

Circumcision Practice Patterns in the United States

Howard J. Stang, MD, and Leonard W. Snellman, MD

ABSTRACT. *Objective.* To determine 1) the performing of circumcision by medical specialty, gender, and years of practice; 2) the pattern of anesthetic use for this procedure; and 3) the reasons physicians cite for not using anesthesia.

Design. A total of 3066 questionnaires were received from a mailing to a representative sampling of physicians stratified by specialty and geographic location.

Results. Fifty-eight percent (1768) of the questionnaires were returned and interpretable from the following specialists: pediatricians (PEDs), 73% ($n = 691$); family practitioners (FPs), 52% ($n = 464$); and obstetricians (OBs), 51% ($n = 623$).

Of the respondents, 956 (54%) perform at least one circumcision per month (35% of PEDs; 60% of FPs; 70% of OBs). Of the physicians performing circumcisions, 45% use anesthesia (71% of PEDs; 56% of FPs; 25% of OBs). Of physicians using anesthesia, 85% use dorsal penile nerve block.

A significantly higher percentage of male physicians (57%) are performing circumcisions than are females (45%), but there was no difference in the percent using anesthesia. Recently trained PEDs and FPs were more likely to use anesthetics than were their older colleagues, but OB use of pain relief was independent of their practice longevity. Physicians in the western states were significantly more likely to use anesthesia than were other physicians from the rest of the United States.

Respondents who did not use anesthesia cited "concern over adverse drug effects" (54%) followed by "procedure does not warrant anesthesia" (44%) as the most common explanations.

Conclusions. A substantial number of PEDs are performing circumcisions, and they are most likely to use anesthesia (71%), followed by FPs (56%), then OBs (25%). With recent recognition of the importance of pain reduction in neonatal procedures and the lack of substantiated contraindications to newborn anesthetic use, additional education of current practitioners, residents, and parents is required to increase the use of anesthesia for circumcision. *Pediatrics* 1998;101(6). URL: <http://www.pediatrics.org/cgi/content/full/101/6/e5>; *circumcision, anesthesia for neonatal circumcision*.

ABBREVIATIONS. AAP, American Academy of Pediatrics; DPNB, dorsal penile nerve block; EMLA, eutectic mixture of local anesthetics; OB, obstetrician; FP, family practitioner; PED, pediatrician.

From the Department of Pediatrics and Adolescent Medicine, HealthPartners Medical Group, Minneapolis–St Paul, Minnesota.

This work was presented in part at the Pediatric Academic Society's Annual Meeting on May 5, 1997 in Washington, DC.

Received for publication Nov 3, 1997; accepted Feb 17, 1998.

Reprint requests to (H.J.S.) 1430 Highway 96, White Bear Lake, MN 55110. PEDIATRICS (ISSN 0031 4005). Copyright © 1998 by the American Academy of Pediatrics.

Despite the debate that continues over the benefits and risks of nonritual neonatal circumcision, it remains one of the most commonly performed surgical procedures in the United States. There were nearly 1.2 million circumcisions performed in the United States in 1992, with ~62% of all male newborns undergoing this procedure (personal communication, National Center for Health Statistics).

There is ample evidence that newborns are capable of experiencing pain, and there is a physiologic stress response that anesthesia or analgesia can help ameliorate.^{1–6} The American Academy of Pediatrics (AAP) has endorsed the use of anesthesia for neonatal procedures by stating that "local or systemic pharmacologic agents now available permit safe administration of anesthesia or analgesia to neonates undergoing surgical procedures . . . the decision [to use anesthesia] should not be based solely on the infants' age or perceived degree of cortical maturity."⁷ Thus, performing a circumcision on a newborn without using anesthesia is justified, only if one would be willing to perform a circumcision on an older child or adult without anesthesia.

