

# Pediatricians Increase Knowledge of Neonatal Circumcision Using [www.neocirc.org](http://www.neocirc.org)

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## Abstract:

**Objectives:** Neonatal circumcision is a common practice. We believe that adverse neonatal circumcision outcomes (ANCOs) may occur owing to a lack of standardized knowledge of circumcision. The goal of this study was to determine if a single tool could provide multiple specialties with increased knowledge of neonatal circumcision.

**Methods:** The authors used insight from multidisciplinary circumcision providers to build the educational model. It was made available online, and a user survey assessed its usefulness. Knowledge of pediatricians in a teaching hospital was assessed before and after using [www.neocirc.org](http://www.neocirc.org), and the scores were compared using a paired t-test.

**Results:** [www.neocirc.org](http://www.neocirc.org) was found to be 95% useful by multidisciplinary users. Pediatricians significantly increased knowledge after using [www.neocirc.org](http://www.neocirc.org) from intake correct answers (18/30, 60%) to exit (23/30, 77%), respectively ( $p < 0.0001$ ).

**Conclusion:** [www.neocirc.org](http://www.neocirc.org) provides a tool to increase pediatrician knowledge about neonatal circumcision. Future research is indicated to assess if the use of [www.neocirc.org](http://www.neocirc.org) may reduce the incidence of ANCOs.

**“Neonatal circumcision is one of the most common procedures in pediatric patients. It is routinely performed by pediatricians, family physicians, obstetricians, and urologists. Adverse neonatal circumcision outcomes (ANCOs) may follow and affect approximately 52000 newborn males each year in the US. (1,5)”**

## Introduction:

Neonatal circumcision is one of the most common procedures in pediatric patients. It is routinely performed by pediatricians, family physicians, obstetricians, and urologists. Adverse neonatal circumcision outcomes (ANCOs) may follow and affect approximately 52000 newborn males each year in the US. (1,5) The American Academy of Pediatrics Task Force on Circumcision charged key organizations (such as the American Academy of Pediatrics, American College of Obstetrics and Gynecology, American Academy of Family Physicians) to collaboratively develop standards of training proficiency in performing circumcision and provide education for the care of circumcised newborn males. (2) However, there has not yet been a systematic effort to standardize the procedure training for providers or home-care for parents resulting in reduced ANCO incidence. The responsibilities of primary

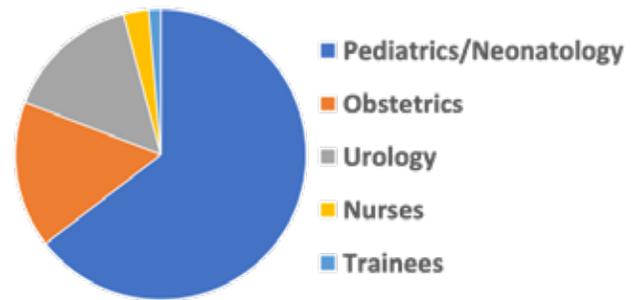


Figure 1. Logins after launch by specialty (n=332).

care physicians and obstetricians in the newborn nursery often include judging suitability for circumcision, performing circumcision, and providing education on care after circumcision to parents. However, it is unusual that primary care residency programs have standardized instruction for these domains. (3) The majority of home-care instruction is frequently provided to families by nursing staff, which varies significantly among providers and hospitals. Because we believe ANCOs largely result from conflicting knowledge regarding newborn circumcision across multiple specialties, we created an online tool to promote consistency in knowledge across specialties. Herein we present the model creation process and the results.

