A., Inschlag, N., Karesch, L., Ponocny-Seliger, E. & Friedrich, M. H. (2008). Comparing stress levels in children aged 2-8 years and in their accompanying parents during first-time versus repeated voiding cystourethrograms. *Wiener Klinische Wochenschrift*, 120, 414-421. doi: 10.1007/s00508-008-1001-x

Beitrag 1 beschäftigt sich spezifisch mit wiederholt durchgeführten MCUs und geht der Frage nach, ob sich die Stressbelastung von Kindern und deren begleitenden Eltern bei erstmaliger und wiederholter MCU unterscheidet. Darüber hinaus wurde die Beziehung zwischen elterlichem Verhalten („Distress Promoting Behavior“ bzw. „Coping Promoting Behavior“), elterlicher Stressbelastung und kindlicher Stressbelastung bei erstmaliger und wiederholter MCU untersucht. Es wurden insgesamt 62 Kinder im Alter von 2 bis 8 Jahren, davon 31 Kinder mit wiederholter MCU und 31 Kinder mit erstmaliger MCU, untersucht. Kindliches und elterliches Verhalten während der MCU wurde mittels einer standardisierten Beobachtungsskala (CAMPIS-R, Blount et al. 1997) kodiert. Ergänzend wurde die kindliche Stressbelastung mittels Selbst- und Fremdeinschätzungsskala (Eltern und Radiologen) sowie die elterliche Stressbelastung mittels einer Selbsteinschätzungsskala erhoben. Weiter wurden Verhaltensänderungen des Kindes eine Woche nach der MCU mittels Elternbefragung erfasst.

Es zeigte sich, dass sich Kinder mit wiederholter MCU in keinem der erhobenen Stressmaße von Kindern mit erstmaliger MCU unterscheiden, die elterliche Stressbelastung erwies sich dagegen bei wiederholter MCU als signifikant geringer. Letzteres zeigte im Mittel zwar keinerlei Auswirkungen auf die Häufigkeit des elterlichen „Coping-“ bzw. „Distress Promoting Behavior“, allerdings variierte das Ausmaß an elterlichem „Distress Promoting Behavior“ innerhalb der Gruppe der Kinder mit wiederholter MCU deutlich stärker als in der Gruppe der Kinder mit erstmaliger MCU, sodass nur bei wiederholter MCU eine signifikant positive Korrelation zwischen elterlicher Stressbelastung und Distress Promoting Behavior festgestellt werden konnte. In beiden Gruppen fand sich eine signifikante positive Korrelation zwischen elterlicher Stressbelastung und kindlichem Distressverhalten. Der in der Literatur beschriebene positive Zusammenhang zwischen elterlichem „Distress Promoting Behavior“ und kindlichem Distress (Blount et al., 1990, 1997; Manimala et al., 2000; Salmon & Pereira, 2002; Zelikovsky et al., 2001) konnte auch für die Gruppe der Kinder mit wiederholter MCU bestätigt werden. Dagegen zeigte elterliches „Coping Promoting Behavior“ – hier im Gegensatz zu Beitrag 3 als Gesamtskala erfasst – in keiner der beiden Gruppen einen bedeutsamen Einfluss auf das kindliche Distressverhalten. Obwohl die Eltern bei der wiederholten MCU ihres Kindes bereits vertrauter mit dem Untersuchungsprozedere sind und ihre Stressbelastung geringer ist, erwies sich das spontane Verhalten der Eltern insgesamt als ineffektiv bzw. sogar kontraindiziert zur Verringerung des kindlichen Distressverhaltens.

BEITRAG 2

Felber, M., Schabmann, A., Inschlag, N., Karesch, L., Ponocny-Seliger, E., Friedrich, M. H., & Völkl-Kernstock, S. (2011). Effects of parental soothing behavior on stress levels of 2-8 year old children during voiding cystourethrograms by phase of procedure. *Journal of Clinical Psychology in Medical Settings*, 18, 400-409. doi: 10.1007/s10880-011-9260-5

Beitrag 2 fokussiert auf das elterliche Beruhigungsverhalten und untersucht, inwieweit zwei von Eltern häufig gezeigte, spontane Beruhigungsstrategien, nämlich beruhigende Kommentare wie „Ist gleich vorbei“ oder „Ist ja gut“ sowie Beruhigung mittels „Sch, sch“, in einer Phase der MCU den kindlichen Distress der nächsten Phase beeinflussen können. Beruhigende Kommentare übermitteln dem Kind Informationen, die suggerieren, dass es ihm gut gehe, ihm nichts passiere bzw. sich die Situation bald zu einem Besseren wende. Damit stehen diese Aussagen der Eltern häufig im Widerspruch zur aktuellen Erfahrung des Kindes einer unangenehmen / schmerzhaften Untersuchung bzw. zum zukünftigen Erleben von Schmerzen im weiteren Untersuchungsverlauf. Beruhigung mittels „Sch, sch“ vermittelt im Gegensatz dazu keine Informationen zum Befinden des Kindes oder zum weiteren Untersuchungsverlauf. Es dürfte vom Kind vielmehr als Zeichen der emotionalen Präsenz und Verfügbarkeit der Eltern wahrgenommen werden und könnte als solches hilfreich sein, um den kindlichen Distress zu reduzieren.

Es wurden insgesamt 68 Kinder im Alter von 2 bis 8 Jahren und deren Begleitpersonen untersucht. Elterliche Beruhigungsstrategien und kindliches Distressverhalten während der MCU wurden mittels einer standardisierten Beobachtungsskala (CAMPIS-R, Blount et al. 1997) kodiert, wobei der Verhaltenscode „Beruhigung mittels Sch, sch“ ergänzend hinzugefügt wurde. Um die Beziehung zwischen elterlichen Beruhigungsstrategien und kindlichem Distress über die vier Phasen der MCU hinweg zu prüfen, wurden Strukturgleichungsmodelle berechnet. Bezogen auf die Auswirkungen von beruhigenden Kommentaren und Beruhigung mittels „Sch, sch“ in einer Phase auf den kindlichen Distress der Folgephase zeigte sich, dass diese elterlichen Beruhigungsstrategien nur in der weniger stressreichen Vorbereitungsphase von Bedeutung sind, wobei Beruhigung mittels „Sch, sch“ den kindlichen Distress der Folgephase signifikant reduzierte, während beruhigende Kommentare diesen erhöhten. Innerhalb der einzelnen Untersuchungsphasen waren dagegen mit Ausnahme der Miktionsphase jeweils beide Verhaltensweisen signifikant positiv mit dem kindlichen Distress korreliert, was u.a. auch die Tatsache widerspiegeln

dürfte, dass Eltern Beruhigungsstrategien vor allem dann einsetzen, wenn sie das Kind als sehr belastet erleben. In der Miktionsphase fand sich für beruhigende Kommentare, nicht aber für Beruhigung mittels „Sch, sch“, eine signifikante, positive Korrelation zum kindlichen Distress.

BEITRAG 3

Felber, M., Schabmann, A., Schmiedek, F., Friedrich, M., & Völkl-Kernstock, S. (2014). Effects of spontaneous adult behavior on distress levels of 2- to 8-year-olds during voiding cystourethrograms. *Children's Health Care, 43*, 273-292. doi: 10.1080/02739615.2013.865186

Beitrag 3 beschäftigt sich detailliert und unter Berücksichtigung des Einflusses des Alters des Kindes mit dem Verlauf des kindlichen Distress während der MCU und untersucht darüber hinaus die Beziehung der drei spontanen Erwachsenen-Verhaltensweisen Ablenkung, Humor und Aufforderung zum Gebrauch von Copingstrategien auf den kindlichen Distress in den einzelnen Phasen der MCU. Es wurden insgesamt 80 Kinder im Alter von 2 bis 8 Jahren untersucht. Erwachsenenverhalten und kindliches Distressverhalten während der MCU wurden mittels einer standardisierten Beobachtungsskala (CAMPIS-R, Blount et al. 1997) kodiert. Die Auswertung erfolgte mittels hierarchisch linearer Modelle. Bezüglich des Distressverlaufs zeigte sich, dass der kindliche Distress zwischen den einzelnen Phasen der MCU deutlich variierte. Der Distress jüngerer Kinder stieg mit Beginn der Katheterisierungsphase markant an und verblieb bis zum Ende der MCU ungeachtet des Nachlassens der untersuchungsbedingten Belastung auf einem hohen Niveau. Älteren Kindern gelang es dagegen wesentlich besser, sich nach der Katheterisierungsphase wieder zu beruhigen.

Die Wirkung der einzelnen Erwachsenen-Verhaltensweisen erwies sich in den einzelnen MCU-Phasen als recht unterschiedlich. Ein erhöhtes Maß an Ablenkung durch Erwachsene ging in allen Untersuchungsphasen mit Ausnahme der Miktionsphase, in der Ablenkung keine Wirkung zeigte, mit verringertem kindlichen

Distress einher. Humor zeigte dagegen nur in der Katheterisierungs- und in der Miktionsphase einen distressreduzierenden Effekt, während sich in Vorbereitungs- und Füllungsphase kein Einfluss auf den kindlichen Distress nachweisen liess. Dabei war der distressreduzierende Effekt von Humor in der Katheterisierungsphase umso grösser, je jünger das Kind war. Für Aufforderung zum Gebrauch von Copingstrategien konnte in keiner der Untersuchungsphasen ein signifikanter Effekt auf den kindlichen Distress nachgewiesen werden.

4 Zusammenfassung und Diskussion

4.1 Zusammenfassende Diskussion der Ergebnisse

Die MCU gilt als Goldstandard zur Diagnose eines Vesicoureteralen Reflux und stellt eine im Kindesalter häufig durchgeführte radiologische Untersuchung dar (vgl. Bundy, 2007; Prasad & Cheng, 2012; Rao, Kennedy, Cohen, & Rosenberg, 2012). Bereits Fischman und Friedland (1986) sowie später Phillips et al. (1996) und Stashinko und Goldberger (1998) haben auf die hohe, mit der MCU verbundene Stressbelastung des Kindes und die Notwendigkeit für stressreduzierende Maßnahmen hingewiesen. Dennoch gibt es bisher nur wenige Studien, die sich mit psychologischen Interventionen zur Reduktion der kindlichen Stressbelastung bei der MCU beschäftigen (vgl. Butler et al., 2005; Rao et al., 2012; Zelikovsky et al., 2000). Ausgehend von der bei verschiedenen invasiven Eingriffen an Kindern gemachten Beobachtung, dass das Verhalten von im Untersuchungsraum anwesenden Erwachsenen das kindliche Distressverhalten sowohl im positiven wie im negativen Sinne wesentlich beeinflussen kann (vgl. Blount et al., 1989, 1990, 1997; Dahlquist, et al., 1995; Frank et al., 1995; Manimala et al., 2000; Manne et al., 1992), versucht die vorliegende Arbeit, basale Daten zum Einfluss des Verhaltens von Eltern und medizinischem Personal auf das kindliche Distressverhalten bei der MCU zu erheben, um daraus Empfehlungen für die Beratung von Eltern und medizinischem Personal abzuleiten. In Anlehnung an das Modell kindlichen Verhaltens bei medizinischen Untersuchungen von Rudolph et al. (1995) wurde dabei angenommen, dass die einzelnen Untersuchungsphasen der MCU sehr verschiedene Anforderungen an das Kind stellen, welche zudem vom Kind in Abhängigkeit von Alter und vorhergehenden MCU-Erfahrungen unterschiedlich gut bewältigt werden können. Kindliches Distressverhalten wie auch Erwachsenenverhalten wurden phasenspezifisch erhoben und die Wirkung des Erwachsenenverhaltens auf den kindlichen Distress im Verlauf der MCU mittels Strukturgleichungsmodellen und hierarchisch linearen Modellen untersucht. Ausgehend von der Überlegung, dass eine an die spezifischen Anforderungen der einzelnen MCU-Phasen angepasste

Beratung von Eltern und medizinischem Personal eine differenzierte Analyse des Erwachsenenverhaltens erforderlich macht, wurden sämtliche untersuchten Erwachsenenverhaltensweisen individuell und nicht in Form von in der Literatur üblichen, übergeordneten Verhaltenskategorien (vgl. Blount et al., 1997) erhoben.

Beitrag 1 versuchte zunächst, die Frage nach dem Einfluss vorhergehender MCU-Erfahrungen auf die kindliche Stressbelastung zu klären. Dabei zeigte sich, dass in der Stressbelastung von Kindern mit einmaliger und wiederholter MCU keine Unterschiede bestehen, die MCU somit für beide Gruppen sehr belastend sein kann und Maßnahmen zur Stressreduktion dringend erforderlich sind.

Beitrag 3 konnte aufzeigen, dass insbesondere jüngere Kinder die Katheterisierung als äusserst stressreich erleben. Je jünger ein Kind war, desto weniger war es zudem imstande, sich nach der Kathetersetzung wieder zu beruhigen. Im Gegensatz zu älteren Kindern verblieben jüngere Kinder bis zum Untersuchungsende auf einem vergleichsweise hohen Distressniveau. In Hinblick auf distressreduzierende Maßnahmen bedeutet dies, dass es von grosser Bedeutung ist, den kindlichen Distress bereits in der Katheterisierungsphase deutlich zu reduzieren.

Beitrag 2 und 3 bestätigten, dass eine phasenspezifische Beratung von Eltern und medizinischem Personal zur Reduktion des kindlichen Distress eine individuelle Analyse der Wirkung einzelner Verhaltensweisen im Verlauf der MCU erfordert. So konnte Beitrag 3 aufzeigen, dass aus der anhand von Studien zu anderen invasiven Eingriffen an Kindern gewonnenen übergeordneten Verhaltenskategorie „Coping Promoting Behavior“ (vgl. Blount et al., 1997) nur die Erwachsenenverhaltensweisen Ablenkung und Humor, nicht aber Aufforderung zum Gebrauch von Copingstrategien bei der MCU eine reduzierende Wirkung auf den kindlichen Distress haben. Bei der Interpretation dieses Ergebnisses ist zu berücksichtigen, dass Aufforderungen zum Gebrauch von Copingstrategien je nach Art der medizinischen Untersuchung sehr unterschiedlich sein können. Im Falle der MCU beziehen sie sich meist auf die Aufforderung zu Husten (dies

erleichtert die Kathetereinführung) bzw. tief zu atmen sowie darauf, sich zu entspannen. Weiter erfordern derartige Aufforderungen im Gegensatz zu Ablenkung und Humor die aktive Mitarbeit des Kindes, die dieses in der unbekannten und bedrohlichen Situation der MCU ohne vorhergehendes Training möglicherweise nicht zu erbringen vermag.

Die Ergebnisse aus Beitrag 3 verdeutlichen zudem, dass die Wirkung von Erwachsenenverhaltensweisen auf das kindliche Distressverhalten in den einzelnen Phasen der MCU eine unterschiedliche ist. So erwies sich Ablenkung in allen Untersuchungsphasen mit Ausnahme der Miktionsphase als hilfreich zur Reduktion des kindlichen Distress. Die Miktionsphase ist die einzige Untersuchungsphase, in der das Kind durch Konzentration auf das Harnlassen aktiv dazu beitragen kann, den Untersuchungsablauf zu beschleunigen. Um sich auf ein ablenkendes Gespräch zu konzentrieren bzw. um auf dieses einzugehen, ist nach McCaul und Malott (1984) ein gewisses Maß an kognitiver Verarbeitungsleistung notwendig, welches die Kinder während ihres Bemühens zu Urinieren u.U. nicht aufbringen können, sodass sich Ablenkung in der Miktionsphase als nicht wirksam zeigte. In der Miktionsphase erwies sich dagegen Humor als hilfreich, da Lachen die Entspannung des Blasenschließmuskels unterstützt.

Beitrag 2, der sich mit elterlichen Beruhigungsstrategien befasste, konnte zeigen, dass Beruhigung mittels „Sch, sch“, welche bisher nur gemeinsam mit anderen Verhaltensanweisungen an das Kind untersucht worden war, die in Summe den kindlichen Distress nicht zu beeinflussen schienen (Blount et al., 1989), bei der MCU sehr wohl einen längerfristigen distressreduzierenden Effekt zeigte, allerdings nur, wenn sie in der Vorbereitungsphase der MCU eingesetzt wird. Hier führte Beruhigung mittels „Sch, sch“ zu einer signifikanten Reduktion des kindlichen Distress in der nachfolgenden Katheterisierungsphase. Dies unterstützt die Vermutung, dass „Sch, sch“ vom Kind als ein Zeichen der emotionalen Präsenz der Eltern wahrgenommen wird, wodurch es eine beruhigende Wirkung auf das Kind ausübt (vgl. Bush et al., 1986; Lumley et al., 1990). Elterliche

Beruhigung mittels „beruhigender Kommentare“ zeigte ebenfalls nur in der Vorbereitungsphase einen längerfristigen, allerdings gegenteiligen Effekt, sie führte zu einer signifikanten Erhöhung des kindlichen Distress in der Katheterisierungsphase. Wurden Beruhigung mittels „Sch, sch“ bzw. „beruhigende Kommentare“ dagegen während den eigentlichen (prozeduralen) Untersuchungsphasen eingesetzt, zeigten sie den bisherigen Annahmen in der Literatur entsprechend (Blount et al., 1989) keine Auswirkungen auf das kindliche Distressverhalten.