The 1989 AAP Task Force on Circumcision⁸ recommended additional study on local anesthesia and, in the subsequent 8 years, numerous studies have documented the efficacy and safety of dorsal penile nerve block (DPNB) with lidocaine,^{9,10} eutectic mixture of local anesthetics (EMLA),^{11–13} oral sucrose,^{14,15} and topical lidocaine.¹⁶

Despite this evidence of anesthesia's benefits and safety, there has been to date little published data on the prevalence of its use. A 1990 study of family physicians in Oregon reported that 75% were performing circumcisions, but that only 36% used anesthesia.¹⁷ Forty-three percent of a survey of physicians in southwest Ontario performed circumcisions, but only 24% used anesthesia, with 14 of the 17 of them using oral ethanol.¹⁸

A literature search revealed no published studies of circumcision practice patterns or anesthesia use based on questioning a national sample of the practitioners who perform the procedure most commonly: obstetricians (OBs), family practitioners (FPs), and pediatricians (PEDs).

This survey was undertaken to determine 1) the performing of neonatal circumcision by medical specialty, gender, and years of practice, 2) the pattern of anesthesia use for this procedure, and 3) the reasons given by physicians for not using anesthesia.

METHODS

A written, one-page questionnaire was mailed in 1996 to 3500 physicians in the United States who were selected randomly from a mailing list obtained from Ross Laboratories Nutritional Division of all the physicians they identified as either delivering infants or caring for infants after birth. Of these, 1500 questionnaires were sent to OBs, 1000 to FPs, and 1000 to PEDs. National birth rate data from 1995 was used to determine the distribution by location (state) of practice.

There was one initial mailing, with a reminder postcard sent to those who did not return the first questionnaire.

The questionnaire included seven questions regarding 1) specialty, 2) gender, 3) years in practice, 4) number of circumcisions performed per month, 5) type of clamp used, 6) type(s) of anesthesia(s) used, and 7) if anesthesia was not used, why.

We defined a physician as a circumciser if he/she performed one or more circumcisions per month. We defined anesthesia use as any method of anesthesia or analgesia used to help alleviate intraoperative or postoperative pain.

Geographic regions were divided according to the US Bureau of Census: West (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming); Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin); Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont); and South (Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia).

The data collection was centralized at the Group Health Foundation. Data input was keypunched at Data Input Services Corporation and then processed with Microsoft Fox Pro Version 2.6 TM database.

Statistical significance was tested by the χ^2 analysis, and any significant results are reported at $P \leq .05$.

This study was reviewed by the Group Health Foundation Institutional Review Board as an exempt study.

RESULTS

Of the 3500 surveys mailed, 434 (12%) were returned as undeliverable, leaving 3066 surveys reaching the appropriate physicians. Of those deliverable, 1778 (58%) were returned and used for study (Table 1).

Overall, 54% of the respondents are performing circumcisions (Table 2). Of those, 35% are PEDs, 60% are FPs, and 70% are OBs. Anesthesia or analgesia is used by 45% of circumcisers and is more likely to be used by PEDs (71%) than by either FPs (56%; $P < .001$) or OBs (25%; $P < .001$).

A significantly higher percentage of male physicians are performing circumcisions than are their female counterparts (57% vs 45%, $P < .0001$). The years in practice had no significant effect on the percentage of physicians who circumcise (Table 3). The smallest percentage (42%) of physicians who circumcise is in the Northeast ($P < .001$) (Table 4).

A total of 67% of the doctors in the West are using anesthetics, which is significantly more than their counterparts in the other regions of the country (45% in the Midwest, 37% in the South, and 28% in the

Northeast; $P < .0001$) (Table 4). There were no significant differences in anesthetic use between male (46%) and female (46%) physicians. Recently trained PED and FP physicians are more likely to use a method of pain relief than are their older colleagues ($P < .001$), whereas OBs are least likely to use anesthesia independent of the number of years in practice (Table 3).

Of those circumcisers who use any anesthesia, DPNB is the overwhelming preferred method (84%), followed by oral sucrose (16%), acetaminophen (16%), EMLA (9%), topical lidocaine (6%), local injection into foreskin (5%), oral alcohol (2%), DPNB with anesthetic other than lidocaine (2%), and other (4%). Many physicians used more than one method, thus accounting for the total percentage $>100\%$.

Of the circumcisers, the Gomco clamp is the technique preferred by 67% of physicians, whereas Plastibell (Hollister, Inc, Libertyville, IL) is used by 19% and the Mogen clamp by 10%. An equal percentage of Gomco and Plastibell users (55%) used some form of anesthesia, whereas only 33% of physicians using the Mogen clamp did. There were no significant differences in the distribution of the various methods of anesthesia across the three clamp groups.

