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JGH
The Journal of Global Health | Columbia University

# Postoperative Pain in Pediatric Male Circumcision Patients in Swaziland

**David J. Dennis, MD**[1], **Echo VanderWal, PA**[2], **Harry VanderWal, MD**[1,2] , **Alan P. Marco, MD, MMM, FACPE**[1], **Mary C. McCarthy, MD, FACS**[1]

[1]Boonshoft School of Medicine, Wright State University, 3640 Colonel Glenn Hwy. Dayton, OH 45434
[2]The Luke Commission, Miracle Campus, Box 41, Sidvokodvo, Swaziland

## Abstract

Swaziland has the highest prevalence of HIV in the world, affecting more than 25% of the population[1,2,3] A highly effective method to reduce transmission of HIV is voluntary medical male circumcision (VMMC). One provider of VMMC in Swaziland is The Luke Commission (TLC), a non-governmental organization that operates a rural, mobile health outreach program. TLC nurses observed that postpubescent boys appeared to be in more pain following VMMC than their prepubescent counterparts. This study was completed with the aid of The Luke Commission during three of their clinics in June and July of 2014.

This study examined the self-reported pain scores of children undergoing VMMC during three separate clinic days using the *Wong-Baker Faces Pain Scale*, a 1-10 pain scale where the user chooses their current level of pain based on the emotion expressed on pictures of faces. A rating of 0 is associated with a smiling face, whereas a rating of 10 is associated with a crying face.

Pain level was assessed preoperatively, 15 minutes postoperatively, postoperative day 2 and postoperative day seven, following with standard TLC postoperative follow—up protocol. Average pain scores were assessed between prepubescent and postpubescent groups. The prepubescent group consisted of all patients 10 years of age or younger (average age 8.3 years), while the postpubescent group included all participants 11-18 years (average age 12.4 years); 112 subjects participated in the study with an average age of 10.6 ± 2.5 years. [WA1] [KL2]. (Please see table one for further breakdown of groups) No significant differences in self-reported pain scores were found at any point between prepubescent and postpubescent children undergoing VMMC in Swaziland. The differences between the observed degree of pain and self-reported pain scores could be due to several reasons, including observer bias, age group stratification, small study population or inconsistent patient follow-up.

## INTRODUCTION

Swaziland has the highest prevalence of HIV in the world, affecting more than 25% of the population and occurring in up to 42% of pregnant women, per the Swaziland Demographic and Health Survey.[1,2,3] Prevalence peaks for women at 54% at ages 30-34 and for men at 47% at ages 35-39. Risk of acquiring a new HIV infection was found to be higher among , women who are not married or live alone, those unaware of their partner's HIV status, those inconsistent condom use and having two or more sexual partners in the past year.[4] A population disaster of this magnitude must be managed with a multifaceted approach, including public awareness and education, access to effective medication

treatment and reduced transmission. One method found to be particularly effective for reducing the transmission of HIV is voluntary medical male circumcision (VMMC). VMMC has been found to reduce male acquisition of HIV by 38-66% and reduce male-to-female HIV transmission by 46%. It has become one of the core components of the U.S. President's Emergency Plan for AIDS Relief in Southern Africa .[5,6,7]

A current focus of discussion in the country is the recommended age for VMMC. Neonatal circumcision has a lower complication rate, is more affordable and has some additional medical benefits including lower rates of urinary tract infection, balanitis and phimosis.[8]However, it is not widely practiced in Swaziland for a variety of reasons, including fear of complications or pain and lack of access to medical care.[9] Neonatal circumcision (also known as early infant male circumcision) also reduces HIV transmission and is emphasized as a target population in Government of the Kingdom of Swaziland *Policy on Safe Male Circumcision for HIV Prevention,* but this study did not examine infants under the age of four.[3] Swaziland has low circumcision rates for all ages at 16% of the male population.[4] The Government of the Kingdom of Swaziland *Policy on Safe Male Circumcision for HIV Prevention* currently recommends VMMC in Swaziland for neonates and in men 15-24 years of age.[3] These recommendations were based off recent studies demonstrating the benefit of VMMC and subsequent guidelines released by the World Health Organization and UNAIDS.[3] Targeting this age group was found to maximize public health benefit by targeting the groups with the largest incidence and optimizing cost-effectiveness .[11] Statistical analysis showed that targeting the ages of 15-34 had the lowest cost per HIV infection averted at 15-years than targeting other age groups including the 10-14 year-olds.[11]

The Luke Commission (TLC) is a non-governmental organization that operates a rural mobile health outreach program in Swaziland. TLC operates clinics several days a week and travels to remote locations throughout Swaziland to provide medical services to those who would otherwise not have access to medical care. Services provided by TLC include blood pressure and glucose screening, tuberculosis screening, visits with a physician, medication dispensary, providing glasses, distributing shoes and voluntary medical male circumcision. The Luke Commission performed 2,201 VMMCs in 2014, 2,170 VMMCs in 2015, and 3,268 in 2016.[12] VMMC is defined by the World Health Organization as "surgical removal of the foreskin – the retractable fold of tissue that covers the head of the penis."[10] All boys who can cooperate with the procedure, typically $\geq$ age 4, with the majority being in their teens or younger, are considered for circumcision.