**“The model presents knowledge interactively as a single method that is applicable to diverse clamp types and circumcision experiences. The model encompasses three domains: before, at, and after circumcision.”**

## Methods:

The model was built based upon insights from circumcision providers (n=46): Pediatrics/Neonatology (24), Obstetrics (14), and Pediatric Urology (8) that were collected during real-time focus groups and by survey data. These insights were then compiled along with the authors' opinions to provide the framework for the content build of the model. The model presents knowledge interactively as a single method that is applicable to diverse clamp types and circumcision experiences. The model encompasses three domains: before, at, and after circumcision. Before circumcision, the model provides a standardized assessment for medical and anatomical clearance for circumcision, referenced as picture match (Figure 4a). At the circumcision table, the model demonstrates a standardized procedure, referenced as NeoCircles (Figure 4b). After circumcision, it provides consistent home-care instructions, referenced as penis skin shaft physical therapy (PSSPT) (Figure 4c). The model was made available online at [www.neocirc.org](http://www.neocirc.org). The model's usefulness was assessed using an embedded survey tool (Likert scale).

The circumcision knowledge gained among pediatric hospitalists and trainees was tested at one author's (CS) hospital, Advocate Children's Hospital in Park Ridge, IL. The subjects included pe-

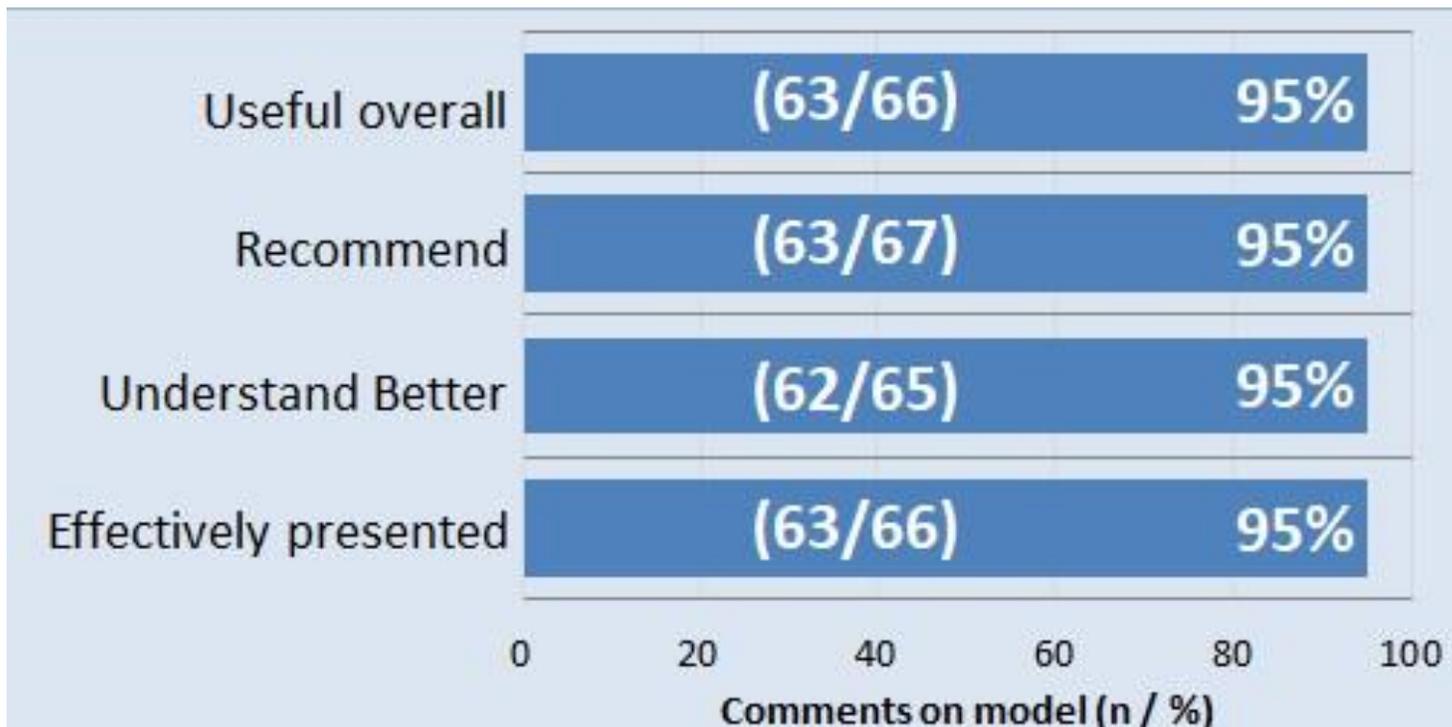


Figure 2. Survey data shows the model is useful at 95% of comments.