The reasons given by physicians who circumcise but do not use any anesthesia are detailed in Table 5, with "concern about adverse effects" (54%) and "procedure does not warrant it" (44%) cited most commonly.

DISCUSSION

The practice of circumcision of males dates back many thousands of years, but only in the last 50 years, since World War II, has the rate been consistently high.¹⁹ Traditionally, this procedure has been performed by either the OB or FP who delivered the infant and until recently was performed routinely without the benefit of anesthesia or analgesia.

There also has been wide variation in the rate of circumcision by region: Midwest, 80.1%; Northeast, 69.6%; South, 64.7%; and West, 34% (1994 data; personal communication from National Center for Health Statistics). The low rate in the West probably reflects the large percentage of Asians and Hispanics, who do not typically practice circumcision, as well as changes in insurance coverage for the procedure.

Although there is good hospital data on the circumcision rate, it is not known which specialists are performing this operation. This study was designed to determine these data. Because PEDs have increasingly provided primary care for larger segments of the newborn population, their role in providing circumcision services was explored.

This survey demonstrated that more than one in

TABLE 1. Circumcision Survey Response

Specialty	Number Mailed	Number Undeliverable	Number Resultant Surveys	Number (%) Returned and Used
(PEDs)	1000	53	947	691 (73)
(FPs)	1000	112	888	464 (52)
(OBs)	1500	269	1231	623 (51)
Total	3500	434	3066	1778 (58)

TABLE 2. Percentage (*n*) of Physicians Performing Circumcisions and Their Anesthesia Practice Pattern by Specialty

	% (<i>n</i>) Circumcisers ^a	% (<i>n</i>) Anesthesia Use by Circumcisers ^b	% (<i>n</i>) of DPNB Use by Anesthetic Users
PEDs (<i>n</i> = 691)	35 (242)	71 (172)	86 (148)
FPs (<i>n</i> = 464)	60 (278)	56 (156)	90 (140)
OBs (<i>n</i> = 623)	70 (436)	25 (109)	77 (84)
Total (<i>n</i> = 1778)	54 (956)	45 (432)	85 (367)

^a Perform one or more circumcisions per month.

^b Use any form of anesthesia or analgesia perioperatively.

TABLE 3. Percentage (*n*) of Physicians Performing Circumcisions and Their Anesthesia Practice Pattern by Gender and Practice Longevity

	% (<i>n</i>) Circumcisers ^a	% (<i>n</i>) Anesthesia Use by Circumcisers ^b	% (<i>n</i>) DPNB Use by Anesthetic Users
Male			
PEDs (<i>n</i> = 419)	39 (163)	67 (109)	85 (92)
FPs (<i>n</i> = 360)	62 (224)	55 (123)	90 (111)
OBs (<i>n</i> = 450)	70 (315)	26 (82)	79 (65)
Total <i>N</i> = 1229	57 (702)	46 (314)	85 (268)
Female			
PEDs (<i>n</i> = 272)	29 (78)	77 (60)	95 (57)
FPs (<i>n</i> = 88)	51 (45)	58 (26)	88 (23)
OBs (<i>n</i> = 169)	70 (117)	21 (25)	76 (19)
Total <i>N</i> = 529	45 (240)	46 (111)	85 (99)
<10 Years in Practice			
PEDs (<i>n</i> = 248)	38 (94)	79 (75)	79 (59)
FPs (<i>n</i> = 159)	64 (101)	64 (64)	100 (64)
OBs (<i>n</i> = 137)	69 (95)	27 (26)	69 (18)
Total <i>N</i> = 544	53 (290)	57 (165)	85 (141)
10–20 Years in Practice			
PEDs (<i>n</i> = 234)	36 (85)	66 (57)	92 (51)
FPs (<i>n</i> = 203)	61 (124)	54 (67)	85 (57)
OBs (<i>n</i> = 255)	70 (179)	28 (50)	82 (41)
Total <i>N</i> = 692	56 (388)	45 (174)	86 (149)
>20 Years in Practice			
PEDs (<i>n</i> = 195)	31 (60)	63 (38)	90 (35)
FPs (<i>n</i> = 87)	53 (46)	43 (20)	75 (15)
OBs (<i>n</i> = 229)	72 (165)	20 (33)	76 (25)
Total <i>N</i> = 511	54 (271)	34 (91)	80 (75)

^a Perform one or more circumcisions per month.