Die Ausführungen zur Wirkung von beruhigenden Kommentaren und Beruhigung mittels „Sch, sch“ im Verlauf der MCU unterstreichen, wie wichtig es ist, die Vorbereitungsphase von den prozeduralen Untersuchungsphasen zu unterscheiden, und bestätigen damit ebenso wie Beitrag 3 die Annahme, dass die Anforderungen der einzelnen Phasen an das Kind sehr unterschiedlich sind und Interventionsannahmen dementsprechend auf die einzelnen Phasen abgestimmt werden müssen. Nach Dahlquist et al. (1995) spiegelt das kindliche Distressverhalten in der Vorbereitungsphase nur die kindliche Angst wider, in den eigentlichen Untersuchungsphasen jedoch sowohl Angst als auch Schmerz. Beruhigungsversuche der Eltern scheinen das Kind demnach nur in der noch weniger belastenden und nur von Angst geprägten Vorbereitungsphase zu erreichen, später jedoch nicht mehr. Dennoch sollten die Auswirkungen der elterlichen Beruhigungsversuche in der Vorbereitungsphase nicht unterschätzt werden, zumal sie - wie Beitrag 2 zeigen konnte - auch das Distressniveau in der sehr belastenden Katheterisierungsphase mitbeeinflussen. Wie bereits erwähnt, verbleiben insbesondere jüngere Kinder nach der Katheterisierungsphase über die gesamte weitere Untersuchungsdauer hinweg auf einem annähernd gleich hohen Distressniveau. Die Beeinflussung des kindlichen Distress der Katheterisierungsphase hat somit indirekt auch Auswirkungen auf den kindlichen Distress in den nachfolgenden Untersuchungsphasen.

Insgesamt ergibt sich der Eindruck, dass insbesondere Eltern nicht wissen, wie sie ihrem Kind bei der MCU am besten helfen können. Zwar wird Ablenkung, die sich

in allen Phasen mit Ausnahme der Miktionsphase als hilfreich erwiesen hat, von Eltern und medizinischem Personal häufig eingesetzt. Sehr oft reagieren Eltern auf die Stressbelastung des Kindes aber mit beruhigenden Kommentaren, die ihnen vermutlich intuitiv als zielführend erscheinen, die aber - wie Beitrag 1 und 2 zeigen konnten - in keiner Weise geeignet sind, das Kind zu beruhigen. Es kann angenommen werden, dass Eltern durch beruhigende Kommentare nicht nur das Kind, sondern auch sich selbst beschwichtigen möchten (vgl. Gonzalez et al., 1993). Eltern zeigen selbst bei wiederholter MCU, bei der ihnen die Untersuchungssituation bereits bekannt ist und bei der sie - wie Beitrag 1 zeigen konnte - eine im Vergleich zu Eltern mit erstmaliger MCU geringere Stressbelastung aufweisen, ein in etwa gleiches Ausmaß an „Distress Promoting Behavior“ wie Eltern bei erstmaliger MCU.

Zusammenfassend lässt sich feststellen, dass es notwendig ist, Eltern und medizinisches Personal bezüglich der bestmöglichen Unterstützung des Kindes im Verlauf der MCU zu beraten. Die in der vorliegenden Arbeit erhobenen Daten zum Einfluss des Erwachsenenverhaltens auf den kindlichen Distress während der MCU sollen als Grundlage für später zu entwickelnde, auf die einzelnen Untersuchungsphasen abgestimmte Beratungsprogramme für Eltern und/oder medizinisches Personal dienen.

4.2 Zusammenfassung der methodischen Herangehensweise

Die Fragestellungen in Beitrag 2 und 3 machten etwas spezifischere methodische Herangehensweisen erforderlich. Beitrag 2 hatte sich die Aufgabe gestellt, die längerfristigen Effekte von elterlichen Beruhigungsstrategien auf den kindlichen Distress, nämlich die Wirkung von einer Phase der MCU auf die nächste, zu untersuchen. Die Beziehungen zwischen Elternverhalten und kindlichem Distress über die vier Phasen der MCU wurden dazu mittels Strukturgleichungsmodellen erhoben, welche es erlauben, kausale Abhängigkeiten zwischen (im diesem Fall manifesten, d.h. direkt beobachtbaren) Variablen über verschiedene Zeitpunkte

hinweg unter Ausschluss von Scheinkorrelationen zu überprüfen. Zuvor wurde eine Faktorenanalyse über die acht Verhaltenscodes der Verhaltenskategorie „Child Distress“ gerechnet. Für die Erstellung der Strukturgleichungsmodelle wurde sodann nur der sich daraus ergebende erste Faktor, der die Verhaltenscodes „Weinen“, „Schreien“ und „Suche nach emotionaler Unterstützung“ umfasste und 77% des gesamten Distressverhaltens der Kinder ausmachte, als Maß für den kindlichen Distress herangezogen. In einem nächsten Schritt wurden über die beiden Elternverhaltensweisen „Sch, sch“ und „Beruhigende Kommentare“ je ein Strukturgleichungsmodell mit Kreuzpfaden zwischen den phasenweise angeordneten Variablenpaaren (Elternverhalten – Distressverhalten des Kindes) im Sinne eines Cross-Lagged-Panel-Designs (Oud, 2002) berechnet.

Die Variabilität in der Dauer der gesamten MCU und der einzelnen Untersuchungsphasen stellte bei der in Beitrag 3 angestrebten Datenauswertung auf Minutenebene eine besondere Herausforderung dar. Aufgrund der pro Kind unterschiedlichen Dauer einer Untersuchungsphase ergaben sich bei Kindern mit kürzerer Phasenlänge am Ende der jeweiligen Phase scheinbare „missing values“. Betrachtet man zum Beispiel die Füllungsphase von zwei Kindern mit 5 und 7 Minuten Dauer, so ergeben sich für das erste Kind am Ende der Füllungsphase in Minute 6 und 7 technisch gesehen zwei „missing values“. Die Daten wurden deshalb mittels hierarchischer linearer Modelle ausgewertet, welche es im Gegensatz zu anderen Verfahren der Analyse longitudinaler Daten erlauben, auch Daten von Versuchspersonen mit mehreren „missing values“ in die Auswertung miteinzubeziehen (DeLucia & Pitts, 2006). Eine mehrebenenanalytische Betrachtungsweise bot sich zudem an, da die erhobenen Daten auf zwei Ebenen geschachtelt waren, nämlich auf jener des Individuums (Ebene 1: Minuten im Verlauf der MCU eines Kindes) und auf jener der Gesamtgruppe (Ebene 2: einzelne Kinder innerhalb der Gesamtgruppe). Hierarchisch lineare Modelle liefern getrennte Schätzwerte der an den einzelnen Individuen erhobenen Daten (Ebene 1) und aggregieren diese Schätzwerte über alle Versuchspersonen hinweg (Ebene 2). Entsprechend wird auch die Varianz der abhängigen Variable aufgeteilt in die

Varianz zwischen den pro Minute erhobenen Messwerten eines Individuums (Ebene 1) und der Varianz zwischen den Individuen (Ebene 2; vgl. Bryk & Raudenbush, 1992; Singer, 1998). Durch die Verwendung hierarchisch linearer Modelle mit festen und zufälligen Effekten und der Annahme einer autoregressiven Korrelationsstruktur zwischen den Messzeitpunkten eines Individuums (Ebene 1) konnte der Struktur der erhobenen Daten optimal Rechnung getragen werden.

4.3 Praktische Implikationen für die Entwicklung von Beratungsprogrammen

Die Ergebnisse der vorliegenden Arbeit bestätigen die Resultate aus früheren Studien, nach denen die MCU insbesondere für jüngere Kinder eine sehr belastende Untersuchung darstellt, und unterstreichen die Bedeutung von Interventionen zur Verringerung der kindlichen Stressbelastung. Es konnte aufgezeigt werden, dass das spontane Verhalten von im Untersuchungsraum anwesenden Erwachsenen, insbesondere den elterlichen Begleitpersonen, bei einmaliger wie wiederholter MCU einen wichtigen Einflussfaktor des kindlichen Distressverhaltens darstellt. Da Trainingsprogramme für Erwachsene, insbesondere für elterliche Begleitpersonen, als zu zeit- und kostenintensiv erscheinen, um im Alltag einer kinderradiologischen Ambulanz dauerhaft erfolgreich implementiert zu werden zu können, bieten sich als Alternative dazu Beratungsprogramme / -brochüren für Eltern bzw. medizinisches Personal an, die diese bezüglich geeigneten Verhaltens zur bestmöglichen Unterstützung des Kindes während der MCU instruieren. Gerade Eltern sind bei medizinischen Untersuchungen ihres Kindes häufig ängstlich, was sie daran hindert, ihr Kind bei der Untersuchung optimal zu unterstützen. Forschungsergebnisse deuten darauf hin, dass bereits minimale Instruktionen an die Eltern diesen helfen können, ihre Angst zu reduzieren und das Kind effektiver zu unterstützen (vgl. Cohen, Blount, & Panopoulos, 1997; Cohen, Bernard, Greco, & McClellan, 2002). Bei der Entwicklung und Evaluation entsprechender Beratungsprogramme ist es nach den

Resultaten der vorliegenden Arbeit von essentieller Bedeutung, das Verhalten der Erwachsenen gegenüber dem Kind auf die unterschiedlichen Anforderungen der einzelnen Untersuchungsphasen der MCU abzustimmen.

In der Vorbereitungsphase sollten Eltern und medizinisches Personal primär dazu angehalten werden, das Kind abzulenken. Eltern sollten ermutigt werden, weinende oder schreiende Kinder in der Vorbereitungsphase durch „Sch, sch“ und weniger durch verbale Beruhigungsversuche („Ist ja gleich vorbei“) zu beruhigen. Interventionen während der Vorbereitungsphase kommt dabei besondere Bedeutung zu. Vor allem jüngere Kinder neigen dazu, Angst und Schmerz in ihrer Wahrnehmung zu vermischen (vgl. Chen, Zeltzer, Craske, & Katz, 2000.). Kann die Angst des Kindes bereits in der Vorbereitungsphase verringert werden, so dürfte dies erheblich dazu beitragen, dass die nachfolgende Katheterisierung vom Kind als weniger schmerzhaft erlebt wird. In Beitrag 2 konnte zudem eine hohe positive Regression des kindlichen Distress der Kathetersisierungsphase auf jenen der nachfolgenden Behandlungsphasen nachgewiesen werden. Ein geringerer Distress in der Katheterisierungsphase bedeutet demnach v.a. für jüngere Kinder auch in den nachfolgenden Behandlungsphasen einen geringeren Distress.

Während der eigentlichen Behandlungsphasen (Katheterisierungs-, Füllungs- und Miktionsphase), die mit einem höheren Distresslevel der Kinder einhergehen, sollten Eltern wie medizinisches Personal vor allem auf Ablenkung und Humor setzen, da Beruhigungsversuche das Kind in diesen Behandlungsphasen nicht mehr zu erreichen scheinen. Dabei kann in der Katheterisierungsphase sowohl zu Ablenkung als auch zu Humor geraten werden, wobei sich Humor – insbesondere bei jüngeren Kindern – als wirksamer erwiesen hat. In der nachfolgenden Füllungsphase empfiehlt sich vor allem Ablenkung. In der abschliessenden Miktionsphase sollte dagegen ausschliesslich auf Humor gesetzt werden. Aufforderungen zum Gebrauch von Copingstrategien erscheinen vorerst in keiner Untersuchungsphase ratsam. Abbildung 1 stellt zusammenfassend die aus den Ergebnissen von Beitrag 2 und 3 abgeleiteten Empfehlungen für das

Erwachsenenverhalten in den einzelnen Untersuchungsphasen dar. Dabei ist zu berücksichtigen, dass die unter der Rubrik „Vorbereitungsphase“ genannte Beruhigung mittels „Sch, sch“ nur in Bezug auf das Elternverhalten untersucht und deshalb vorerst auch nur für die Eltern empfohlen werden kann.

Empfehlenswerte Erwachsenenverhaltensweisen pro MCU-Phase

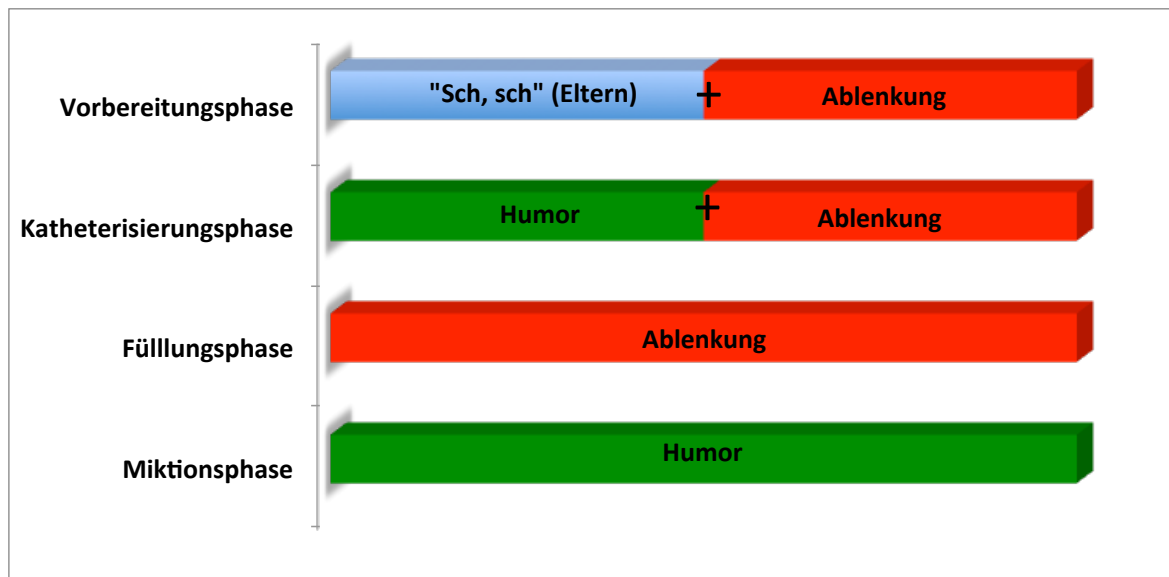


Abb. 1: Empfehlungen für das Erwachsenenverhalten in den einzelnen Untersuchungsphasen

4.4 Limitationen der vorliegenden Arbeit

Bei der Interpretation der Resultate muss angemerkt werden, dass die Generalisierbarkeit der Ergebnisse durch den geringen Prozentsatz an Buben in der Untersuchungsstichprobe eingeschränkt ist. Auch konnte mit Ausnahme vorhergehender MCUs die medizinische Vorgeschichte der Kinder (andere invasive Untersuchungen, frühere Erkrankungen, usw.) nicht ausreichend berücksichtigt werden. Die vorliegende Arbeit konzentrierte sich ausschließlich auf das bei der MCU gezeigte Eltern- bzw. Erwachsenenverhalten. Der Einfluss von Einstellung und Verhalten der Eltern im Vorfeld der MCU (z.B. MCU-bezogene Ängste, Vorbereitung des Kindes auf die MCU) sowie der Einfluss von MCU-

bezogenen Vorinformationen an Kind und Eltern durch Kinderärzte, Radiologen oder andere Fachkräfte wurde nicht bzw. nur rudimentär erhoben und fand in den Analysen keine Berücksichtigung.

Als Maß für die kindliche Stressbelastung wurde mit Ausnahme des ersten Beitrags ausschliesslich das beobachtbare Distressverhalten herangezogen. Dadurch könnten die Ergebnisse einen Bias zugunsten des Verhaltens jüngerer Kinder aufweisen, die ihre Stressbelastung unter Umständen deutlicher zeigen als ältere Kinder. Dies gilt insbesondere für die Ergebnisse aus Beitrag 2, in dem nach der eingangs durchgeführten Faktorenanalyse nur die den ersten Faktor konstituierenden Verhaltensweisen „Schreien“, „Weinen“ und „Suche nach emotionaler Unterstützung“ in die Analyse miteinbezogen wurden. Verbale Distressäusserungen von Widerstand, Schmerz oder Angst, die v.a. von älteren Kindern gezeigt werden, waren von der Analyse ausgeschlossen.

Schliesslich wurde in Beitrag 3 bei der Untersuchung des distressreduzierenden Effekts von Ablenkung, Humor und Aufforderungen zum Gebrauch von Copingstrategien nicht zwischen dem Verhalten von Eltern und medizinischem Personal differenziert. Auch wenn dieses Vorgehen aufgrund der häufigen Interaktionen von Eltern und medizinischem Personal in Bezug auf diese Verhaltensweisen gerechtfertigt erscheint, hat es den Nachteil, dass die Ergebnisse keine Aussagen bezüglich der Auswirkungen des alleinigen Elternverhaltens bzw. des alleinigen Verhaltens des medizinischen Personals zulassen.

4.5 Ausblick auf zukünftige Forschung

Das Ziel der vorliegenden Arbeit war die Erhebung grundlegender Daten zum Einfluss des Erwachsenenverhaltens auf das kindliche Distressverhalten bei der MCU. Zukünftige Forschung sollte über eine rein beschreibende Erhebung der Wirkung des Erwachsenenverhaltens hinausgehen und sich mit der Entwicklung

und Evaluation von konkreten Beratungsprogrammen für Eltern und / oder medizinisches Personal im Vorfeld der MCU zur Reduktion der kindlichen Stressbelastung beschäftigen. Entsprechend den Ergebnissen der Beiträge dieser Arbeit sollten dabei die spezifischen Anforderungen der einzelnen Untersuchungsphasen besondere Berücksichtigung finden.

Vor der Entwicklung und Evaluation von konkreten Beratungsprogrammen mag es notwendig sein, in weiteren Forschungsprojekten Fragen zu klären, die in der vorliegenden Arbeit nicht aufgegriffen werden konnten. So war in Beitrag 3 nicht zwischen dem Effekt von Elternverhalten und jenem des medizinischen Personals differenziert worden. Weitere Studien sollten die Wirkung von Ablenkung, Humor und Aufforderungen zum Gebrauch von Copingstrategien getrennt für Eltern und medizinisches Personal untersuchen. Das Ergebnis aus Beitrag 3, nach dem Aufforderungen zum Gebrauch von Copingstrategien bei der MCU keine Auswirkungen auf den kindlichen Distress zeigen, wirft zudem die Frage auf, ob Aufforderungen zum Gebrauch von Copingstrategien bei der MCU generell nicht zu empfehlen sind, oder ob sie nicht vielmehr einer vorhergehenden Instruktion der Eltern und eventuell auch des Kindes bedürfen. Auch dies müsste in einer weiteren Studie geklärt werden.