diatric physicians and trainees in a teaching hospital, and knowledge of circumcision was tested before and after access to the model. The intake and exit test scores were then compared using a paired t-test.

**Results:**

Focus groups reviews of [www.neocirc.org](http://www.neocirc.org) indicated the model content as “very valuable” for the three domains: before (19/19),

at (22/31), and after circumcision (21/27). For example, before circumcision, there were 19/19 comments which indicated the picture match method to assess suitability was “very valuable.” A total of 19/27 (70%) comments showed that at circumcision, “how to mark the circumcision site,” using the standardized method of NeoCircles was “very useful.” Furthermore, the model content on home care provided as PSSPT was “very useful” in 21/27 (78%) comments.

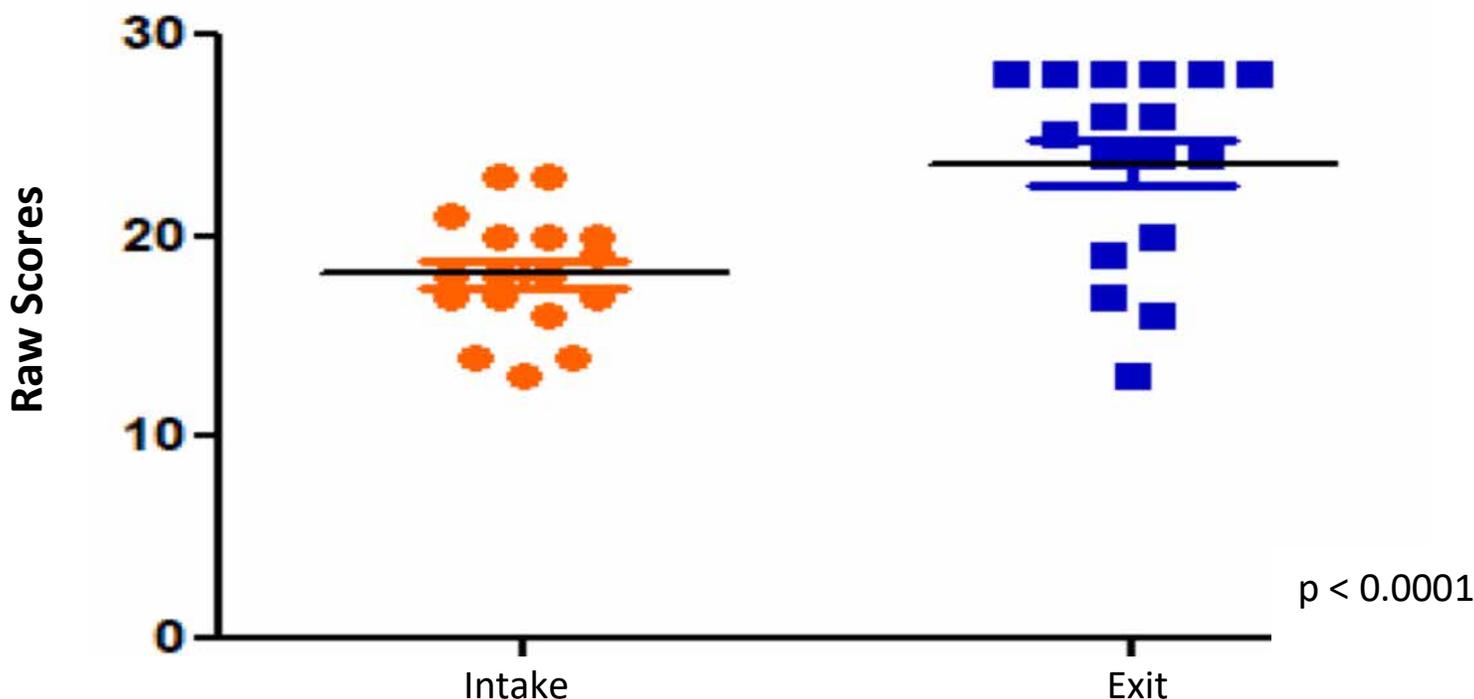


Figure 3. Physician staff knowledge to correctly answer 30 questions increased significantly after access to the [www.neocirc.org](http://www.neocirc.org) model ( $p < 0.0001$ ).



Figure 4A. NeoCirc.org presents innovative methods for the process of circumcision. Method of “Picture Match” to judging suitability for circumcision. All views require a “yes” for circumcision planned to be suitable.

The focus group comments were assimilated into content creation and the authors’ personal views. We used word of mouth to launch the model. This resulted in 332 users who logged in from diverse specialties (Figure 1). The majority of users (65%) were pediatricians/neonatologists, followed by (16%) obstetricians, (15%) urologists, (3%) nurses, and (1%) trainees from several different practices and hospitals.