^b Use any form of anesthesia or analgesia perioperatively.

three PEDs (35%) are now performing circumcisions, a much higher number than we anticipated. It is difficult to determine how fast this percentage is changing because this study is the first of its kind to detail the circumcision practice patterns by specialty of current practitioners.

There is substantial clinical experience and research that clearly documents the neonate's ability to experience and perceive pain.^{1–4} In addition, recent data would suggest that a painful experience in the newborn has an effect on how pain is perceived later in life.^{20,21} The AAP, in recognition of neonatal pain, has strongly recommended the use of pain relief for all neonatal surgical procedures.⁷

All too frequently, the physician performing the circumcision denies the infant the benefit of anesthesia because of inaccurate perceptions of the risks of anesthesia or denial that the procedure warrants such amelioration of pain.^{17,18} This study documents the explanations given by physicians who do not anesthetize infants for neonatal circumcision (Table 5). A 1990 study of Oregon FP physicians cited the most common reasons why anesthesia was not used as lack of awareness (31%), pain response is insignificant (29%), and concern about safety (27%).¹⁷ Other

studies have examined the impact on anesthetic use by implementing a physician education program²² and with a residency teaching program.²³ The trend toward more anesthesia use by PEDs may be forthcoming as residency guidelines have been published that recommend exposure to correct circumcision technique and anesthesia by the Ambulatory Pediatric Association.²⁴

Unfortunately, these misconceptions about anesthesia for circumcisions prevent physicians from providing comfort for a very painful procedure. A total of 54% in this survey stated that they were concerned about adverse drug effects, despite the AAP statement on the availability of safe agents for neonatal anesthesia.⁷ Local anesthesia with DPNB for routine neonatal circumcision was first described by Kirya and Werthmann in 1978,²⁵ and since then, multiple studies have demonstrated both efficacy and safety.^{5,9,10} Snellman and Stang prospectively documented the safety of lidocaine for DPNB, with transient bruising in 11% of infants being the only complication,¹⁰ and in another study found no significant effect on the brainstem auditory-evoked response.²⁶ Fontaine retrospectively examined DPNB complications and found no lidocaine toxicity, voiding delay,

TABLE 4. Percentage (*n*) of Physicians Performing Circumcisions and Their Anesthesia Practice Patterns by Geographic Region

	% Circumcisers*	% Anesthetic Use by Circumcisers†	% DPNB Use by Anesthetic Users
West (AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, WY)			
PEDs (<i>n</i> = 170)	52 (89)	81 (72)	89 (64)
FPs (<i>n</i> = 117)	71 (83)	77 (64)	97 (62)
OBs (<i>n</i> = 145)	54 (78)	38 (30)	87 (26)
Total <i>N</i> = 432	58 (250)	67 (166)	90 (152)
Midwest (IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI)			
PEDs (<i>n</i> = 161)	33 (53)	74 (39)	87 (34)
FPs (<i>n</i> = 118)	72 (85)	51 (43)	84 (36)
OBs (<i>n</i> = 142)	72 (102)	25 (26)	77 (20)
Total <i>N</i> = 421	57 (240)	45 (108)	83 (90)
Northeast (CN, MA, ME, NH, NJ, NY, PA, RI, VT)			
PEDs (<i>n</i> = 124)	13 (16)	59 (10)	100 (10)
FPs (<i>n</i> = 67)	28 (19)	42 (8)	75 (6)
OBs (<i>n</i> = 111)	84 (93)	19 (18)	61 (11)
Total <i>N</i> = 302	42 (128)	28 (36)	75 (27)
South (AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV)			
PEDs (<i>n</i> = 233)	36 (83)	60 (50)	76 (38)
FPs (<i>n</i> = 148)	57 (84)	43 (36)	89 (32)
OBs (<i>n</i> = 228)	73 (167)	22 (36)	78 (28)
Total <i>N</i> = 609	55 (334)	37 (122)	80 (98)

* Perform one or more circumcisions per month.

† Use any form of anesthesia or analgesia perioperatively.