Ein eigenes Forschungsgebiet stellt die Frage nach dem Einfluss des elterlichen Befindens auf das Elternverhalten und die kindliche Stressbelastung während der MCU dar. Weiter besteht bezüglich der Frage, inwieweit eine unterschiedliche Vorbereitung des Kindes seitens Eltern und / oder medizinischem Personal die kindliche Stressbelastung während der MCU beeinflusst, noch Forschungsbedarf.

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Anhang

Beitrag 1

Comparing stress levels in children aged 2–8 years and in their accompanying parents during first-time versus repeated voiding cystourethrograms

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Stressbelastung von 2–8-jährigen Kindern und deren Eltern infolge erstmaliger und wiederholter Miktionszystourethrographie

Zusammenfassung. *Hintergrund:* Invasive Prozeduren wie die MCU bedeuten für Kinder und Eltern eine hohe Stressbelastung. Ziel der vorliegenden Studie war es, zu untersuchen, ob sich die Stressbelastung von Kindern und deren begleitenden Eltern bei erstmaliger und wiederholter Miktionszystourethrographie (MCU) unterscheidet. Darüber hinaus sollte die Beziehung zwischen elterlichem Verhalten (das kindliche Coping förderndes und den kindlichen Distress förderndes Verhalten), elterlicher Stressbelastung und kindlicher Stressbelastung bei erstmaliger und wiederholter MCU untersucht werden.

Methodik: In einer prospektiven Studie wurde das Distressverhalten von 31 Kindern im Alter von 2 bis 8 Jahren bei wiederholter MCU untersucht. Eine Parallelstichprobe von 31 Kindern mit erstmaliger MCU diente als Kontrollgruppe. Kindliches und elterliches Verhalten während der MCU wurde von drei unabhängigen Beobachtern mittels einer standardisierten Beobachtungsskala (CAMPIS-R, Blount et al.) kodiert. Die Kinder beurteilten ihre Stressbelastung anhand einer Gesichterskala. Eltern und Radiologen schätzten die kindliche Stressbelastung anhand einer visuellen Analogskala ein. Ergänzend schätzten die Eltern ihre eigene Stressbelastung ebenfalls auf einer visuellen Analogskala ein.

Ergebnisse: Kinder mit wiederholter MCU unterscheiden sich in ihrer Stressbelastung nicht von Kindern mit erstmaliger MCU, die elterliche Stressbelastung ist jedoch bei wiederholter MCU signifikant geringer. In beiden Gruppen findet sich eine signifikante positive Korrelation zwischen Distress förderndem Verhalten der Eltern und kindlichem Distress, sowie zwischen elterlicher Stressbelastung und kindlichem Distress. Zwischen Coping förderndem Verhalten der Eltern und kindlichem

Distress bzw. elterlicher Stressbelastung konnten in keiner der beiden Gruppen signifikante Korrelationen gefunden werden. Elterliche Stressbelastung und Distress förderndes Verhalten der Eltern waren nur bei wiederholter MCU signifikant positiv korreliert. Im Coping und Distress fördernden Verhalten der Eltern zeigten sich keine signifikanten Unterschiede zwischen erstmaliger und wiederholter MCU.

Schlussfolgerungen: Die kindliche Stressbelastung ist bei wiederholter MCU vergleichbar hoch wie bei erstmaliger MCU. Obwohl die elterliche Stressbelastung bei wiederholter MCU geringer ist, erweist sich das spontane Verhalten der Eltern als ineffektiv bzw. sogar kontraindiziert zur Verringerung der kindlichen Stressbelastung. In einem nächsten Schritt sollten weiterführende Studien zu effizienten Beratungs- und Trainingsprogrammen für Eltern und Kinder bei wiederholter MCU folgen.

Summary. *Objectives:* Invasive procedures such as voiding cystourethrograms (VCUGs) cause distress in both children and their accompanying parents. The main purpose of this study was to examine whether stress levels in children and their parents differ during first-time and repeated VCUGs. The second objective was to examine the relationship between parental behavior (behavior promoting child coping and behavior promoting child distress), parental stress levels and child distress in first-time versus repeated VCUGs.

Methods: In a prospective study, the distress behavior of 31 children aged 2–8 years who were undergoing a repeated VCUG was examined. A second group of 31 children who were undergoing a VCUG for the first time served as a control sample. Child and parental behavior during the VCUG was coded by three independent observers using a standardized rating scale (CAMPIS-R, Blount et al.). Children reported on their stress levels

using a faces scale; parents and radiologists rated the child's distress on a visual analog scale. Similarly, parents assessed their own stress levels on a visual analog scale.

Results: The stress levels of children undergoing a repeated VCUG do not differ from those of children undergoing a VCUG for the first time, but parental stress levels were significantly lower during repeated VCUGs. In both VCUG groups there was significant positive correlation between parental distress-promoting behavior and child distress, and between parental stress levels and child distress. Parental coping-promoting behavior showed no significant correlation with child distress or parental stress levels in either VCUG group. Parental stress levels and parental distress-promoting behavior correlated positively only for repeated VCUGs. Neither parental coping- nor distress-promoting behavior differed between first-time versus repeated VCUG groups.

Conclusions: Repeated VCUGs and first-time VCUGs are both highly distressing procedures for children. Even though parental stress levels are lower during repeated VCUGs, spontaneous parental behavior proves to be ineffective or even counterproductive in reducing the child's distress. Further research into efficient counseling and training methods for parents and children undergoing VCUGs is required.

Key words: Voiding cystourethrogram (VCUG), psychological stress, parent-child-behaviour, child, pre-school.

Vesicoureteral reflux in children may cause permanent damage to the kidneys [1] and is most commonly triggered by a urinary tract infection. Such infections occur significantly more frequently among girls than boys [2], with infants and toddlers at increased risk of infection [3]. The voiding cystourethrogram (VCUG) is the standard method of diagnosing a vesicoureteral reflux and from initial diagnosis to the successful completion of treatment children must undergo an average of four VCUGs, usually carried out at intervals of a year [4].

Several studies have shown that because of its invasive nature the VCUG is highly distressing for children, especially young ones, and also for their parents [5–8]. Stashinko and Goldberger [9] have described several distressing aspects of a VCUG for children, which include having a stranger examining the child's genital area, a foreign body (the catheter) being inserted into the child's body and thereby causing pain, the embarrassment of lying naked on the examining table, being required to urinate in front of all those present and, finally, the child's experience of its parents being present yet doing nothing to prevent what is happening. Phillips et al. [7, 10] interviewed children's parents one week post-VCUG and found behavioral changes such as sleep disturbance, withdrawal or bed wetting occurring in 45% of the children during that week.

The effects of repeated VCUGs on child distress have been examined in two studies, with contradictory results. Zelikovsky et al. [11] found that radiologists rated children with previous VCUGs as more fearful, whereas in the parent's ratings and the children's self-reports there was no

difference in the children's fear during first-time and repeated VCUGs. In the study by Robinson et al. [8], radiologists' ratings of children's distress were lower for repeated than for first-time VCUGs, whereas parent's ratings of children's distress were higher for repeated VCUGs. These contradictory findings need to be re-evaluated using assessments based on a standardized rating scale administered by independent observers. The effects of repeated VCUGs on parental distress and its impact on the child's distress during the procedure have not yet been studied.

The primary objective of this study was to examine whether there is a difference in the distress levels of children and their parents when the child undergoes a repeated compared with a first-time VCUG. The child's distress was rated by the child, by independent observers using a standardized rating scale, by the parents and by the radiologists. In addition, parents reported on changes in their child's behavior during the week following the VCUG.

In various medical interventions the Blount working group [12–14] were able to prove that parental behavior such as reassurance, criticism or pity (distress-promoting behavior) increases the child's level of stress. Although the sample sizes were small ($N = 32$ and 40), this result was also found to be true for the VCUG [15, 16]. Parental behavior that distracts the child or stimulates active coping (coping-promoting behavior) increases the child's coping behavior [12–14] but, where the parents have not received special training, in most studies this has no, or only limited, effect in reducing child distress [12, 17]. For the VCUG, Zelikovsky et al. reported an inverse relationship between parental coping-promoting behavior and child distress [15], but this result cannot be generalized to include spontaneous parental behavior as half of the parents in their sample had been trained beforehand to use specific coping-promoting behaviors. Although Zelikovsky et al. found no relation between parental anxiety and parental behavior, a highly significant correlation between parental anxiety and child distress during the VCUG was proven [15].

The secondary objective of the present study was to examine whether the correlations cited above could be repeated in a larger sample ($N = 62$) and in a sample comprising only children undergoing repeated VCUGs. The following hypotheses were assumed: a) parental distress-promoting behavior correlates positively with child distress, b) parental coping-promoting behavior shows no or only a small negative correlation with child distress, and c) parental stress levels correlate positively with child distress but show no correlation with parental behavior. In addition, differences in parental behavior (distress- and coping-promoting behaviors) during first-time and repeated VCUGs were examined.

Materials and methods

Instruments

Demographic and medical variables

Data on the child's and parents' socio-demographic variables and the child's medical history (number of previous VCUGs) were collected using a semi-structured anamnestic interview.

Child distress: self-reports

The children assessed their own condition during the VCUG using the face pain scale of Bosenberg et al. which shows satisfactory validity [18]. On this scale, faces corresponding to the level of stress, ascending from left to right and coded from 1 to 6, are used for the evaluation.

Observed behavior of parents and child, including child distress, during the VCUG

Child and parental behavior during the VCUG was recorded using the Child-Adult Medical Procedure Interaction Scale – Revised (CAMPIS-R) by Blount et al. [13]. The CAMPIS-R is a standardized rating scale used to record child and adult behavior during medical interventions and whose reliability and validity has been proven in numerous studies [13, 19]. The scale consists of 35 individual behavioral codes grouped into six categories, namely Child Coping (e.g. distraction, loud, audible breathing), Child Distress (e.g. crying, screaming, search for support), Child Neutral, Adult Coping Promoting (e.g. distraction, humor), Adult Distress Promoting (e.g. reassurance, empathy and criticism) and Adult Neutral. The category Child Distress was considered the most important measurement for observable child stress levels. The categories Child Neutral and Adult Neutral were not used.

Behavioral coding was used according to Blount et al. [20], although because of our hospital's legal regulations it was not possible to make video or audio recordings of the VCUGs. The behavior of parents, child and medical staff was therefore coded by three independent observers who had undergone special training. Continuous behaviors such as "crying" and "screaming" were coded at intervals of 5 seconds [cf. 21]. The frequency of a particular category of behavior was calculated

by dividing the frequency of its appearance by the respective duration of the procedure (in minutes) [cf. 13].

Child distress: parental and radiologists' reports

Similarly, child stress levels were assessed by the accompanying parent and the radiologist using a 100 mm visual analog scale with the poles "No stress at all" (0% stress) and "Highest imaginable level of stress" (100% stress). The reliability and validity of such ratings have been proven in other studies [cf. 22].

Parental distress

The accompanying parent also provided information about their own stress levels during the VCUG, recorded on a 100 mm visual analog scale with the poles "No stress at all" (0% stress) and "Highest imaginable level of stress" (100% stress).

Noticeable behavioral problems in the child during the week following the VCUG

A semi-structured telephone interview was conducted with the parent who had accompanied the child. The trained interviewer asked about the child's wellbeing during the previous week (open question) as well as about any behavioral changes, medical interventions or health problems (open questions), or any other stressful experiences (list of possible stressful events) that might have arisen during the week following the VCUG.

General behavioral problems in the child

In order to examine group differences in the premorbid functioning of the child during the period six months prior to the current VCUG, and to statistically control for any differ-

Table 1. Socio-demographic characteristics and medical history of children undergoing voiding cystourethrograms (VCUGs)

N (%)	First-time VCUG N=31	Repeated VCUG N=31
Age (mean $\pm$ sd)	4.3 $\pm$ 1.8	4.1 $\pm$ 1.9
Sex		
Female	28 (90.3%)	28 (90.3%)
Male	3 (9.7%)	3 (9.7%)
Accompanying Parent(s)		
Mother only	11 (35.5%)	11 (35.5%)
Father only	2 (6.5%)	4 (12.9%)
Both parents	13 (41.9%)	11 (35.5%)
Mother + other relative (grandmother or aunt)	5 (16.1%)	5 (16.1%)
Hospital		
AKH	5 (16.1%)	6 (19.4%)
St. Anna	26 (83.9%)	25 (80.6%)
Education of mother		
Compulsory school	3 (9.7%)	0 (0%)
Apprenticeship	13 (42.3%)	17 (54.9%)
A-level	8 (25.8%)	7 (22.6%)
Academic	5 (16.1%)	7 (22.6%)
Missing	2 (6.5%)	0 (0%)
Education of father		
Compulsory school	5 (16.1%)	0 (0%)
Apprenticeship	8 (25.8%)	16 (51.6%)
A-level	11 (35.5%)	5 (16.1%)
Academic	5 (16.1%)	10 (32.3%)
Missing	2 (6.5%)	0 (0%)
Medical history		
Chronic diseases	1 (3.2%)	3 (9.7%)
Other health problems	6 (19.4%)	7 (22.6%)

ences, the accompanying parent completed the German version of the Child Behavior Checklist: CBCL 1.5–5 for the children aged 2–3 years [23], CBCL 4–18 for those aged 4–8 years [24]. These scales are commonly used in assessment of emotional and behavioral problems in children.

Psychological problems and symptoms in the accompanying parent

Group differences in psychological problems/symptoms in the accompanying parents were assessed using the German version of the Brief Symptom Inventory (BSI) [25], aiming to statistically control for any differences. The BSI reflects psychological symptom patterns (e.g. somatization, depression, anxiety) and allows measurement of overall psychological distress levels.

Participants

Between December 2004 and July 2005 a random sample of children aged between 2 and 8 years who had been referred as outpatients to two Viennese children's hospitals for a VCUG were recruited to this prospective study together with their parents. Exclusion criteria consisted of the following: children who were scheduled to undergo the procedure under sedation (exceptional cases), mentally disabled children, and children and parents who were not able to converse easily in German. The final sample comprised 62 children: 56 (90.3%) girls and 6 (9.7%) boys, with a mean age of 56.1 months (SD 22.3). In the repeated VCUG group, 39% children ($n = 12$) were coming for their second procedure, 35% ($n = 11$) for their third and 26% ($n = 8$) for their fourth (or more), with the previous VCUG having been carried out 1.13 years earlier (SD 0.48) on average. Table 1 shows additional sociodemographic data and data on medical history.

Procedure

The study was approved by the ethics committees of both hospitals. When registering the child for the VCUG, parental consent and the completion of the two questionnaires regarding the child's and the accompanying parent's behavioral/psychological problems was requested. (If both parents were present, questionnaires were completed by the child's mother.) During the VCUG child and parental behavior was rated by three independent observers using the CAMPIS-R rating scale.

Immediately after each VCUG the ratings were compared and discussed by the observer team. A priori agreement among the raters was 76–82%. In the case of incongruent ratings a consensus was aimed for; the second author's (M.F.) ratings were used where no consensus was reached ($<5\%$ of all ratings). After the VCUG the radiologist and the accompanying parent each assessed the child's stress level during the VCUG, independently of one another. In addition, the accompanying parent assessed her/his own stress level during the child's VCUG. Afterwards, sociodemographic data and the child's previous medical history were recorded using a semi-structured anamnestic interview. Lastly, all children of at least 3 years of age assessed their own mental state during the VCUG. Seven to nine days after the VCUG the parents were contacted by telephone and asked in a semi-structured telephone interview about any changes in the child's behavior since the VCUG and about any other stressful events that might have occurred in the meantime.

Data analyses

The Statistical Package for the Social Sciences (SPSS) version 15 was used for all statistical analyses. Pearson's chi-squared tests were used for group comparisons of categorical variables; t -tests for independent samples were used for continuous variables. Differences among the four ratings of child distress (child self-report, parents and radiologists' ratings, CAMPIS-R) were evaluated by applying a Friedman test on the ranked ratings with additional paired Wilcoxon tests and Bonferroni-Holm correction. Differences in the ratings of child distress between parents and radiologists were evaluated using the paired samples t -test. In addition, relationships between continuous data were analyzed using Pearson's correlation coefficients. The type I error was set to 0.05.

Results

Preliminary Analysis

Group comparisons between first-time versus repeated VCUGs showed no group differences with regard to the child's baseline psychological problems or with the accompanying parent's psychological functioning (Table 2). Boys did not differ from girls in baseline psychological problems (CBCL) or in any of the four measures

Table 2. Child's behavioral problems and accompanying parent's psychological problems: number and group means (SDs), t -test results, degrees of freedom (df), P -values, effect sizes, and 95% confidence intervals (CI)

	n	First VCUG	n	Repeated VCUG	t -test result	df	P value	Effect size*	Mean difference $\pm$ 95% CI
<i>Child's behavioral problems</i>									
CBCL T-score	29	54.0 (9.6)	30	50.8 (11.9)	1.12	57	.27**	–0.33	3.14 $\pm$ 5.23
internalizing behaviors									
CBCL T-score	29	49.0 (10.2)	30	49.8 (12.0)	–0.27	57	.79**	0.08	–0.78 $\pm$ 5.81
externalizing behaviors									
CBCL T-score total	29	52.6 (8.5)	30	50.1 (13.3)	0.87	50	.39**	–0.30	2.52 $\pm$ 5.78
behavior problems									
<i>Accompanying parent's psychological problems</i>									
BSI global severity index	31	0.35 (0.28)	29	0.35 (0.41)	0.05	58	.96**	0.02	0.004 $\pm$ 0.18

*Cohen's d = difference in group means/SD of the control group (first VCUG). **2-tailed

of child distress (self-report, ratings of parents and radiologists and CAMPIS-R). In children with repeated VCUGs, children who came for their second VCUG and those who came for their third or more procedure did not differ in baseline psychological problems (CBCL).