The time intervals that subjects accessed the learning before completing the exit survey were: less than 30 minutes (n=27), 30 min to 1 hour (n=67), 1-2 hours (n=15), greater than or equal to 2 hours (n=2). This data shows the majority (94/111, 85%) of subjects completed learning sufficient enough for them to access the exit survey within 1 hour of learning.

**“This data shows the majority (94/111, 85%) of subjects completed learning sufficient enough for them to access the exit survey within 1 hour of learning.”**

The www.neocirc.org model was found to be 95% useful by the 66 users who completed the survey (Figure 2). The survey data demonstrated that users gained a “better understanding of neonatal circumcision,” that the model provided “effective presentation of knowledge,” and that users “would recommend www.neocirc.org to a colleague.” A sample user comment on suitability was, “Thanks to your valuable advice, I [learned] that mild [glanular] hypospadias as long as it is located distal to corona, is not contraindicated for circumcision....”

There was strong overall subjective agreement on the model’s usefulness for the 111 responses as follows. The survey responses showed the model was effective: strongly agree (n=54), agree (n=50), neutral (n=5), and disagree (n=2); and survey responses showed the model provided significantly better knowledge: strongly agree (n=54), agree (n=48), neutral (n=8), and disagree (n=1). For this research, we define effective as “useful and increases circumcision knowledge.”