TABLE 5. Reasons Cited by Physicians Who Do Not Use Anesthetics or Analgesics*

Concern about adverse drug side effects	54%
Procedure does not warrant it	44%
Infants do not remember pain	23%
Not familiar with technique	18%
Adds too much time	9%

* More than one response may have been recorded by an individual respondent.

or vascular complications, and only 1.2% with small ecchymoses.⁹ With a maximum of .8 mL (8 mg) injected for DPNB, even a 2.5-kg infant would not be expected to show toxicity, because 7 mg/kg is described as the lower limit of a potentially toxic dose.²⁷ Literature reviews have revealed only two reported complications of DPNB in newborns. One, a case of methemoglobinemia with the use of prilocaine for anesthesia,²⁸ and the other, a case of penile pallor when epinephrine was mistakenly injected instead of lidocaine.²⁹

At HealthPartners (a staff model health maintenance organization in the Twin Cities), PEDs have performed over 10 000 neonatal circumcisions with DPNB with 1% lidocaine without any recognized significant adverse reactions (unpublished data).

Oral acetaminophen has a long track record for its safety, but it has been shown to be helpful only for relief of postoperative circumcision pain.³⁰ Oral sucrose is an effective adjunct for pain relief¹⁵ and should be considered safe, although no published study has examined this issue. Concerns about methemoglobinemia and prilocaine sensitivity and²⁸ its inferiority to DPNB³¹ and long application time for effectiveness have limited the use of EMLA. Recent reports,^{11,13} however, have demonstrated an excellent safety record in small numbers of patients.

Of physicians surveyed, 44% do not use anesthesia

because they feel the procedure does not warrant its use. Multiple papers have detailed the capability of neonates to experience pain¹⁻⁴ and its psychological and physiologic effects.³⁻⁶ Newborns should not be denied pain relief based on their physicians' ignorance of this literature. Advocates for infants and children need to support educating practitioners about the importance of anesthesia for all neonatal surgical procedures.

A total of 23% do not use pain control because "the infants will not remember" the painful experience. A recent study in Canada demonstrated that infants undergoing circumcision without anesthesia had exaggerated stress responses to their infant immunizations months later compared with infants who did not undergo circumcision,²⁰ and that furthermore, infants who had anesthesia for their circumcision had an attenuated pain response to their vaccinations.²¹ Boys who have had anesthesia certainly are better at feeding, quieting themselves, and responding to stimuli than are their counterparts who were not given the benefit of pain relief.³²

"Not familiar with technique" was the reason given by 18% of the circumcisers. The DPNB technique has been described since 1978 in multiple papers.^{25,33-35} The technique is very similar to a digital block used in finger trauma and is easily taught to established practitioners^{5,36} as well as to residents.²³ When used in conjunction with DPNB, a more comfortable restraint chair and oral sucrose was found recently to decrease the distress of the circumcision.¹⁵

Nearly 10% cited "adding too much time" for not using anesthesia. In practice, DPNB adds only 1 to 2 minutes, and the waiting time of 3 to 5 minutes for the anesthetic effect can be well used for preparing the instruments and surgical field or performing a discharge examination. The topical agents pose more

of a timing issue, because they need to be applied 60 to 90 minutes in advance for maximum effect, which may pose technical problems in a busy nursery setting.

In summary, reasons given for not using anesthesia have been answered by research and experience. Thus, there is no reason for these myths to be perpetuated to the detriment of these infant boys. As stated in 1988,⁵ if regulations require all animals involved in research surgery to be anesthetized, are we not morally obligated to provide the same care for infant humans?

The study also documents that a larger percentage of PEDs use anesthesia than FPs or OBs. This may be a result of the large amount of data on neonatal pain relief present in the pediatric literature. Providing instruction on correct circumcision and anesthetic technique, as well as the need for pain relief, should be stressed in training programs for all three specialties.³⁷

In this dataset, 58%, 36%, and 5% of the practitioners who circumcise >10 infants per month were OBs, PEDs, FPs, respectively. Thus, because three quarters of OBs do not use anesthesia, there is a large number of infants who do not get anesthesia.

There are limitations to survey data. They may suffer from misrepresentation or untruthful responses to questions. Questions may reflect the surveyors' bias. Respondents may represent a biased rather than a representative sample.