Primary outcome: comparison of child and parental distress during first-time and repeated VCUG

Comparisons of the child's own assessment of her/his stress level during first-time and repeated VCUGs revealed no significant group differences. The total distress values demonstrated by CAMPIS-R and by radiologists' and parents' assessments also indicated that there were no significant group differences (Table 3, Fig. 1). Furthermore, we found no difference with respect to the number of children whose parents reported changes in behavior (clinging, sleep disturbances, toilet habits, irritability etc.) during the week following the VCUG. Seven children whose parents had reported the occurrence of additional stressful events after the VCUG (illness, accident etc.) were excluded from this analysis. The only difference between first-time and repeated VCUGs was found in parental stress levels, which were significantly lower in the repeated VCUG group (Table 3, Fig. 1).

No significant differences were found among the four measures of child distress with the exception that parental assessments of child distress were significantly higher than those of the radiologists in both groups (first-time VCUG:

$t_{(df=30)} = -3.27$; $P_{(2-tailed)} = 0.001^{***}$; repeated VCUG: $t_{(df=30)} = -3.17$; $P_{(2-tailed)} = 0.003^{**}$; Total: $t_{(df=61)} = -4.90$; $P_{(2-tailed)} < 0.001^{***}$). For reasons of objectivity, all further analyses of child distress (secondary outcome) were based on child distress as measured by CAMPIS-R.

Secondary outcome: influence of parental behavior and stress levels on child distress (CAMPIS-R) and comparison of parental behavior between first-time and repeated VCUG

- In both VCUG groups we found a highly significant correlation between parental distress-promoting behavior and child distress (first-time VCUG: $r = 0.78$; $P_{(1-tailed)} = <0.001^{***}$; repeated VCUG: $r = 0.74$; $P_{(1-tailed)} = <0.001^{***}$; Total: $r = 0.71$; $P_{(1-tailed)} < 0.001^{***}$). The distress-promoting behavior most frequently used by parents was reassurance (82% of total parental distress-promoting behaviors).
- No significant correlations were found between parental coping-promoting behavior and child distress in either group. The coping-promoting behavior most frequently used by parents was distraction (66% of the total of parental coping-promoting behaviors).
- Significantly positive correlations were demonstrated between parental stress levels and child distress for first-time VCUGs ($r = 0.35$; $P_{(1-tailed)} = 0.029^*$), for repeated VCUGs ($r = 0.49$; $P_{(1-tailed)} = 0.003^{**}$) and

Table 3. Child distress, parent distress and behavior: number and group means (SDs), t-test results, degrees of freedom (df), P values, effect sizes, and 95% Confidence Intervals (CI)

	n	First VCUG	n	Repeated VCUG	t-test result	df	P value	Effect size*	Mean difference $\pm$ 95% CI
<i>Child distress (self-report)</i> (6-point faces scale: 1 = no distress, 6 = very high distress)	24	3.5 (1.9)	22	3.9 (1.8)	-0.74	44	.47***	0.22	-.41 $\pm$ 1.11
<i>Child distress (CAMPIS-R)</i> (mean number of occurrences/min)	31	3.2 (2.8)	31	2.9 (2.5)	0.48	60	.63***	-0.12	.33 $\pm$ 1.35
<i>Parent report on child distress</i> (100 mm analog scale: 0 = no distress, 100 = highest distress possible)	31	63.6 (25.1)	31	55.5 (29.0)	1.18	60	.24***	-0.27	8.13 $\pm$ 13.8
<i>Radiologist report on child distress</i> (100 mm analog scale: 0 = no distress, 100 = highest distress possible)	31	45.1 (22.0)	31	38.7 (20.0)	1.20	60	.24***	-0.29	6.42 $\pm$ 10.7
<i>Parent distress (self-report)</i> (100 mm analog scale: 0 = no distress, 100 = highest distress possible)	31	61.8 (31.1)	30	43.9 (32.6)	2.19	59	.016**	-0.58	17.91 $\pm$ 16.32
<i>Parent CAMPIS-R coping-promoting behavior</i> (mean number of occurrences/min)	31	1.34 (0.98)	31	1.41 (1.00)	-0.28	60	.393**	0.07	-0.07 $\pm$ 0.50
<i>Parent CAMPIS-R distress-promoting behavior</i> (mean number of occurrences/min)	31	0.86 (0.66)	31	1.06 (1.06)	-0.90	60	.375***	0.30	-0.20 $\pm$ 0.45

*Cohen's d = difference in group means/SD of the control group (first VCUG). **t 1-tailed, ***2-tailed.

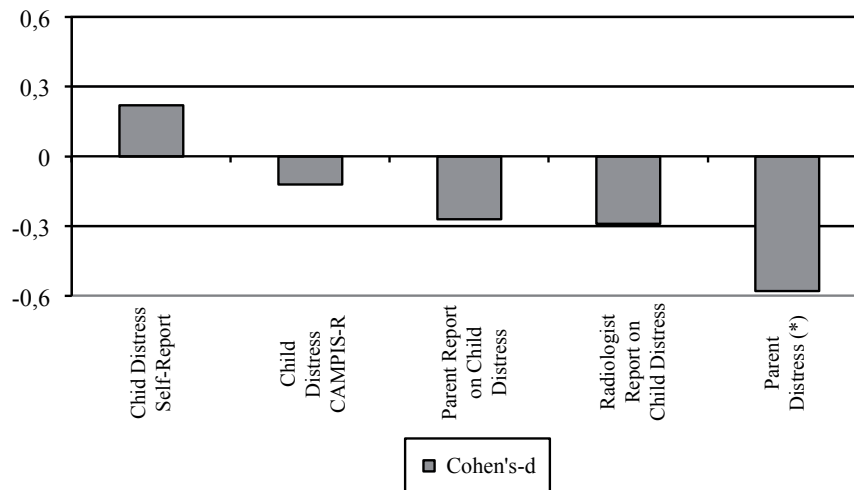


Fig. 1. Group differences in stress levels (children and parents) between first-time and repeated VCUG. Cohen's $d < 0$... first-time VCUG's higher distress levels, Cohen's $d > 0$... repeated VCUG's higher distress levels

for the two groups combined ($r = 0.41$, $P_{(1-tailed)} < 0.001^{***}$).

- (d) We further examined whether parental stress levels influenced the parents' own behavior. With regard to parental coping-promoting behavior, no influence could be proven in either of the two groups. For parental distress-promoting behavior, there was a positive correlation with parental stress levels only in the repeated VCUGs group (first-time VCUG: $r = 0.18$; $P_{(2-tailed)} = 0.346$; repeated VCUG: $r = 0.60$; $P_{(2-tailed)} < 0.001^{***}$).
- (e) Neither parental coping- nor distress-promoting behavior differed between parents of first-time versus repeated VCUGs (Table 3).

Discussion

The distress experienced by children during a repeated VCUG did not differ from the distress experienced by those undergoing a VCUG for the first time. This result was obtained consistently, using children's self-reports, a standardized rating scale administered by independent observers, and parental and radiologists' assessments. In addition, no differences could be found in changes in behavior during the week following the VCUG.

It has been shown that for a variety of medical procedures memories of painful or distressing procedures can foster the child's experience of fear during subsequent procedures [26], with the result that these subsequent procedures are experienced as more painful and therefore more stressful than previous ones [27]. Although it has been proven that children aged 3–7 years do remember details of the VCUG, even six weeks after the procedure [28], in the present study the child's distress did not increase with repeated VCUGs.

In contrast to child distress, parental distress was significantly lower during repeated VCUGs.

Srivastava et al. [29] were able to prove that the anticipated fear which parents displayed prior to their child's first VCUG was significantly greater than fear they subsequently experienced. This learning experience during

the first-time VCUG, as well as the fact that the procedure was more familiar, may explain the reduction in parental distress during repeated VCUGs demonstrated in the present study.

In parental behavior, the distress-promoting and coping-promoting behaviors most frequently used were reassurance and distraction, respectively. This result is consistent with Salmon and Pereira [16], who also assessed spontaneous parental behavior during VCUGs. In our study, a highly significant positive correlation was found between parental distress-promoting behavior and child distress (CAMPIS-R) in both groups, thus confirming the results of previous studies [15, 16], both in our larger sample as well as within the group of children undergoing a repeated VCUG. These parental behaviors may intuitively seem right to the parents but they only reinforce the child's distress. In addition, it is most likely that parents try to ease their own stress by reassuring their child, which only adds to the child's distress.

Parental coping-promoting behavior occurred slightly more frequently than parental distress-promoting behavior (Table 3) and had no effect on child distress (CAMPIS-R) in either group. This finding is in line with Blount et al. [12] who, in a study of children undergoing bone marrow aspirations, also found that spontaneous parental distraction and humor had no reducing effect on child distress. In very stressful medical procedures such as the VCUG, spontaneous parental behavior proves to be ineffective in reducing child distress. It appears that parents simply do not know how to properly assist their child during this situation. This is also underlined by the fact that even though parental distress is lower during a repeated VCUG it does not lead to a change in parental behavior. Compared with first-time VCUG, parents display neither less distress-promoting nor more coping-promoting behavior. Even when less stressed and more familiar with the procedure, as during a repeated VCUG, parents have no effective strategies to reduce their child's distress.

As expected, it was possible to demonstrate significantly positive correlations between parental stress levels

and child distress (CAMPIS-R) in both groups. Regarding the influence of parental distress on parental behavior, no influence of coping-promoting behavior could be proven in either group.

Parental distress-promoting behavior showed a positive correlation only with parental stress levels in the repeated VCUG group. Although parental distress-promoting behavior did not differ between the groups in terms of its average frequency, it varied considerably more during the repeated VCUG group than in the first-time VCUG group (Table 3). During a first-time VCUG, parental stress levels are probably too high to allow for substantial variation in parental behavior such as reassurance or empathy. Only when parental stress levels are lower, which is the case in the repeated VCUG group, is a variation in these parental behaviors possible and a relationship between parental stress and behavior can be found.

For both first-time and repeated VCUG, parents' ratings of the child's distress were significantly higher than those of the radiologists. This may be explained by the fact that parents are making comparison with their child's usual behavior (which may be very calm), whereas radiologists are comparing the child's behavior with that of other children receiving VCUGs and may feel that a particular child, compared with other children, did reasonably well. Furthermore, parents are emotionally much more involved than radiologists, which may also lead to higher assessments of distress.

Conclusions

Results indicate that repeated VCUGs involve just as much distress for children as first-time VCUGs. Even though parents are more familiar with the procedure and are less stressed during repeated VCUGs, they do not know how to assist their child properly and use either ineffective or even counterproductive means to ease their child's distress. The use of special training programs for parents and children are clearly advisable prior to the VCUG, as described in Zelikovsky et al. [15], also for repeated VCUGs. As parents show reduced stress levels during a repeated VCUG, they might especially benefit from such training. However, training programs may be too time consuming to be implemented as a part of standard clinical routine, and counseling of the parents on how to best assist their child may be an alternative that should be evaluated.

Conventional radiographic VCUG involves considerable radiation exposure [30]. In discussion of children's distress during VCUGs, the growing trend, especially for girls and for follow-up VCUGs, of replacing conventional VCUGs by alternative methods such as direct or indirect radionuclide cystography or voiding urosonography [30] in order to minimize radiation exposure should also be considered. No catheterization is required in indirect radionuclide cystography or voiding urosonography, making these procedures less invasive than conventional VCUG [30].

Study limitations: the intention of the current study was to analyze differences in children's and parents' distress when comparing first-time and repeated VCUGs. The sample size allowed us to prove group differences in child distress between first-time and repeated VCUGs

only for clinically relevant large effects ($d \geq .85$). The small number of boys in this sample strongly affected the extent to which these findings could be generalized. Further research should also take into account the medical history of the children (e.g. other invasive procedures, other diagnoses).

As this study focused on spontaneous parental behavior, a next step would be to investigate adequate counseling strategies for parents prior to the VCUG and the design of special training methods to be used by parents and children when undergoing repeated VCUGs, as described by Zelikovsky et al. [11].

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Beitrag 2

Effects of Parental Soothing Behavior on Stress Levels of 2–8 Year Old Children During Voiding Cystourethrograms by Phase of Procedure

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Abstract Using the example of a voiding cystourethrogram (VCUG), a painful radiological procedure, this study investigated whether parental soothing behavior (reassuring comments like “it’s almost over” or “You’re O.K.” and soothing by “sh, sh”) in one phase of the procedure influenced the child’s distress in the following phase. The sample was comprised of 68 2–8 year-old children and the accompanying parent(s). Child and parental behavior during the VCUG was coded using a standardized rating scale (CAMPIS-R). Parental reassurance during the anticipatory phase significantly increased the child’s distress of the following phase, while parental “sh, sh” significantly reduced it. Both parental behaviors showed no significant effect on the child’s distress of the following phase when applied during the procedure itself. Results underline the importance of differentiating between anticipatory and procedural phases of the VCUG. Counselling methods for parents on more appropriate strategies to assist their children during procedural phases of the VCUG are necessary.

Keywords Voiding cystourethrogram (VCUG) · Psychological stress · Behavior · Parents · Child

Introduction

The voiding cystourethrogram (VCUG) is an invasive radiological procedure often carried out during childhood that may involve high levels of physical and psychological stress for children (Agrawalla, Pearce, & Goodman, 2004). The VCUG is the standard method of diagnosing a vesicoureteral reflux in children which may cause permanent damage to the kidneys (Oak, Kulkarni, & Chaubal, 1999). The most common trigger for a vesicoureteral reflux are urinary tract infections which occur significantly more frequently amongst girls than boys (Marild & Jodal, 1998).

Concerning the VCUG and its procedural phases, this study compared the effect of two frequently used parental soothing behaviors, that is reassuring comments (“It’s almost over.”, “You’re O.K.”) and soothing by “sh, sh”, in one phase of the procedure on child distress in the following phase. While the effect of reassuring comments on child distress, has been the focus of many studies (Blount et al., 1997; Blount et al., 1989; Dahlquist, Power, & Carlson, 1995; Salmon & Pereira, 2002), the effect of soothing by “sh, sh” on child distress has not yet been examined.

VCUG Procedure and Child Distress

During the VCUG, first a catheter is inserted in the urethra (catheterisation phase). Next, the bladder is filled with a contrast medium and X-ray images are taken during the filling of the bladder (filling phase). When the bladder is full, the child is asked to void on the examination table (voiding phase). During the voiding of the bladder x-ray images are taken again to see whether the child has a reflux, that is whether urine flows from the bladder back to the kidneys rather than being expelled through the urethra (Fotter, 2001).

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Stashinko and Goldberger (1998) describe several distressing aspects of a VCUG for children which include having a stranger examining the child's genital area, a foreign body being inserted into the child's body and thereby causing pain (catheterisation phase), the unpleasant feeling of the bladder filling (filling phase), the embarrassment of lying naked on the examining table and being required to urinate in front of all those present (voiding phase). In addition, there is the anticipated anxiety of the child when at the beginning of the VCUG, the procedure is explained to him/her and she/he is asked to lie on the examining table (anticipatory phase). Butler, Symons, Henderson, Shortliffe, and Spiegel (2005) found catheterisation to be the most stressful part. In the study by Zelikovsky, Rodrigue, Gidycz, and Davis (2000), catheterisation and voiding phase have been shown to be equally stressful for children.

Parental Moderators on Child Distress

According to Rudolph, Dennig, and Weisz (1995) child (distress) behavior in medical settings is influenced by person-specific and situation-specific moderators (Fig. 1). Important situation-specific moderators they list are stage of stressor (i.e. phase of procedure) and parental influence. Studies on pediatric cancer procedures in children further suggest that the effect of parental influence is moderated by phase of procedure (Blount, Sturges, & Powers, 1990; Dahlquist, Power, Cox, & Fernbach, 1994; Dahlquist et al., 1995). In the two studies by Dahlquist et al. (1994, 1995) on child cancer procedures parental behavior and child distress appeared to be more strongly related during the anticipatory phases than during the procedural phases. Discussing these results the authors hypothesized that child distress during the anticipatory part of the procedures reflects only child anxiety, while child distress during the procedural parts most likely reflects both anxiety and pain. If parent behavior impacts child anxiety, it makes sense

that parent behavior during the anticipatory phase of the procedure should be most effective. As to VCUG, the effect of parent behavior on child distress may therefore be assumed to be highest for parent behavior during the anticipatory phase.

Some of the most common strategies used by parents to assist their children in medical procedures are reassuring comments (Blount et al., 1989; Butler et al., 2005). The effect of reassurance on child distress was first examined in a study by Blount et al. (1989) on children undergoing bone marrow aspirations and lumbar punctures. In this study, reassurance was defined as comments that are directed toward the child with the intent of reassuring the child about his/her condition ("You're O.K."), or the course of the procedure ("It's almost over."). Using sequential analysis it was found that an adult's reassuring comments typically preceded child distress. Reassuring comments were also the most frequently occurring behavior to follow child distress. Apart from reassurance the less frequent behaviors "empathy" ("I know this is hard."), "criticism" ("Boy, you are in a bad mood today."), "apology" ("I am so sorry I cannot help you.") and "giving control to the child" ("Are you ready?") were also found to be correlated with child distress (Blount et al., 1990). In the Child Adult Medical Procedure Interaction Scale-Revised (CAMPIS-R), developed by the study group of Blount et al. and also used in the study presented here, the five parental behaviors of reassurance, empathy, criticism, apology and giving control to the child comprise the scale Distress Promoting Behavior' (Blount et al., 1997). A high positive correlation between these distress promoting behaviors and child distress has also been proven for VCUG (Salmon & Pereira, 2002; Zelikovsky, Rodrigue, & Gidycz, 2001). When interpreting these results it has to be taken into account that correlations between simultaneous events do not allow conclusions as to causal relations. Sequential analysis, on the other hand, only examines the immediate effect of reassurance on the very next child behaviors, so it is still unclear whether reassurance would also have a distress promoting effect when observed over a longer time interval (e.g. several minutes). Blount et al. (1990), using Spearman correlation, found a moderately positive correlation between the total of several adult distress promoting behaviors (including reassurance) during the anticipatory phases of bone marrow aspirations and child distress during procedural phases, which might suggest that there is a distress promoting effect also over a longer time interval.