Effectiveness in increasing knowledge was tested prospectively at

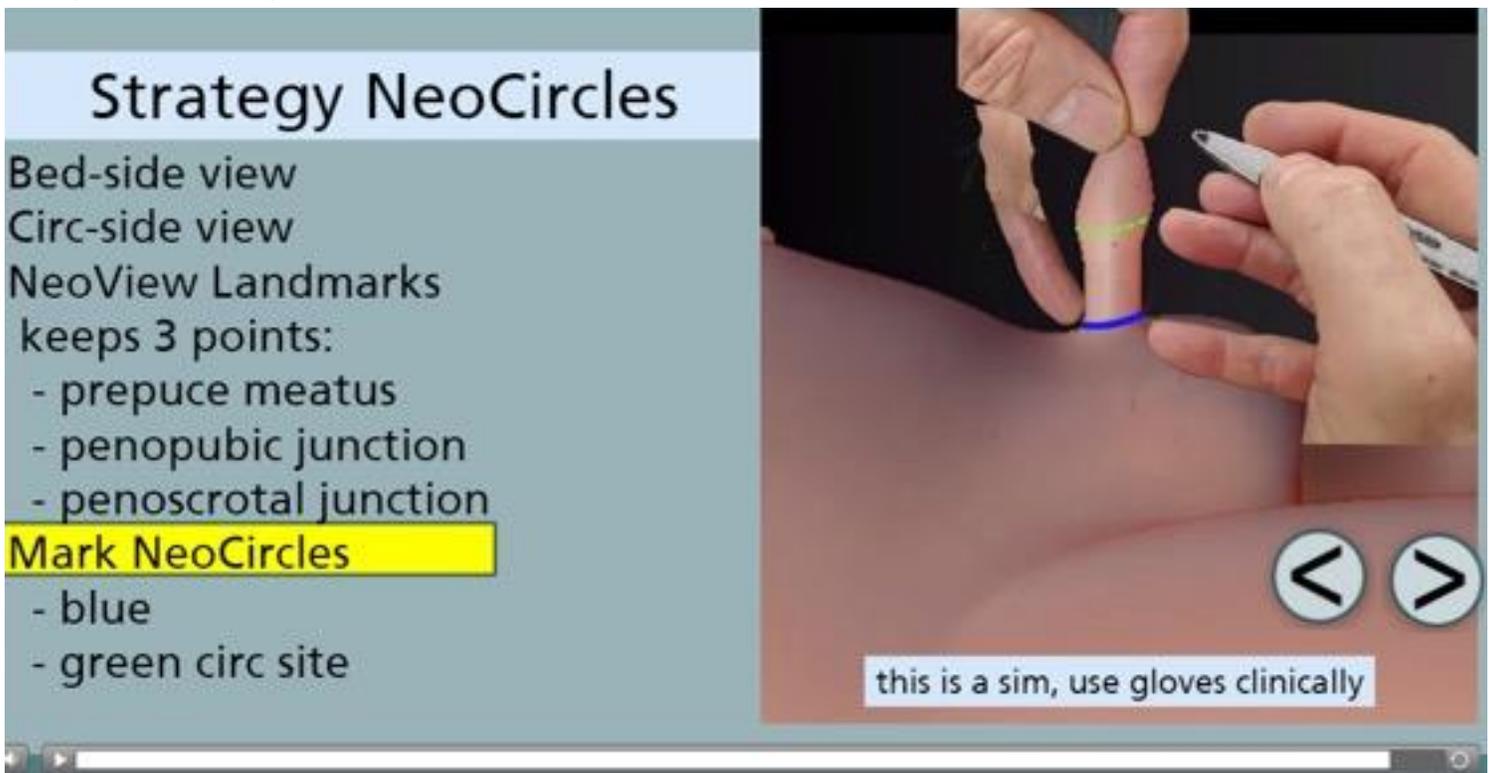


Figure 4B. NeoCircles (blue and green lines) are the markings of a standardized method for circumcision incision. The blue line identifies the penopubic crease at the base of the penis and guides marking the skin just distal to the glans corona in parallel orientation. The green line marks the circumcision incision site.



Learn before discharge either – here after circ

*Figure 4C. Penis Shaft Skin Physical Therapy (PSSPT) is taught to parents before discharge, preferably before circumcision. This method works to keep shaft skin below the glans and promote healing.*

an academic hospital among pediatric hospitalist attendings and trainees (Figure 3). A total of 30 pediatricians completed an intake knowledge test (30 questions) and then accessed the [www.neocirc.org](http://www.neocirc.org) model for online education. A total of 15 (50%) also completed the same test on exit. Comparison of intake and exit test scores showed a significant increase in knowledge after access to [www.neocirc.org](http://www.neocirc.org) from intake correct answers (18/30, 60%) to exit (23/30, 77%), respectively ( $p < 0.0001$ ).