This survey was mailed to physicians from a database identifying those who deliver babies or who are known to care for newborn infants. The survey did not address all practitioners of circumcisions, such as urologists, surgeons, and mohels (a Jewish ritual circumciser), but was directed to the groups performing most of the newborn circumcisions in a medical setting. The questionnaire was constructed to allow quick, multiple-choice answers while allowing elaboration by those who desired. This design was selected to minimize surveyor bias.

Although the response rate of 58% of mailed surveys is somewhat low, we believe that with the large number of participants in the survey, it is likely to give a reasonable representation of how newborn circumcision is being practiced in this country.

In conclusion, a substantial number of PEDs are now performing circumcisions. They are the specialty most likely to use anesthesia, followed by FPs, then OBs. With recent recognition of the importance of pain reduction in neonatal procedures and the lack of substantiated contraindications to newborn anesthetic use, additional education of current practitioners, residents, and parents is required to increase the use of anesthesia for circumcision.

ACKNOWLEDGMENTS

We thank the American Academy of Pediatrics Research in Pediatrics Practice Fund and the Group Health Foundation for financial support; Ross Laboratories Nutritional Division for providing mailing labels; Cheri Rolnick, PhD, and Mary Kelley for their help with the questionnaire development, data compilation, and statistical analysis; and Susie Fruncillo for her expertise in the manuscript preparation.

REFERENCES

1. Anand KJS, Hickey RP. Pain and its effect in the human neonate and fetus. *N Engl J Med*. 1987;317:1321-1329
2. Gunnar MR, Fisch RO, Korsvik S, et al. The effects of circumcision on serum cortisol and behavior. *Psychoneuroendocrinology*. 1981;6:269-275
3. Marshall RE, Stratton WC, Moore JA, et al. Circumcision. Effects on newborn behavior. *Infant Behav Dev*. 1980;3:1-14
4. Marshall RE, Porter FL, Rogers AG, et al. Circumcision. Effects upon mother-infant interaction. *Early Hum Dev*. 1982;7:367-374
5. Stang HJ, Gunnar MR, Snellman LW, et al. Local anesthesia for neonatal circumcision: effects on distress and cortisol response. *JAMA*. 1988;259:1507-1511
6. Porter FL, Miller RH, Marshall RE. Neonatal pain cries: effect of circumcision on acoustic features and perceived urgency. *Child Dev*. 1986;57:790-802
7. American Academy of Pediatrics, Committee on Fetus and Newborn and Committee on Drugs. Neonatal anesthesia. *Pediatrics*. 1987;80:446
8. American Academy of Pediatrics. Report of the Task Force on Circumcision. *Pediatrics*. 1989;84:388-391
9. Fontaine P, Dittberner D, Scheltema KE. The safety of dorsal penile nerve block for neonatal circumcision. *J Fam Pract*. 1994;39:243-248
10. Snellman LW, Stang HJ. Prospective evaluation of complications of dorsal penile nerve block for neonatal circumcision. *Pediatrics*. 1995;95:705-708
11. Taddio A, Stevens B, Craig K, et al. Efficacy and safety of lidocaine-prilocaine cream for pain during circumcision. *N Engl J Med*. 1997;336:1197
12. Benini F, Johnston CC, Faucher D, Aranda JV. Topical anesthesia during circumcision in newborn infants. *JAMA*. 1993;270:850-853
13. Law RMT, Hapern S, Martins RF, et al. Measurement of methemoglobin after EMLA analgesia for newborn circumcision. *Biol Neonate*. 1996;70:213-217
14. Blass EM, Hoffmeyer LB. Sucrose as an analgesic for newborn infants. *Pediatrics*. 1991;87:215-218
15. Stang HJ, Snellman LW, Condon LM, et al. Beyond dorsal penile nerve block: a more humane circumcision. *Pediatrics*. 1997;100(2). URL: <http://www.pediatrics.org/cgi/content/full/100/2/e3>
16. Weatherstone KB, Rasmussen LB, Erenberg A, et al. Safety and efficacy of a topical anesthetic for neonatal circumcision. *Pediatrics*. 1993;92:710-714
17. Toffler WL, Sinclair AE, White KA. Dorsal penile nerve block during newborn circumcision: underutilization of a proven technique? *J Am Board Fam Pract*. 1990;3:171-174
18. Wellington N, Rieder MJ. Attitudes and practices regarding analgesia for newborn circumcision. *Pediatrics*. 1993;92:541-543
19. Grossman E, Posner NA. Surgical circumcision of neonates: a history of its development. *Obstet Gynecol*. 1981;58:241-246
20. Taddio A, Goldbach M, Ipp M, et al. Effect of neonatal circumcision on pain responses during vaccination in boys. *Lancet*. 1995;345:291-292
21. Taddio A, Katz J, Ilersich AL, Koren G. Effect of neonatal circumcision on pain response during subsequent routine vaccination. *Lancet*. 1997;349:599-603
22. Ryan CA, Finer NN. Changing attitudes and practices regarding local analgesia for newborn circumcision. *Pediatrics*. 1994;94:230-233
23. Fontaine P. Local anesthesia for neonatal circumcisions: are family practice residents likely to use it? *Fam Med*. 1990;22:371-375
24. Ambulatory Pediatric Association. Health supervision. In: Kittredge D, APA Education Committee, Bar-on M, eds. *Educational Guidelines for Residency Training in General Pediatrics*. McLean, VA: Ambulatory Pediatric Association; 1996:73-132
25. Kirya C, Werthmann MW Jr. Neonatal circumcision and penile dorsal nerve block—a painless procedure. *J Pediatr*. 1978;92:998-1000
26. Snellman LW, Stang HJ, Wilson L. Impact of neonatal circumcision with local anesthesia on brainstem auditory responses. *Am J Dis Child*. 1992;146:506
27. Holve RL, Bromberger PJ, Groveman HD, et al. Regional anesthesia during newborn circumcision: effect on infant pain response. *Clin Pediatr Phila*. 1983;22:813-818
28. Mandel S. Methemoglobinemia following neonatal circumcision. *JAMA*. 1989;261:702. Letter
29. Behrens R, Pontus SP. A complication associated with dorsal penile nerve block. *Reg Anesth*. 1990;15:309-310
30. Howard CR, Howard FM, Weitzman ML. Acetaminophen analgesia in neonatal circumcision: the effect on pain. *Pediatrics*. 1994;93:641-646
31. Guillet R, Butler-O'Hara M. Efficacy of anesthesia during neonatal