Gonzalez, Routh, and Armstrong (1993) provide as a possible explanation for the distress promoting effect of reassurance that it may be acting as a discriminative stimulus that announces a painful/unpleasant situation. The fearful facial expression or voice accompanying the reassuring comment might influence the child's appraisal of the

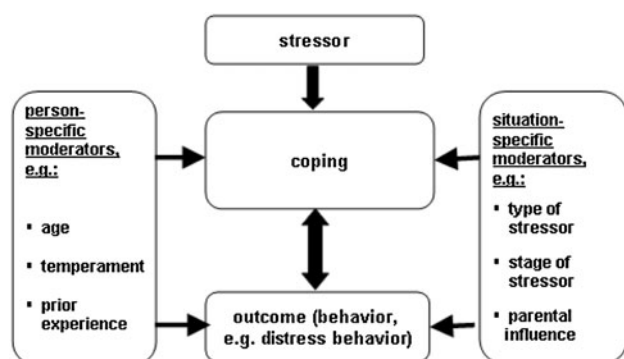


Fig. 1 Model of child behavior in medical settings, modified according to Rudolph et al. (1995)

situation by a process of social referencing. Finally, reassuring comments might rather serve to reassure the parents themselves and be indicative of the parent's anxiety, by which the children in turn would get infected or motivated to imitate the parents' reactions by processes of social learning. Apart from these mechanisms described by Gonzalez et al. (1993), for procedures as the VCUG, where child distress considerably varies during phases, another explanation should be taken into account. Reassuring comments might convey relieving information to the child, suggesting that the child's situation is fine ("You're O.K.") or will soon change for the better ("It's almost over."). For highly distressing phases such as catheterisation this is consistent with the child's experience, as pain and unpleasant feelings decrease during the filling phase to follow. When reassurance is uttered during phases of low distress such as the anticipatory or filling phase, however, where phases of higher distress are still to follow, parental prediction is proven wrong by the further course of the procedure. This inconsistency in information might in turn increase the child's anxiety and lead to higher levels of distress during the phase to follow. According to this reasoning, the distress promoting effect of reassurance should be greater during the anticipatory and filling phase than during the catheterisation phase.

With regard to this assumption, another parental behavior that is often used to calm down the child, soothing by "sh, sh", is of interest. So far, the effect of "sh, sh" on child distress has not yet been studied on its own. Blount et al. (1989, 1997) subsume "sh, sh" under "behavioral commands" (e.g. "No, don't hurt your mum.", "Wipe the tears."), a scale for which in total no effect on child distress was found. In contrast to reassuring comments, "sh, sh" does not convey any information about the child's situation or the course of the procedure. We therefore did not expect "sh, sh" to have an increasing effect on child distress. Rather it may be conceived by the child as a signal that the parents care and are emotionally involved with what is happening, which might be helpful to reduce the child's distress. We therefore assumed a distress decreasing effect for soothing by "sh, sh". This is in line with the findings of Bush, Melamed, Sheras, and Greenbaum (1986), who found little emotional involvement of parents in medical procedures on children to be associated with higher child distress. Furthermore, as "sh, sh" does not convey any information about the child's situation or the course of the procedure, its effect across phases should be independent of the characteristics of the following phase.

Objectives of the Study

The objective of this study was to examine the effect of parental soothing behavior, that is reassuring comments

and soothing by "sh, sh", on child distress during VCUGs. In order to explore the effect of these parental behaviors over a longer time interval, the effect of parental behavior in one phase of the procedure on child distress of the following phase was examined using structural equation modelling. The results were compared to correlations within phases. Special interest was put on differences in the effect of parental behavior on child distress between the four phases of the VCUG.

Parents use reassuring comments or "sh, sh" in order to soothe the child, so it can be assumed that these strategies are primarily used when the child shows some amount of distress. Accordingly, several studies report high correlations between child distress and parental reassurance (Blount et al., 1990; Salmon & Pereira, 2002; Zelikovsky et al., 2001). There are no similar studies for parental "sh, sh", but it seems plausible that parents use "sh, sh" more frequently when the child is crying or screaming. For correlations within phases we therefore assumed that both parental reassurance and parental "sh, sh" should be correlated positively with child distress.

With regard to regressions of parental behavior of one phase on child distress of the next phase, as outlined above, we hypothesized a distress increasing effect for reassurance and a distress decreasing effect for soothing by "sh, sh". As the information conveyed by the parent by reassuring comments is consistent with the child's experience in the catheterisation phase but not so in the anticipatory and filling phase, we expected the distress increasing effect of reassurance for the catheterisation phase to be the smallest. With the exception of the anticipatory phase, for which we expect the effect of both reassurance and "sh, sh" to be the greatest (cf. Dahlquist et al., 1994, 1995), effects of parental "sh, sh" were assumed to be approximately the same in all phases.

Method

Participants

Between December 2004 and July 2005 a random sample of 68 children aged 2–8 who had been referred as outpatients to two Viennese children's hospitals (St. Anna Children's Hospital and General hospital of Vienna) for a VCUG, and their parents, were recruited for this study. Exclusion criteria consisted of the following: children scheduled to undergo the procedure under sedation (exceptional cases), mentally disabled children, and children and parents who were not able to converse in German easily. Table 1 shows socio-demographic data of the children and the accompanying parents as well as data on the children's medical history.

Table 1 Socio-demographic characteristics and medical history

	Means	SD
Age in years	5.2	± 2.0
Gender	<i>N</i>	%
Female	62	91.2%
Male	6	8.8%
Accompanying parent(s)	<i>N</i>	%
Mother only	28	41.1%
Father only	6	8.8%
Both parents	24	35.3%
Mother + Further relative (grandmother or aunt)	10	14.8%
Medical history	<i>N</i>	%
VCUG		
First-time	37	54.4%
Repeated	31	45.6%
Chronic diseases		
Yes	6	8.8%
No	62	91.2%
Other health problems		
Yes	13	19.1%
No	55	80.1%
Hospital	<i>N</i>	%
St. Anna	57	83.8%
AKH	11	16.2%

Procedure

The study was approved by the ethics committees of both hospitals. Informed consent was requested from the accompanying parent when registering the child for the VCUG. During the VCUG child and parental behavior was rated by three independent observers using the CAMPIS-R rating scale (Blount et al., 1997). Beginning and end of the phases of the VCUG were defined as follows: The anticipatory phase started as soon as the child and the accompanying parent(s) entered the examination room. The procedure was explained to the child by the radiological assistant and the child was asked to lie on the examination table. The catheterisation phase started as soon as the doctor or an assistant began to disinfect the site. The filling phase started after the catheter had been properly inserted and fixed by a plaster. The end of the filling phase was characterized by a set of x-rays taken by the radiologist as soon as the bladder was full. After that the radiologist asked the child to urinate, which marked the beginning of the voiding phase. After voiding, the phase ended as soon as the child had been taken from the examination table. After the procedure the accompanying parent was asked to assess her/his stress level during the child's VCUG on a visual analogue scale. Socio-demographic data and the child's previous medical history were recorded using a semi-structured interview.

Instruments

Child Distress and Parental Soothing Behavior During the VCUG

Child and parental behavior during the VCUG was recorded using the CAMPIS-R by Blount et al. (1997). The CAMPIS-R is a standardised rating scale used to record child and adult behavior during medical interventions. The reliability and validity of the CAMPIS-R is confirmed in numerous studies (Blount et al., 1997; Cohen, Blount, Cohen, Schaen, & Zaff, 1999). The CAMPIS-R consists of 35 individual behavioral codes grouped into three categories for child behavior, namely child coping, child distress and child neutral, as well as three categories for adult behavior, namely adult coping promoting, adult distress promoting and adult neutral, referring to its effects on child behavior. The reliability of these CAMPIS-R scales has been reported to range from .65 to .92 (Blount et al., 1997). In the present analysis only the three most frequent distress behaviors of the category “child distress” (crying, screaming and emotional support) were used as a parameter for child distress, with emotional support indicating verbal solicitation of hugs, hand-holding or physical or verbal comfort by the child. As measures for parental soothing behavior the behavior code “reassuring comments” (e.g. “It's almost over.” or “You're O.K.”) of the category “adult distress promoting” was used as well as parental “sh, sh”, which does not constitute a separate behavioral code in the CAMPIS-R but is subsumed among the code “behavioral commands to the child” that belongs to the category “adult neutral behavior”. Behavioral coding took place according to Blount et al. (1989), although due to the hospital's legal regulations it was not possible to make video or audio recordings of the VCUGs. Therefore the behavior of parents and children was coded by three independent observers who had undergone special training. Continuous behaviors, such as “crying” and “screaming”, were coded at intervals of 5 s (cf. Cohen et al., 1999). Immediately after each VCUG the ratings were compared and discussed by the observer-team. A priori agreement amongst the raters was between 73–80%. In the case of incongruent ratings a consensus was aimed for; the first author's (M.F.) ratings were used where no consensus was reached (<5% of all ratings). The frequency of a particular category of behavior was calculated by dividing the frequency of its appearance by the respective duration of the procedure (in minutes) (cf. Blount et al., 1997).

Parental Stress Level

The accompanying parent assessed his/her stress levels during the VCUG, recorded on a 100 mm visual analogue

scale with the poles “no stress at all” (0% stress) and “highest imaginable level of stress” (100% stress).

Statistical Analyses

Relationships between parent behavior and child distress during the four phases of the VCUG were tested by means of structural equation modeling (SEM). At first, a factorial analysis of the eight child behaviors constituting the category “child distress” was conducted (principal component analysis using Kaiser’s criterion of eigenvalues greater than 1.0 to determine the number of components to retain). Varimax rotation yielded two factors (Table 2). Factor 1 is constituted by the child behaviors “crying”, “screaming” and “emotional support” and can be interpreted as a primarily non-verbal expression of child distress. Factor 2 consists of the child behaviors “verbal resistance”, “verbal pain”, “verbal fear”, “verbal emotion”, and “information seeking” and therefore can be clearly interpreted as verbal expressions of child distress. The behaviors constituting factor 1 make up 77% of all child distress behaviors. For further analysis only factor 1 was used as a measure for child distress. As measures for parental “sh, sh”, the corresponding frequencies per minute were used.

To investigate the effect of parental behavior on changes in child distress from one phase to the next, latent change score models (cf. McArdle, 2009) would have been most appropriate for our purpose. However, modelling latent variables resulted in negative variances and standardized regression weights as the number of resulting parameters was too high in relation to the small number of participants in our study. We therefore conducted simple cross-lagged panel analyses, one with “reassurance”, the other with “sh, sh” as parental predictors for child distress. Each model comprised all phases of the VCUG, thus integrating multiple regression with path analysis. Child distress of one phase was assumed to be predicted by (a) child distress of

the previous phase, (b) parent behavior of the previous phase and (c) parent behavior of the present phase (Fig. 1). Likewise, parent behavior of one phase was assumed to be predicted by (a) parent behavior of the previous phase, (b) child distress of the previous phase and (c) child distress of the present phase. No restrictions were set. All variables in the models were considered manifest variables.

The analysis was conducted using SPSS® for Windows ver. 15 und AMOS® 7 for structural equation modelling.

Results

Duration of the Phases of the VCUG and Child Distress Within Phases

The length of the four phases of the procedure varied considerably (Table 3). The dispersion within each phase was due to the fact that children differ in the amount of time they need to comply with the commands of the medical staff. The duration of the filling phase also varied with the children’s age (the larger the bladder, the longer the duration of the filling phase). Child distress was highest during catheterisation, followed by the voiding phase. During the anticipatory phase the observed child distress was lowest (Table 3). Table 4 lists the mean frequencies of the child and parental behaviors investigated in this study.

Interactions Between Parental Behavior and Child Distress Across Phases

As for SEM, in both models, correlations between the error terms of the manifest variables were allowed. Both models appeared to have a good fit (Figs. 2, 3).

Correlations Between Reassurance and Child Distress Within Phases

As expected in all phases there was a significant positive correlation between parental reassurance and child distress (Fig. 2). We found moderate to high correlations during the anticipatory and filling phase (.52 and .62), while correlations during the catheterisation and voiding phase appeared to be smaller (.42 and .38).

Effect of Reassurance in One Phase on Child Distress of the Next Phase

We had hypothesized that parental reassurance of one phase would show a positive regression on child distress of the next phase and that this effect would be greatest for reassurance observed during the anticipatory phase, followed by the filling phase, and lowest for reassurance

Table 2 Communalities, percentage of explained variance and factor loadings for child behaviors constituting the CAMPIS-R scale “child distress”

	h^2	Factor 1	Factor 2
Percentage of variance		35.9	23.2
Crying	.81	.899	.074
Screaming	.64	.788	-.152
Emotional support	.62	.753	.228
Verbal pain	.48	.360	.589
Verbal resistance	.47	.449	.519
Verbal fear	.58	-.086	.754
Verbal emotion	.46	.153	.659
Information seeking	.68	-.112	.814

Only factor 1 was used for SEM-analysis

Fig. 2 Results of the structural equation model for “reassurance.” Model Fit: $\chi^2/df = .987$, $df = .987$, $GFI = .960$; $AGFI = .881$; $CFI = 1.000$; $NFI = .967$, $RMSEA = .000$

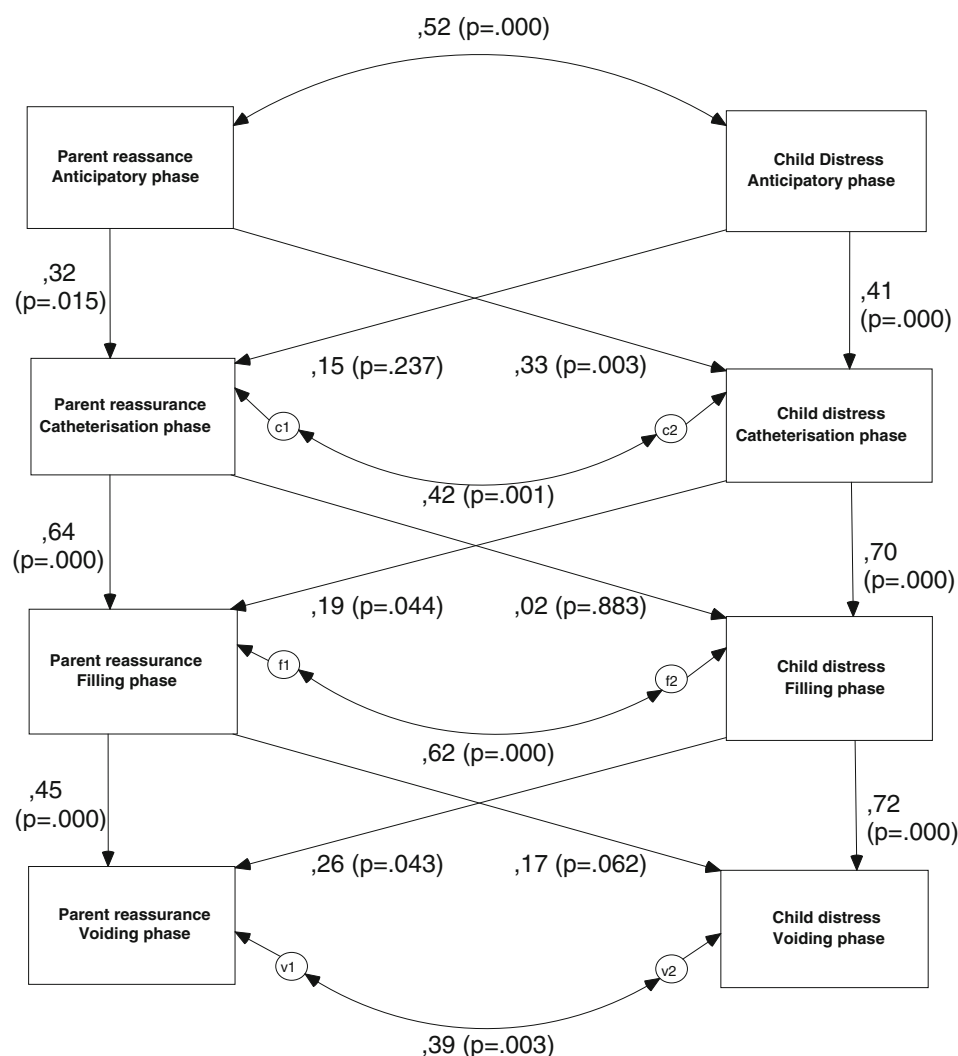


Table 3 Duration of procedure and child distress by phase of procedure

	Duration of VCUG (min)		Child distress (crying, screaming and search for support) (mean frequency/min)	
	Means	SD	Means	SD
VCUG total	21.1	±6.9	1.99	±2.05
Anticipatory phase	3.2	±2.1	1.28	±2.36
Catheterisation phase	4.0	±2.2	2.89	±3.05
Filling phase	7.4	±3.6	1.73	±2.25
Voiding phase	6.5	±4.1	1.94	±2.37