***“We have shown that the online tool created significantly improves newborn circumcision practices among pediatricians, and survey data shows it was effective and valuable (95%) across multiple specialties.”***

#### Discussion:

We have shown that the online tool created significantly improves newborn circumcision practices among pediatricians, and survey data shows it was effective and valuable (95%) across multiple specialties. Insights from focus groups revealed that about 70% of circumcision providers desire more information on objective landmarks to place the circumcision incision planned; [www.neocirc.org](http://www.neocirc.org) content on such placement, presented as NeoCircles, was regarded as very valuable (70%).

In our opinion, determining suitability for circumcision and defining medical clearance is currently not clearly defined or standardized and varies greatly among primary care physicians and obstetricians, preventing clamp circumcision from being the safe and consistently performed procedure that it can and should be. As we have shown that all 19 responses on judging suitability using the picture match method as being “very valuable,” we believe such an objective method will reduce the likelihood of misjudging suitability for circumcision and subsequent performance of clamp circumcision when it is contraindicated (i.e., in cases of hypospadias, penile torsion, or chordee). This selection process is expected to reduce ANCOs that require surgical repair. (4)

Furthermore, while practices on home care were not explicitly tested, focus group data showed about 80% of subjects regarded the home care of PSSPT as “very useful.” From such results, we believe that the provision of consistent home care education will lead to a reduction in ANCOs as penile adhesions and skin bands. Similarly, as the [www.neocirc.org](http://www.neocirc.org) method to mark the circumcision site is objective, we believe the application of this method will promote consistency in placement of incision at circumcision and that an ample amount of foreskin is excised as to provide a satisfying cosmetic result.

We showed a significant gain in knowledge among pediatric hospitalists and trainees using [www.neocirc.org](http://www.neocirc.org) (i.e., average intake score of 60% vs. average exit score of 77%). A total of 30 study subjects completed the intake test, and 50% completed the exit testing is likely the result of the voluntary nature of the subjects’ participation. Feedback from the surveys supports the view that the model was an appropriate duration and useful, and participants did not see it as a significant time burden.

During the launch of the educational model at the academic hospital, other aspects of multidisciplinary neonatal care related to circumcision were improved. At this institution, neonatal providers are asked to provide medical and/or anatomical clearance for surgical colleagues who perform the circumcision, but medical clearance has been poorly defined. Using a standardized model for medical and anatomical clearance during this study contributed to developing better-defined guidelines for clearance for circumcision among obstetricians, neonatologists, and pediatricians at the hospital. This demonstrates the potential for [www.neocirc.org](http://www.neocirc.org) to also improve hospital-based patient care with standardized newborn nursery guidelines and policies regarding neonatal circumcision.

***“While the study captured a large majority of providers who perform circumcision, it did not capture users from all groups involved in providing newborn circumcision care, including family medicine physicians and mid-level providers.”***

While the study captured a large majority of providers who perform circumcision, it did not capture users from all groups involved in providing newborn circumcision care, including family medicine physicians and mid-level providers. This was likely due to the hospital staffing models, with hospital-based pediatricians providing the majority of newborn care at the sites involved. This is not believed to impact the 95% usefulness rating among multiple specialty providers.

#### Conclusion:

In conclusion, [www.neocirc.org](http://www.neocirc.org) is an effective and useful learning tool that provides a model to increase knowledge about neonatal circumcision in pediatrics. We believe this tool will also benefit other specialties. This research does not probe the arena of circumcision success or if using [www.neocirc.org](http://www.neocirc.org) may reduce the incidence of ANCOs, but we expect to do so in future research.

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### Author Contributions

Drs. Max Maizels, Walid A. Farhat, Edwin A. Smith, and Emily S. Blum were responsible for designing the learning module, designing the study, analyzing the data, interpreting results, and writing the manuscript.

Dr. Chloe Salzmann was responsible for designing the study, data collection, interpretation of results, and writing the manuscript.

Dr. Paola Fliman and Dr. Elizabeth Goetz provided a critical review of the online content and reviewed and revised the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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