- circumcision. *Pediatr Res.* 1997;41:152A
32. Dixon S, Snyder J, Holve R, Bromberger P. Behavioral effects of circumcision with and without anesthesia. *J Dev Behav Pediatr.* 1984;5:246–250
 33. Fontaine P, Toffler WL. Dorsal penile nerve block for newborn circumcision. *Am Fam Pract.* 1991;43:1327–1333
 34. Pelosi MA, Apuzzio J. Making circumcision a painless event. *Contemp Pediatr.* 1985;85–88
 35. Poma PA. Painless neonatal circumcision. *Int J Gynaecol Obstet.* 1980;18:308–309
 36. Ferguson KJ, Caplan RM, Williamson PS. Factors associated with behavior change in family physicians after CME presentations. *J Med Educ.* 1984;59:662–666
 37. Kelley C, Edmonson B, Pascoe JM. Pediatric residency training in the normal newborn nursery. *Arch Pediatr Adolesc Med.* 1997;151:511–514

Circumcision Practice Patterns in the United States

Howard J. Stang and Leonard W. Snellman

Pediatrics 1998;101:e5

DOI: 10.1542/peds.101.6.e5

Updated Information & Services

including high resolution figures, can be found at:
<http://pediatrics.aappublications.org/content/101/6/e5>

References

This article cites 34 articles, 8 of which you can access for free at:
<http://pediatrics.aappublications.org/content/101/6/e5#BIBL>

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):
Fetus/Newborn Infant
http://www.aappublications.org/cgi/collection/fetus:newborn_infant_sub
Circumcision
http://www.aappublications.org/cgi/collection/circumcision_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®



PEDIATRICS[®]

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Circumcision Practice Patterns in the United States

Howard J. Stang and Leonard W. Snellman

Pediatrics 1998;101:e5

DOI: 10.1542/peds.101.6.e5

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/101/6/e5>

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 345 Park Avenue, Itasca, Illinois, 60143. Copyright © 1998 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN[®]