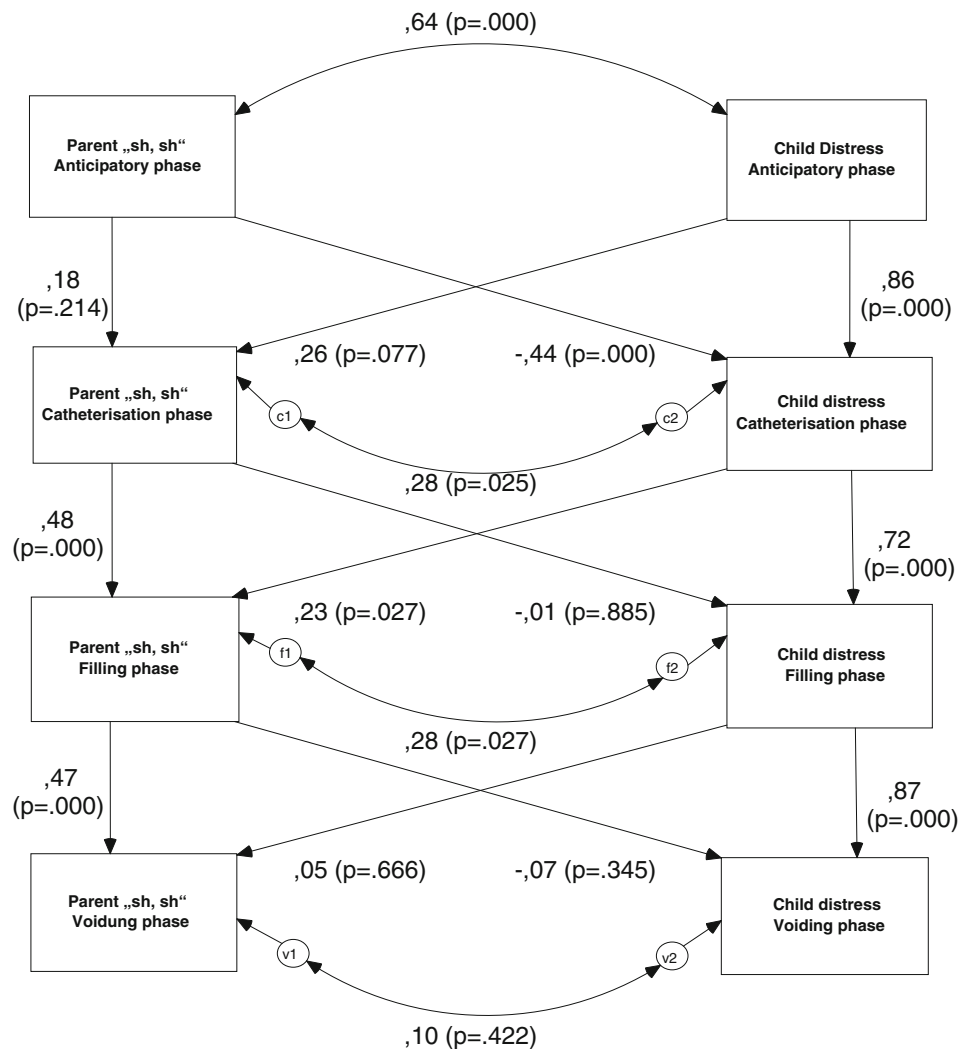
observed during the catheterisation phase. Results showed that the effect of reassurance was different across phases. It was in fact strongest when uttered during the anticipatory phase (Fig. 2). Here, reassurance showed the postulated effect as it significantly increased the child's distress of the

Table 4 Frequency of child distress behavior and parental reassurance and “sh, sh”

	Means	SD
Child distress		
Crying	1.57	±1.59
Screaming	0.18	±0.35
Emotional support	0.25	±0.32
Parental soothing behavior		
Reassurance	1.06	±0.86
sh, sh	0.11	±0.20

following catheterisation phase. Reassurance used during the moderately stressful filling phase (Table 3) increased the amount of distress displayed by the child during the next phase, but this effect did not reach significance ($r = .17$, $P = .062$). Reassurance observed during the catheterisation phase, however, showed no effect on child distress of the next phase at all (Fig. 2).

Fig. 3 Results of the Structural Equation Model for “sh, sh.” Model Fit: $\chi^2/df = .859$, GFI = .964; AGFI = .892; CFI = 1.000; NFI = .964, RMSEA = .000



Correlations of “Sh, Sh” and Child Distress Within Phases

Except for the voiding phase, where no significant correlation was found, all other phases as expected presented a significant positive correlation between parental “sh, sh” and child distress (Fig. 3). We found a moderate to high correlation during the anticipatory phase (.64), while correlations during catheterisation, filling and voiding phases were smaller (.28 and .10).

Effect of “Sh, Sh” in One Phase on Child Distress of the Next Phase

We had hypothesized that parental “sh, sh” of one phase would show a negative regression on child distress of the next phase and that this effect would be greatest for “sh, sh” observed in the anticipatory phase. Results showed that

an effect of “sh, sh” was only identifiable when used during the anticipatory phase (Fig. 3), where it showed the expected effect as it significantly decreased the child’s distress in the following catheterisation phase. “Sh, sh” observed during the catheterisation and filling phase, however, showed no effect on child distress of the next phase (Fig. 3).

Additional Results

In each phase there was a significant positive regression of child distress on child distress of the following phase. For parental reassurance as well as parental “sh, sh” there was a significant positive regression of parent behavior of one phase on that of the next phase, except for the regression of “sh, sh” from the anticipatory to the catheterisation phase, where no significant regression was observed (Figs. 2, 3). As for child distress in the anticipatory phase, there was a

significant positive regression on parental reassurance of the catheterisation phase. For child distress during the catheterisation phase, there was a significant positive regression on both parental reassurance and parental “sh, sh” of the filling phase (Figs. 2, 3). Regarding total VCUG, both child distress as well as parental reassurance and “sh, sh” were positively correlated with parental stress experience during VCUG as measured shortly after the procedure (partial correlations controlling for age: child distress: $r_{(1\text{-tailed})} = .30$, $p = .007$; reassurance: $r_{(2\text{-tailed})} = .26$, $p = .032$; “sh, sh” $r_{(2\text{-tailed})} = .33$, $p = .008$).

Discussion

The goal of this study was to examine the effect of parental soothing behavior, that is reassuring comments and soothing by “sh, sh”, on child distress during the different phases of the VCUG.

First, our findings support the notion that each of the phases of the VCUG puts different demands on the child and needs to be examined separately. In accordance with Butler et al. (2005) we found the catheterisation phase clearly to be the most distressing phase, followed by the voiding and the filling phase. Average child distress was lowest during the anticipatory phase. Our results are contrary to Zelikovsky et al. (2000) who found the voiding phase as distressing for children as the catheterisation phase. The difference in the two studies is not very likely to be explained by differences in the children’s age (Zelikovsky: 3–7 years, present study: 2–8 years) nor in their sex (Zelikovsky: 85% girls; Present study: 91% girls). Perhaps the difference is due to different styles of calculating average child distress. The CAMPIS-R offers a proportion-based mode (used by Zelikovsky et al. 2000) and a frequency-based mode (used in the present study). Although the proportion of child distress behavior out of all child behaviors of a particular phase may be similar in the catheterisation and voiding phases, on an absolute level child distress during the catheterisation phase seems to be higher.

In accordance with the findings of Zelikovsky et al. (2001), Salmon and Pereira (2002) and Butler et al. (2005), we found reassuring comments and child distress to be positively correlated within all four phases of the VCUG. Except for the voiding phase, where no significant correlation was found, soothing by “sh, sh” and child distress also proved to be positively correlated within all phases of the VCUG. This is in line with our assumption that parents use reassuring comments and “sh, sh” in order to calm down the child and that these strategies therefore should be primarily used when the child is distressed. For “sh, sh”, correlations within phases were strongest in the

anticipatory phase, whereas in the voiding phase no correlation was found. Knowing that after voiding the procedure is over, it is likely that during the voiding phase parents rather react to their child’s distress with prompts to urinate than with soothing by “sh, sh”.

In order to examine if there was a causal relationship between parental behaviors and child distress, we examined the effect of parental reassurance and “sh, sh” of one phase on child distress of the following phase. The results supported our hypothesis that the distress promoting effect of reassuring comments on the very next child behaviors that Blount et al. (1989) found using sequential analysis, is also found when the effect on child behaviors after a longer time interval is observed. Here, however, the specific characteristics of the procedural phases have to be taken into account. A higher amount of reassurance during the anticipatory phase leads to a higher amount of child distress in the catheterisation phase. In contrast, reassurance during the highly stressful catheterisation phase shows no effect on child distress of the filling phase. Reassuring comments during the mild to moderate stressful filling phase again show a small positive regression on child distress of the following voiding phase ($p = .06$).

For soothing by “sh, sh”, the hypothesis of a causal relationship with child distress is also partially supported. As expected, parental “sh, sh” significantly decreased child distress of the following phase, but it did so only when used during the anticipatory phase. During the other phases it showed no effect. On the one hand, this supports our hypothesis that “sh, sh” is conceived by the child as a signal of the parent’s emotional involvement and therefore is helpful to reduce child distress (cf. Bush et al., 1986). On the other hand, these results indicate that “sh, sh” is only effective when child distress is comparatively low as is the case during the anticipatory phase. The result also explains why Blount et al. (1989) listed “sh, sh” among the neutral scale “Behavioral Commands to the child”. During the actual procedural phases, parental “sh, sh” in fact seems to have no effect on child behavior.

Results for both reassurance and “sh, sh” clearly support our assumption that parent behavior has its greatest impact in the anticipatory phase. Referring to Dahlquist et al. (1994, 1995) we had assumed that parent behavior would primarily impact child anxiety and would be most effective in anticipatory phase, where the child may experience anxiety, but no pain yet. In a more general way it can be concluded that during a VCUG, parent behavior has its greatest impact in phases where child distress is low. This is in line with the result that neither reassurance nor “sh, sh” proved to be effective when used in the highly distressing catheterisation phase.

We had hypothesized that the information conveyed by reassuring comments would play a role in its phase-specific

effect on child distress. Results support this assumption. The filling phase (like the anticipatory phase) is followed by a phase that involves high distress. If parents try to soothe the child during the filling phase by reassuring him/her that the child's situation is fine ("You're O.K.") or that it will soon change for the better ("It's almost over."), this information is inconsistent with the child's experience during the latter part of the filling phase and during the voiding phase (pain and unpleasant bodily sensations due to the full bladder, embarrassment of voiding on the examination table). The child may feel that even his/her parent cannot be trusted, which in addition to the distress increasing effects of reassurance mentioned by Gonzalez et al. (1993) may lead to further irritation and distress of the child. Contrary to reassurance, "sh, sh" does not convey any information about the child's situation or the course of the procedure. Its effect therefore is independent of the characteristics of the next phase. As mentioned before, it is primarily effective when used during the anticipatory phase.

Even though "sh, sh" proved to be helpful in reducing child distress only during the anticipatory phase, this effect should not be underestimated. Results show that there is a high positive regression of child distress from catheterisation to filling and finally voiding. Children, whose distress during the catheterisation phase could be effectively lowered, are likely to experience less distress throughout the whole procedure. Likewise, children, who show high distress during the catheterisation phase, are likely to stay on a high distress level throughout the procedure. The distress increasing effect of reassurance during the anticipatory phase may therefore affect the child's distress during the whole VCUG. Except for the regression of "sh, sh" from the anticipatory to the catheterisation phase, which is not significant, there is also a significant positive regression from parental behavior of one phase on that of the next (Figs. 2, 3). Compared to child distress, these regressions are of moderate size. Still, they show that even though reassurance is not helpful in reducing the child's distress at all, parents tend to keep this strategy until the end of the procedure. Likewise, they stick to "sh, sh" during the filling and catheterisation phase, even though it does not seem to be helpful anymore. As the significant positive regressions of child distress on parental behavior show, child distress during the catheterisation phase increases both parental reassurance and "sh, sh" during the filling phase. It seems that once triggered by the perception of the child's distress, parents stick to these strategies, as they may intuitively seem right to them.

In summary it can be stated that reassurance proved to have a distress promoting effect on child distress, but only when used during the less distressing phases of the VCUG.

Contrary to this, "sh, sh" proved helpful in reducing child distress, however only when used during the anticipatory phase, which involves comparatively low child distress. During catheterisation, when child distress is higher, neither reassurance nor "sh, sh" were able to impact child distress in any way. This leads to the conclusion that in a stressful medical procedure as the VCUG, spontaneous parental soothing behavior is either ineffective or counterproductive or as is the case with "sh, sh"—only helpful during the anticipatory, but not the procedural phases. It appears that without specific instructions, it is very hard for parents to properly assist their child during the stressful parts of the procedure.

As training programs may be too time consuming to be implemented as a part of standard clinical routine, in a next step, counselling programs for parents whose child has to undergo a VCUG should be developed and evaluated. Here, the changing demand of the different phases of the VCUG should be taken into account.

Limitations

The small number of boys in this sample strongly affects the extent to which these findings can be generalised. As factorial analysis of the eight child behaviors of the CAMPIS-R category "child distress" yielded two factors, only the three behaviors "crying", "screaming" and "emotional support," that constituted factor 1 were used for analysis. Though these three behavioral codes made up 77% of all child distress behaviors, they only included non-verbal expressions of child distress. Verbal expressions of resistance, pain or fear by the child were excluded from analysis. As older children tend to show more verbal expressions of distress than younger ones, results may be biased towards the reactions of younger children. In this respect, it would have been helpful to include the variable "age" into the two structural equation models. This, however, was not possible due to the limited number of subjects in this study. As to the use of simple cross-lagged panel analyses, latent change score models would have been more appropriate for our purpose, but could not be employed due to the small number of participants in our study. Also, this study did not take into account the influence of parental basic attitude and behavior before a VCUG, e.g. whether parents were very anxious about the procedure or if and how they had prepared their child for the VCUG. Further research should take into account the child's age, verbal expressions of child distress, basic parental attitude and behavior as well as the child's medical history (e.g. other invasive procedures, other diagnoses).

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Beitrag 3

Effects of Spontaneous Adult Behavior on Distress Levels of Two- to Eight-Year-Olds During Voiding Cystourethrograms

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The Voiding Cystourethrogram (VCUG) is an invasive radiological procedure that may involve high distress in children. This study investigated the course of child distress and the relationship between child distress and spontaneous adult behavior such as distraction, humor, and commands to use coping strategies during VCUG. The sample comprised 80 two- to eight-year-olds undergoing outpatient VCUGs. Child and adult vocalizations were coded using a standardized rating scale. Data

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were analyzed by means of hierarchical linear models. Results showed that child distress varies significantly across the phases of the VCUG. Distraction and humor were associated with a decrease in child distress, while for commands to use coping strategies no association could be established with child distress.

The voiding cystourethrogram (VCUG), an invasive radiological procedure frequently performed in children, may involve high levels of physical and psychological distress for the child (Agrawalla, Pearce, & Goodman, 2004; Phillips, Watson, & Collier, 1996; Rao, Kennedy, Cohen, & Rosenberg, 2012). The VCUG is the standard method used to diagnose a vesicoureteral reflux in children, which has been estimated to affect 2% of the child population (Verrier-Jones, 1999). Vesicoureteral reflux may cause permanent damage to the kidneys (Oak, Kulkarni, & Chaubal, 1999). Urinary tract infections, which occur significantly more frequently among girls than boys (Marild & Jodal, 1998), are the most common cause of vesicoureteral reflux.

This study investigated the relationship between three naturally occurring adult behavior styles (i.e. the behavior of parents and medical staff), that is, distraction, humor, and commands to use coping strategies, and child distress during VCUG. Previous studies on VCUG (Salmon & Pereira, 2002; Zelikovsky, Rodrigue, Gidycz, & Davis, 2000) have investigated the combined effect of these three types of adult behavior and together have found them to be associated with reduced child distress. By examining each of these adult behavior styles individually and by using hierarchical linear models and time-lagged analyses that allow phase- and age-specific analyses of the effects of adult behavior on child distress, this study aimed at a more detailed exploration of the influence of these types of adult behavior on child distress during VCUG.

VCUG PROCEDURE AND CHILD DISTRESS

During the VCUG, a catheter is first inserted into the urethra (catheterization phase). Next, the bladder is filled with a contrast medium and x-ray images are taken during the filling of the bladder (filling phase). When the bladder is full, the child is asked to void on the examination table (voiding phase). During the voiding of the bladder, x-ray images are taken again to see whether the child has a reflux, that is, whether urine flows from the bladder back to the kidneys rather than being expelled through the urethra (Fotter, 2001).

Unlike other invasive procedures, the VCUG may not only be painful and frightening but also embarrassing for the child. Stashinko and Goldberger (1998) described several distressing aspects of a VCUG for children, which include having a stranger examining the child's genital area, a foreign body being inserted into

the child's body and thereby causing discomfort or pain (catheterization phase), the unpleasant feeling of the bladder filling (filling phase), the embarrassment of lying naked on the examining table, and being required to urinate in front of the medical staff (voiding phase). In addition, there is the anticipated anxiety of the child when at the beginning of the VCUG, the procedure is explained to him and he is asked to lie on the examining table (anticipatory phase).

MODERATORS ON CHILD DISTRESS

According to Rudolph, Dennig, and Weisz (1995), child (distress) behavior in medical settings is influenced by person-specific and situation-specific moderators (see Figure 1). An important person-specific moderator is age. Robinson, Savage, Stewart, and Sweeney (1999) found severe distress during VCUG to be highest in the age group of one- to four-year-olds and lowest in children age one and younger. Among the age group of the two- to seven-year-olds, child distress behavior during VCUG is reported to be higher the younger the child is (Phillips, Watson, & Collier, 1996; Salmon & Pereira, 2002; Zelikovsky et al., 2000). Referring to the influence of gender on child distress, the few existing studies on this subject report no significant differences in child distress between girls and boys during

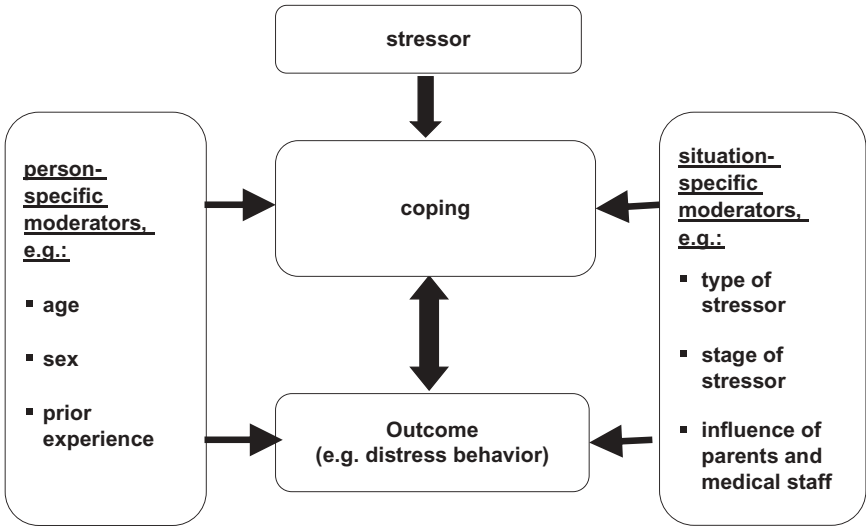


FIGURE 1 Model of child behavior in medical settings, modified according to Rudolph, Dennig, and Weisz (1995).

VCUG (Oswald et al., 2002; Salmon & Pereira, 2002). As for the influence of previous VCUG experience, analysis of a subsample of the present data indicates no influence of previous VCUG experience on child distress (Felber et al., 2011).

As an important situation-specific moderator of child distress, Rudolph, Dennig, and Weisz (1995) mentioned the stage (i.e. phase) of stressor (see Figure 1). As described above, the demands placed upon the child vary according to the phases of the VCUG. Butler, Symons, Henderson, Shortliffe, and Spiegel (2005) found catheterization to be the most stressful part. In the study by Zelikovsky et al. (2000), catheterization and voiding phase have been shown to be equally stressful for children. Another important situation-specific moderator of child distress during medical procedures is parent and staff in-session behavior. In the original model of Rudolph, Dennig, and Weisz (1995), only parental influence is mentioned. Following Varni, Blount, Waldron, and Smith's (1995) description of factors influencing child distress during painful medical procedures, we have modified the model by Rudolph, Dennig, and Weisz (1995) by replacing parental influence in Figure 1 by the influence of adults (i.e. parents and staff) present in the examination room. An in-depth investigation of the influence of adult behavior during invasive medical procedures on children was done by the study group of Blount et al. (e.g. Blount et al., 1989; Blount, Sturges & Powers, 1990). To code vocal interactions in the treatment room, they developed the "Child Adult Medical Procedure Interaction Scale-R" (CAMPIS-R; Blount et al., 1997). The CAMPIS-R assesses several types of child and adult behavior, with adult behavior being grouped into the categories adult coping promoting, adult distress promoting, and adult neutral behavior. We have already investigated the effects of adult distress promoting behavior on child distress during VCUG in another study (Felber et al., 2011). The present study focused on three adult behavior styles, i.e. nonprocedural-related talk to the child (distraction), humor shown to the child and commands to the child to use coping strategies (e.g., "breathe."), which constitute the scale of "coping promoting behavior," as they have been shown to enhance child coping behavior (cf. Blount et al., 1989; Blount et al., 1990; Manimala, Blount & Cohen, 2000).

Blount et al. (1990) and Manne et al. (1992) found these strategies to be also related to decreased child distress. In connection with VCUG, adult distraction, humor and commands to use coping strategies have not yet been investigated individually. The total scale of "coping promoting behavior" used by CAMPIS-R (Blount et al., 1997) was reported to be associated with increased child coping (Salmon & Pereira, 2002; Zelikovsky, Rodrigue, & Gidycz, 2001) and decreased child distress (Zelikovsky et al., 2001) during VCUG.

The effects of adult influence on child distress may be moderated by the phase of procedure (Blount et al., 1990; Dahlquist, Power, Cox & Fernbach, 1994; Dahlquist, Power & Carlson, 1995; Manne et al., 1992). The phase-specific influence seems to vary depending on the medical procedure involved. Blount et al.

(1990), in their study on child cancer procedures, found both distraction and humor to be related to reduced child distress only during the anticipatory phase, but not during the more stressful procedural phases. This, however, does not necessarily need to apply to VCUG. In VCUG, catheterization can be assumed to be the most painful part. Kleiber and McCarthy (1999) studied nine children undergoing urethral catheterisation (as a single procedure and not as a part of a VCUG) and found verbal distraction to be associated with a decrease in child distress. Regarding commands to use coping strategies, Blount et al. (1990) reported them to be associated with reduced child distress only during the procedural phases and not during the anticipatory phase. Contrary to this result, Manne et al. (1992), in a study on IV injections, found commands to use coping strategies to be associated with less child distress not during injection but only during the post-injection phase.

OBJECTIVES OF THE STUDY

The first objective of this study is to describe the course of child distress during VCUG and how it varies with the child's age. In keeping with the results of Zelikovsky et al. (2000) and Butler et al. (2005), we assume child distress to vary significantly across the four phases and to be highest during catheterization and voiding phase. For all phases, we expect child distress to decrease with the child's age (cf. Salmon & Pereira, 2002; Zelikovsky et al., 2000).

The second objective of this study is to investigate how individual adult behavior styles, distraction (nonprocedural talk), humor, and commands to use coping strategies relate to child distress during VCUG and its four phases. Using hierarchical linear modeling, taking minutes of the VCUG as time points, associations between child distress and adult behavior in the same minute are examined. Analyses are then conducted with a time-delay of one minute, thus allowing child distress to be predicted on the basis of the adult behavior shown during the preceding minute. For both types of analyses, hypotheses are as follows: In accordance with the studies described above, we expect distraction, humor, and commands to use coping strategies to be associated with decreased child distress (cf. Blount et al., 1990; Kleiber & McCarthy, 1999; Zelikovsky, Rodrigue, & Gidycz, 2001). As to the phase-specific effect of adult behavior, the findings in literature vary depending on the medical procedure involved. Regarding VCUG, no phase-specific results have been found yet, except for Kleiber and McCarthy (1999), who examined catheterization as a single procedure and not as a part of a VCUG. We generally assume the intensity of the association of distraction, humor, and commands to use coping strategies with child distress to vary depending on the phases of the VCUG. In accordance with Kleiber and McCarthy (1999), we expect distraction to be associated with reduced child distress during the catheterization

phase. As humor may release muscular tension in the sphincter of the bladder, thereby facilitating voiding, we assume it to be negatively correlated with child distress during the voiding phase.

METHOD

Participants

The study comprised a random sample of 80 children aged two to eight who had been referred as outpatients to two Vienna children's hospitals (St. Anna Children's Hospital and AKH, General Hospital of Vienna) for a VCUG, and their parents. Exclusion criteria consisted of the following: children scheduled to undergo the procedure under sedation (exceptional cases), mentally disabled children, and children and parents who were not able to converse in German easily. The children did not receive any kind of pharmacological preparation or psychological intervention prior to the procedure. Eighty-four percent of the children had been prepped by their parents beforehand, and 21% had been prepped by a medical professional at a time other than the day of the procedure. [Table 1](#) shows socio-demographic data of the children and the accompanying parents as well as data on preparation prior to the procedure and the children's medical history. Participating medical staff included four male radiologists as well as one male and eight female radiology assistants.

Procedure

The study was approved by the ethics committees of both hospitals. Informed consent was requested from the accompanying parent when registering the child for the VCUG. During the VCUG, child and adult behavior was rated by three independent observers using the CAMPIS-R rating scale (Blount et al., 1997). The beginning and the end of the VCUG phases were defined as follows: The anticipatory phase started as soon as the child and the accompanying parent(s) entered the examination room. The radiology assistant explained the procedure to the child and the child was asked to lie on the examination table. The catheterization phase started as soon as the doctor entered the room and staff made preparations by disinfecting the site. The filling phase started after the catheter had been properly inserted and fixed by a Band-Aid. The end of the filling phase was characterized by a set of x-rays taken by the radiologist as soon as the bladder was full. After that, the radiologist asked the child to urinate, which marked the beginning of the voiding phase. After voiding, the phase ended as soon as the child was taken from the examination table. After the procedure, socio-demographic data and the

TABLE 1
Socio-Demographic Characteristics and Medical History

	Means	SD
Age in years	4.6	1.9
	N	%
Gender		
Female	71	88.8%
Male	9	11.2%
Accompanying Parent(s)		
Mother only	35	43.7%
Father only	7	8.8%
Both parents	26	32.5%
Mother + further relative	12	15.0%
Child was informed beforehand about		
Procedure in general	42	52.5%
Catheterization	45	56.3%
Voiding on examination table	30	37.5%
Medical history		
VCUG first-time	45	56.2%
VCUG second-time	14	17.5%
VCUG third-time or more	21	26.3%
Chronic diseases	6	7.5%
Other health problems	15	18.8%
Hospitalisation experience: one	24	30.0%
Hospitalisation experience: two or more	28	35.0%
Hospital		
St. Anna	64	80.0%
AKH (General Hospital of Vienna)	16	20.0%

child's previous medical history were recorded using a semi-structured anamnestic interview. Children aged three years or older were asked to assess how they felt during VCUG by means of a faces scale.

Instruments

Child distress and adult behavior during the VCUG

Child and adult (that is, parent and medical staff) behavior during the VCUG was recorded using the CAMPIS-R by Blount et al. (1997). The CAMPIS-R is a standardized rating scale used to record child and adult behavior during medical interventions whose reliability and validity has been proven in numerous studies (Blount et al., 1997; Cohen, Blount, Cohen, Schaen, & Zaff, 1999). The reliability of the CAMPIS-R scales was reported to range from 0.65 to 0.92 (Blount et al., 1997). In the CAMPIS-R, individual behavioral codes for children and adults are grouped into six scales, of which the following two scales were used in the present

analysis: The CAMPIS-R-scale “Child Distress” served as parameter for child distress levels. It comprises the child behavior codes “crying,” “screaming,” “verbal resistance” (e.g., “Stop!”), “verbal fear” (e.g., “I’m scared!”), “verbal pain” (e.g., “That hurts!”), “verbal emotion” (referring to anger, self-pity, or resentment, e.g., “I hate that”), “emotional support” (e.g., “Hold me!”), and “information seeking” (e.g., “Will you tell me when you are going to do something?”). The scale adult coping promoting, with its codes “nonprocedural-related talk to the child (distraction),” “humor,” and “command to use coping strategy,” constitutes the types of adult behavior examined in this study. Distraction comprises nonprocedural-related talk to the child as, for instance, conversations about the child’s siblings, toys, or school. Humor refers to any statement that is clearly intended to be humorous and lighthearted in tone as, e.g., funny or outlandish remarks, statements that emphasize the humorous aspects of a problem, or simply laughter. Commands to use coping strategies refer to any suggestions, which prompt the child to engage in a coping behavior such as, e.g., coughing during catheterization, relaxation, deep breathing, distraction, or use of coping statements. Behavioral coding took place according to Blount et al. (1989), although due to the hospital’s legal regulations, it was not possible to make video or audio recordings of the VCUGs. Therefore, to simplify the coding procedure, behavioral scales not relevant for the study (child coping behavior, child neutral, adult neutral) were not coded in detail. Child behavior codes such as “crying” and “screaming” were only coded at intervals of 5 seconds (cf. Cohen et al, 1999). The frequency of a particular category of behavior was calculated by dividing the frequency of its appearance by the respective duration of the procedure (in minutes) (cf. Blount et al., 1997). The coding was done by three independent observers who had undergone special training (coding of videotaped and real-life venipunctures). A priori agreement amongst the raters (measured as percentage of identical codings throughout the procedure) was between 73–80%. Immediately after each VCUG, the ratings were compared and discussed by the observer-team. In the case of incongruent ratings consensus was sought; the first author’s (M.F.) ratings were used where no consensus was reached (< 5% of all ratings).

In addition to the observational measurement of child distress by the CAMPIS-R, for self-report assessment of child distress during VCUG, the face pain scale by Bosenberg, Thomas, Lopez, Kokinsky, and Larsson (2003) was employed, which shows satisfactory validity. Faces on the scale are coded from 1 (no pain/distress) to 6 (worst pain/distress).

Statistical Analyses

Preliminary analyses were conducted using SPSS for Windows ver. 15. Main data analysis was based on a hierarchical linear modeling approach (HLM) using the MIXED procedure in SAS, vers. 2002–2003. HLM provides separate estimates of

data collected from individuals and aggregates these estimates across all participants. The variance in the dependent variable is partitioned into the effects that occur at the different hierarchical levels, in the present analysis the time level (= variance across time points of the VCUG) and those at the individual level (= variance across children). Contrary to traditional techniques for the analysis of longitudinal data, hierarchical linear modeling allows participants with missing data at one or several points of time to be retained in the analysis (DeLucia & Pitts, 2006). For the present analysis, this was crucial, as average duration of the VCUG varies considerably, thus creating many “missing values” at the end of those data sets with short duration of the VCUG (For more detail on HLM methodology, see Bryk & Raudenbush, 1992; DeLucia & Pitts, 2006; Singer, 1998; Snijders & Bosker, 1999).

To estimate the change in child distress over the course of the VCUG, unbalanced mixed-model, repeated-measures analyses were conducted, with child distress as the dependent outcome variable and slope and dummy variables that indicate different time intervals during VCUG as predictors, while controlling for sex and age. A random subject effect and the autoregressive correlation structure were used to account for correlation between measurements taken from the same subject. In order to examine the course of child distress as a function of adult behavior over time, adult behavior as predictor was added to the model and separate HLM models were run for each type of adult behavior in question. Analyses were conducted separately for total VCUG and each of its phases. Analyses were also conducted with a time-delay of one minute, thus allowing for predictions of child distress at a certain minute by the adult behavior shown in the preceding minute. HLM requires the residuals of the dependent variable to be normally distributed. Graphical inspection of the distribution of the residuals of child distress in the final models confirmed normal distribution of the residuals.

For all hierarchical linear modeling analyses, exact p-values are reported. For both preliminary and hierarchical linear modeling analyses, p-values < 0.05 are interpreted as significant.

RESULTS

Duration of the Phases of the VCUG

The individual phases of the VCUG varied considerably in their duration. The mean durations for each phase were as follows: anticipatory phase = 3.3 minutes (SD = 2.4), catheterization phase = 4.0 minutes (SD = 2.2), filling phase = 7.5 minutes (SD = 3.6), and voiding phase = 6.7 minutes (SD = 4.1). The dispersion within each phase is due to the fact that children differ in the amount of time they need to comply with the commands of the medical staff. The duration of the

filling phase also varies with the children's age (the larger the bladder, the longer the duration of the filling phase).

Self-Report Assessment of Child Distress During VCUG

The face pain scale by Bosenberg et al. (2003) was completed by 61 children (87% of the children three-years-old and older). Children reported a mean distress score of 3.5 (SD = 1.8), with scores being negatively correlated with the child's age ($r = -0.31$; $p_{1\text{-tailed}} < 0.01$) and positively correlated with child-distress as measured by the CAMPIS-R ($r = 0.60$; $p_{1\text{-tailed}} < 0.001$).

Child Distress During the Course of the VCUG

For all further analyses, the CAMPIS-R scale child distress was used as parameter for child distress. In order to examine child distress during VCUG, first the mean of the child distress scores of each phase was analyzed. In a next step, a HLM model was constructed describing the course of child distress during VCUG in a more detailed way after controlling for child age and sex.

As hypothesized, repeated measure analysis of variance indicated that mean child distress varies significantly across the phases of the VCUG ($F(3.0) = 20.1$, $p < 0.001$). We had assumed child distress to be highest during catheterization and voiding phase. Our findings in fact showed child distress to be highest during the catheterization phase, followed by the voiding phase. Child distress was lowest during the anticipatory phase (see Table 3). Analysis showed that child distress during the catheterization phase was significantly higher than during the voiding phase (Wilcoxon: $Z_{(1\text{-tailed})} = -3.62$; $p < 0.001$), child distress during the voiding phase was significantly higher than during the filling phase (Wilcoxon: $Z_{(1\text{-tailed})} = -2.16$; $p < 0.05$), and child distress during the filling phase was significantly higher than during the anticipatory phase (Wilcoxon: $Z_{(1\text{-tailed})} = -2.03$; $p < 0.05$). As expected, there was a significant negative correlation of child distress with the child's age in all phases (anticipatory phase: $r = -0.28$, $p_{1\text{-tailed}} < 0.01$, catheterization phase: $r = -0.39$, $p_{1\text{-tailed}} < 0.001$, filling and voiding phase and total VCUG: $r = -0.50$, $p < 0.001$).

Due to the variability in the duration of the VCUG and its phases, modeling the course of child distress during VCUG by the time variable (minute) in its polynomial terms did not achieve a good fit relative to the data in the HLM model. To assess change in child distress over time, each time point (minute) of a child's VCUG had first to be assigned to a specific part of the procedure. The segregation of the phases of the VCUG into smaller parts was first achieved by analyzing the graphics of the average courses of child distress during each of the VCUG phases. Next, dummy and slope variables were assigned to the different parts. Several models with different linear and/or quadratic terms for the slope variables were

constructed and tested. (For an illustration of the variables included in the final model, see Figure 2). In a next step, the child's sex and age (with age = 0 indicating a two year old child, sex = 0 indicating a girl, and sex = 1 indicating a boy) were entered into the model. In order to determine if the child's age significantly interacted with the course of child distress during parts of the VCUG, all possible interaction terms of the child's age with the above dummy and slope variables were tested and only significant interactions were retained. In the same way, interaction terms of the child's sex with the above dummy and slope-variables were tested. Finally, the model was checked for random effects of the dummy and slope variables by testing each possible random effect with a likelihood ratio test. Table 2 presents the results for the final model with the best fit relative to the data.

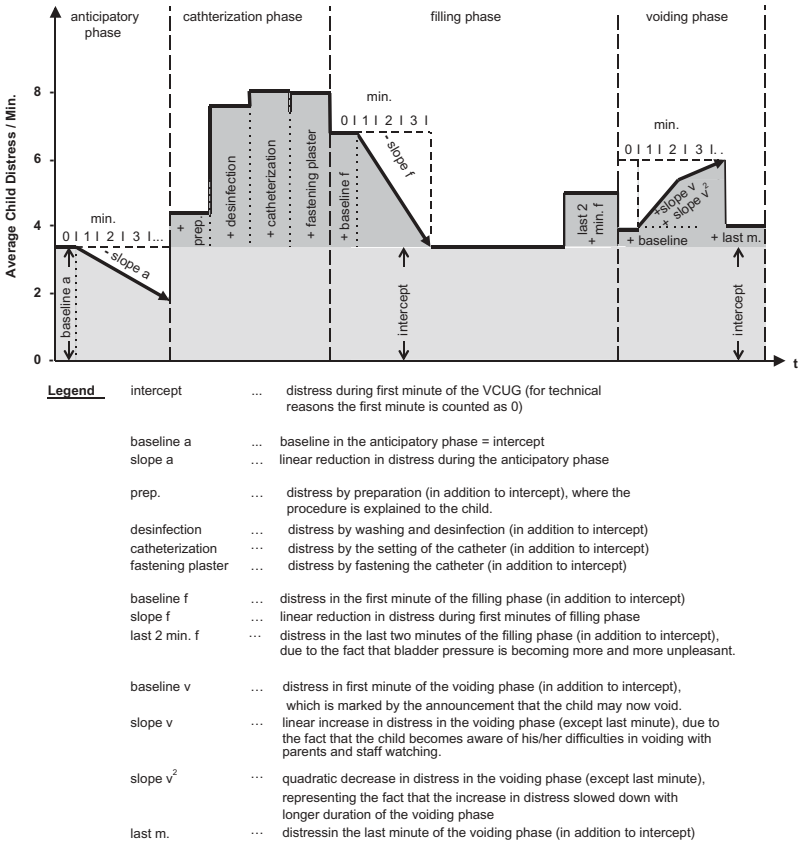


FIGURE 2 Course of child distress during VCUG in a two-year-old girl.

TABLE 2
Effect of Time Variables on Child Distress After Adjusting for Age and Sex in Hierarchical Linear Model

<i>Fixed Effects</i>	<i>Coefficient</i>	<i>SE</i>	<i>t-ratio</i>	<i>p-value</i>
Intercept	3.37	0.51	6.61	<0.001
Age	-0.51	0.12	-4.08	0.001
Sex	-1.02	0.75	-1.37	0.174
Slope a (anticipatory phase)	-0.41	0.17	-2.48	0.013
Preparation (catheterization phase)	0.89	0.28	3.21	0.001
Desinfectant (catheterization phase)	4.20	0.63	6.69	<0.001
Setting of the catheter (catheterization phase)	4.66	0.66	7.08	<0.001
Fastening of the catheter by plaster (catheterization phase)	4.58	0.52	8.75	<0.001
Baseline (in addition to intercept) in filling phase	3.34	0.52	6.45	<0.001
Slope f (slope during first minutes of filling phase)	-1.35	0.26	-5.17	<0.001
Middle part of filling phase	-0.09	0.31	-0.28	0.780
Last 2 minutes of filling phase	1.66	0.51	3.27	0.001
Baseline (in addition to intercept) in voiding phase except last minute	0.47	0.35	1.34	0.182
Slope v (slope during voiding phase except last min.)	0.83	0.16	5.16	<0.001
Slope v ² (slope during voiding phase except last min.)	-0.07	0.01	-5.17	<0.001
Last minute of voiding phase	0.54	0.33	1.61	0.108
Age*slope a	0.14	0.04	3.20	0.001
Age*Desinfection	-0.54	0.15	-3.53	0.001
Age*Setting of the catheter	-0.43	0.17	-2.54	0.011
Age*Fastening of the catheter by plaster	-0.57	0.14	-4.15	<0.001
Age*Baseline in filling phase	-0.45	0.13	-3.48	0.001
Age*Slope f	0.17	0.07	2.34	0.012
Age*Last two minutes of filling phase	-0.32	0.11	-2.93	0.004
Age*slope v	-0.12	0.04	-3.15	0.002
Age*slope v ²	0.01	0.00	3.15	0.002
Sex*Setting of the catheter	1.96	0.95	2.06	0.040
<i>Random effects</i>	<i>Coefficient</i>	<i>SE</i>	<i>z-ratio</i>	<i>p-value</i>
Intercept	3.96	0.79	4.99	<0.001
Setting of the catheter x Intercept	0.88	0.72	1.21	0.225
Setting of the catheter	4.77	1.20	3.97	<0.001
Baseline voiding phase x Intercept	-0.72	0.49	-1.48	0.138
Baseline voiding phase x Setting of the catheter	-0.61	0.59	-1.04	0.299
Baseline voiding phase	1.36	0.54	2.53	0.006
AR (1)	0.55	0.03	20.24	<0.001
Residual	4.89	0.30	16.37	<0.001

The intercept of the fixed effect section in Table 2 represents the average number of instances of distress behavior (e.g., crying, screaming, seeking emotional support, etc.) of a two-year-old girl (that is with the variables age and sex set to

TABLE 3
Child Distress and Adult Behavior: Average Frequencies/Min. and Fixed Effects of Adult Behavior on Child Distress in Hierarchical Linear Models

Average Frequencies/Min. of Child Distress and Adult Behavior										
Total VCUG		Anticipatory Phase		Catheterizat. Phase		Filling Phase		Voiding Phase		
mean	SD	mean	SD	mean	SD	mean	SD	mean	SD	
Child distress	2.7	2.6	1.7	2.8	3.5	2.2	2.8	2.6	2.8	
Adult distraction	1.6	1.1	2.2	2.1	1.7	2.0	1.8	0.8	1.1	
Adult humor	0.4	0.4	0.4	0.6	0.6	0.4	0.6	0.4	0.5	
Adult commands to use coping strategy	0.3	0.3	0.2	0.6	1.5	0.1	0.2	0.2	0.4	

Effects of Adult Behavior on Child Distress in Model Without Time Delay										
Total VCUG		Anticipatory Phase		Catheterizat. Phase		Filling Phase		Voiding Phase		
estimate	p	estimate	p	estimate	p	estimate	p	estimate	p	
Distraction	-0.07	<.001	-0.07	0.046	-0.16	0.005	-0.07	0.007	-0.05	0.331
Humor	-0.48	<.001	-0.14	0.507	-1.25	<.001	-0.29	0.116	-0.53	0.054
Humor x Age	0.08	0.005	0.01	0.952	0.20	0.020	0.05	0.198	0.10	0.123
Commands to use coping strategy	-0.08	0.157	-0.04	0.712	-0.14	0.069	0.14	0.513	0.09	0.557

Effects of Adult Behavior on Child Distress in Model with Time Delay										
Total VCUG		Anticipatory Phase		Catheterizat. Phase		Filling Phase		Voiding Phase		
estimate	p	estimate	p	estimate	p	estimate	p	estimate	p	
Distraction	-0.04	0.080	-0.02	0.600	-0.06	0.309	-0.03	0.225	-0.03	0.620
Humor	-0.02	0.722	-0.05	0.607	0.08	0.597	-0.07	0.305	0.01	0.951
Commands to use coping strategy	0.08	0.061	0.01	0.917	0.08	0.182	0.42	0.036	0.02	0.890

0 in the model) in the first minute of the VCUG. [Figure 2](#) illustrates the course of child distress during VCUG in a two year-old girl according to the results presented in [Table 2](#). As can be seen from [Table 2](#), during some parts of the VCUG, there were significant interactions between child distress and the child's age or sex. Older children started out at a lower distress level, but also showed less decrease in distress during anticipatory phase. During actual catheterization, their increase in distress was markedly smaller, they calmed down more easily right after catheterization (first minute of filling phase), and remained on a lower distress level during filling and voiding phase. Boys clearly showed more distress during actual catheterization. The above describes the typical course of child distress during VCUG. As for random effects, results showed that at the start of the VCUG (intercept), during the setting of the catheter as well as at the start of the voiding phase (base-time voiding phase), significant variation among children was observed (see [Table 2](#)).

Relationship Between Adult Behavior and Child Distress

The relationship between adult behavior and child distress was investigated separately for total VCUG and its phases. [Table 3](#) shows the mean frequencies of each form of adult behavior during VCUG phases. For each phase, a separate HLM model was constructed in relation to the phase-specific part of the total VCUG model. Each form of adult behavior as a predictor of child distress was added independently to these models. To check for possible interaction effects of adult behavior with the child's age, the corresponding interaction term was entered into the total VCUG model. If the interaction term was significant on the 0.05 level or lower, it was retained in the total VCUG model as well as in the phase-specific models. Child distress was first predicted by adult behavior shown in the same minute (model without time delay) and next by adult behavior shown in the preceding minute (model with time delay). Results for both types of analyses are presented in [Table 3](#). Whenever there was a relevant interaction effect between an individual adult behavior and the child's age in the total VCUG model, results in [Table 3](#) are presented including the interaction term. None of the examined types of adult behavior was able to minimize the random effects established in the model for child distress during the first minute, the insertion of the catheter, or the baseline of child distress in the voiding phase.

Distraction

We hypothesized that distraction should be associated with a decrease in child distress and that this effect should vary depending on the phases of the VCUG. Specifically, we postulated a significantly distress-reducing effect of distraction for catheterization phase. Distraction/nonprocedural talk to the child in fact

proved to be related to decreased child distress. This was true for total VCUG as well as for all phases except the voiding phase (cf. Table 3), where adults used distraction less often than during the other phases (cf. Table 3). Being associated with a decline in child distress of about -0.07 distress behavior/min, the effect of spontaneous distraction was rather small, however. The effect seemed strongest during the catheterization phase (cf. Table 3). There was no significant interaction between distraction and the child's age. In analysis with time delay, no significant effect of distraction was found.

Humor

As expected, humor was related to a decrease in child distress in the total VCUG model. Like distraction, we had assumed the effect of humor to vary depending on the phases of the VCUG and specifically hypothesized humor to be associated with reduced child distress during the voiding phase. Results showed a significant correlation for both the catheterization ($r = -1.25$) and voiding phase ($r = -0.53$). During the catheterization phase, however, the distress-reducing effect of humor appeared to become smaller with each year of age. There was no significant correlation for the anticipatory or filling phase. In the analysis with time delay, humor showed no effect on child distress during the following minute.

Command to Use Coping Strategy

Contrary to the hypothesis, in both analyses—with and without time delay—commands to use coping strategies showed no relation to child distress.

DISCUSSION

The goal of this study was to get a clearer picture of the course of child distress during VCUG and how it is influenced by the spontaneous adult behaviors distraction, humor, and commands to use coping strategies. Unlike previous studies (Salmon & Pereira, 2002; Zelikovsky et al., 2000), which investigated the combined effect of these three types of behavior, this study focused on the individual effect of distraction, humor, and commands to use coping strategies on subsequent child distress by means of hierarchical linear models and time-lagged analyses. Special emphasis was put on the influence of the child's age and the different phases of the VCUG.

For total VCUG, it has been proven that average child distress is higher the younger the child's age (Phillips, Watson, & Collier, 1996; Robinson et al., 1999; Salmon & Pereira, 2002; Zelikovsky et al., 2000). Results showed that this is also true for each of the VCUG phases, though the relationship between child's distress and age seemed weaker during the anticipatory phase when child distress

generally was lower. Child distress during anticipatory phase can be assumed to reflect only child anxiety, while during the other phases it may reflect both anxiety and pain (cf. Dahlquist et al., 1995). This may also explain why child distress decreased during the course of anticipation phase. Once children have entered the room, they might have realized that so far nothing had happened and so their anxiety decreased. As results showed, this was especially true for the younger ones who started out with a higher level of distress, but—as their ability for anticipation is not yet developed so well (cf. Atance & Meltzoff, 2005)—seemed to calm down more easily than the older ones. The opposite effect, however, was observed as soon as catheterization started and pain was involved. In accordance with Butler et al. (2005), we found average child distress to be highest during the catheterization phase. The increase in child distress during actual catheterization was clearly higher in younger children who—contrary to anticipation phase—now tended to stay on a pretty high distress level throughout the remaining VCUG procedure. This corresponds to the developmental phenomenon that following a change in stimuli, younger children are less able to modify their reactions (Allen & Marotz, 2003). One may argue that older children may not verbally show distress, but may still be experiencing emotional distress. Children's self-reported distress, however, proved to be positively correlated with observed child distress and it, too, decreased with age.

Even when controlling for sex and age, there was still considerable variation in distress among children during the course of the VCUG. Children started out at very different distress levels, they showed significant variation in their distress while the catheter was being set, and they reacted differently to the pressure of voiding in public. None of the adult behaviors examined in this study was able to minimize these variations in child distress. Perhaps they might be explained by differences in the parental preparation of the children for VCUG, in child anxiety, or in their level of shame, all of which have not been the focus of this study.

As for the spontaneous adult behaviors investigated in this study—distraction, humor, and prompts to use coping strategies—Blount et al. (1990), in their study on child cancer procedures, found these types of adult behavior to be related to decreased child distress. Their results refer to the combined effect of these three adult behavior styles. Contrary to this, the present study aimed at examining the effect of these types of adult behavior on child distress during VCUG individually. Results showed that spontaneous distraction and humor were, in fact, related to reduced child distress, while spontaneous commands to use coping strategies for VCUG did not show this effect. Furthermore, we had assumed the strength of the association of distraction, humor, and commands to use coping strategies with child distress to vary depending on the phases of the VCUG. This was also confirmed for distraction and humor but not for commands to use coping strategies. For both distraction and humor, the association with reduced child distress seemed strongest during the catheterization phase. Though this might be surprising at first,

one has to take into account that during this phase, child distress peaked highest, so the potential for reduction was bigger here than during the other phases of the VCUG.

For the entire VCUG process, we found distraction/nonprocedural talk to the child to be related to decreased child distress in the model without time delay. This applied for younger and older children alike. In accordance with Kleiber and McCarthy (1999), we had expected distraction to be associated with reduced child distress during the catheterization phase. Results showed a relation between distraction and reduced child distress in all phases except the voiding phase. The latter is the only phase during VCUG when children—by concentrating on voiding—can actively help to facilitate the procedure. To focus on verbal distraction, a certain level of cognitive processing is necessary (McCaul & Malott, 1984) that children may not be able to perform while they concentrate their efforts on voiding. Therefore, distraction seems less useful during the voiding phase. Adults intuitively seemed to be aware of this, as during the voiding phase, they used distraction less often than during the other phases of the VCUG.

As hypothesized, humor in the total VCUG model was clearly related to reduced child distress in the model without time delay. Compared to distraction, the relationship to child distress seemed clearly stronger. In the model with time delay, no effect was found. One may conclude that the effect of humor is strong but only momentarily so and therefore does not impact child distress of the following minute. Likewise, the correlation in the model without time-delay may reflect the fact that adults used humor preferably when the child showed low or no overt signs of distress. Further research is necessary to clarify this subject. As to the effect of humor during the different phases of the VCUG, we had assumed humor to be related to decreased child distress in the voiding phase, as it may release muscular tension in the sphincter of the bladder. Results confirmed a negative correlation between humor and distress for voiding phase, thus indicating that short sequences of humor might in fact facilitate voiding. Results showed that humor was also very effective in reducing child distress during the catheterization phase, and that it clearly had a stronger effect than distraction. Humor seems to be especially suited to reducing catheterization distress in younger children, since—unlike the voiding phase—its effect during catheterization phase declined with the child's age. Humor showed no significant effect on child distress during anticipation and filling phase. The reasons for this are not clear. It may be assumed that during anticipation phase children are tense as they are unaware of what lies ahead of them and are thus not very responsive to humor. During filling phase, when bladder pressure increases continually while children are not allowed to void, humor may be less effective, as children intuitively may be aware that laughing may trigger voiding. Adult's use of humor was more or less similar in all phases.

Contrary to distraction and humor, for commands to use coping strategies, we found no significant correlation to child distress in the model without time delay. This was also true for analysis with time delay. Adult prompts to use coping strategies mostly referred to asking the child to cough (during catheterization), to take a deep breath, or to relax. Unlike distraction and humor, commands to use coping strategies need the child's active cooperation in order to be effective. Without special training beforehand or more detailed instruction on the part of the adult (e.g., on how to relax), children can hardly be expected to benefit from these adult prompts.

Study Limitations and Future Directions

The small number of boys in this sample strongly affects the extent to which these findings can be generalized. As hospital legal regulations did not allow the VCUGs to be video- or audiotaped, three observers had to be present in the examination room. Their presence could have affected the child's experience and distress levels in a way that also may reduce the validity of the results. Further research should also take more into account the medical history of the children (e.g., other invasive procedures, other diagnoses). As the effect of spontaneous instances of adult behavior could be expected to be rather small, this study did not aim at differentiating between the effect of parent and staff behavior. Still, in order to develop appropriate counseling or training programs, further studies should explore possible differences in the effect of distraction, humor, and prompts to use coping strategies when used by parents or staff. In general, further research should move beyond descriptive work to actual implementation of evidence-based methods to reduce the pain and distress associated with this painful procedure.

IMPLICATIONS FOR PRACTICE

The results of the study confirmed that distress during VCUG is high especially for younger children and underline the necessity of developing and evaluating counseling/training programs for parents/medical staff in order to reduce child distress during this frequently performed examination. Results clearly indicate that counseling/training programs need to take into account the changing demands of the different phases of the VCUG. Results suggest that for the anticipation and filling phase, parents and staff should be advised to use distraction, while for the voiding phase, they should be advised to primarily employ humor. During catheterization, both distraction and humor may be used, but humor has proven more effective, especially in younger children. According to the results of this study, prompts to use coping strategies do not seem advisable during any phase. As mentioned above, it must, however, be considered, that prompts to use coping

strategies may be more effective in reducing child distress when adults and/or children are counseled or trained beforehand. Further research is necessary to clarify this point.

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Weiterbildung

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Publikationen

- Felber, M., Schabmann, A., Schmiedek, F., Friedrich, M., & Völkl-Kernstock, S. (2014). Effects of spontaneous adult behavior on distress levels of 2- to 8-year-olds during voiding cystourethrograms. *Children's Health Care*, 43, 273-292.
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