Workers from TLC observed that younger, prepubescent children appeared to be in less pain following VMMC than their older, postpubescent counterparts. Some of the anecdotal observations included that older, postpubescent children seemed to display signs of discomfort after the procedure such as crying and grimacing more often than younger children. Postoperatively prepubescent children also seemed to sit more calmly in their seats while the older children would squirm and appear uncomfortable.

The goal of this study was to determine if self-reported pain scores were consistent with this observation by using a validated scale to assess pain. If there is a significant reduction in pain in younger patients, then this may help to provide support for lowering the recommended target age of VMMC and reaching more children before they become sexually active and potentially exposed to HIV.

## METHODS

After Wright State University IRB approval, all males that elected to undergo VMMC during three separate TLC clinic days located in Mahlabaneni, Mabondvweni, and Lushikishini Swaziland, with associated follow-up at postoperative days two and seven, in June and July of 2014 were assessed for pain using the *Wong-Baker Faces Pain Scale*, using a zero through ten scale. The Baker Faces Pain Scale is a common self-reported pain scale used in a variety of pediatric settings such as emergency departments following accidents and following operations, in which the user chooses the face associated with their current level of pain. A rating of 0 is associated with a smiling face, whereas a rating of 10 is associated with a crying face. The *Wong-Baker Faces Pain Scale* and other similar scales have demonstrated validity in the pediatric setting in similar areas and languages in Africa including in

neighboring South Africa and when used in Swahili, a language closely related to the Swazi spoken in Swaziland.[13,14,15,16]

Preoperatively, the use of the scale was explained by a Swazi translator, and the patients were assessed for their current pain level. Their pain level was then assessed in the postoperative room 15 minutes after the procedure and during surgical follow-up at two and seven days postoperatively. These times were chosen because TLC returns to previous clinic sites on postoperative day two and seven for post-surgical follow-up, and these patient visits were utilized to assess for pain in this study.

Per standard TLC protocol, pain was controlled preoperatively by administration of one paracetamol/codeine tablet (500/20mg) for patients greater than 30kg, and half a tablet for patients less than 30kg. A right and left dorsal penile nerve and ring block was performed with a mixture of 8mL 1% lignocaine HCl: 2mL 0.5% bupivacaine HCl. Three mL of the anesthetic was used for both dorsal penile nerve blocks and for the ring block. The patients then underwent a forceps-guided circumcision. Following the procedure, ten 500/20mg paracetamol/codeine tablets were provided for the children who were instructed to take one in the morning and one in the evening, as needed for pain. .

## RESULTS

A total of 112 subjects participated. The parent(s) of all patients consented to study participation; those over the age of 18 (4 patients) were excluded from analysis. The patients excluded were aged 19, 22, 25, and 34. These four patients were excluded since this study was examining pain ratings in pediatric patients and adulthood is typically considered to start at age 18, as well as to prevent outlying data from several much older patients confounding the results. The patients were grouped by age using the average onset of puberty for boys in the region, which starts during the tenth year, and the average reported pain level was recorded for each group (Table 1).[17] The prepubescent group was considered age 10 and younger with an average age of 8.3 years. The postpubescent group included all participants aged 11 to 18 year with an average age of 12.4 years. Participant ages ranged from 4 to 16 years with an average age of 10.6 ± 2.5 years. A further breakdown of groups can be seen in table 1. No 17- or 18-year-old patients underwent VMMC during the time of this study. Statistical comparisons were done with the independent samples Mann-Whitney Test.

| | Age | N | Mean±SD | p-Value | Mean Difference Between Groups | 95% CI of Difference Between Groups |
|---|---|---|---|---|---|---|
| **Preoperative** | Prepubescent | 36 | 0.44±1.08 | 0.64 | -0.065 | -0.695–0.565 |
| | Post-pubescent | 55 | 0.55±1.69 | | | |
| **Postoperative** | Prepubescent | 46 | 1.91±2.56 | 0.54 | -0.051 | -0.976–0.875 |
| | Post-pubescent | 55 | 1.96±2.13 | | | |
| **Day 2 Follow-Up** | Prepubescent | 29 | 2.90±3.41 | 0.55 | 0.799 | -0.675–2.27 |
| | Post-pubescent | 41 | 2.10±2.36 | | | |
| **Day 7 Follow-Up** | Prepubescent | 43 | 0.84±1.17 | 0.77 | 0.004 | -0.501–0.509 |
| | Post-pubescent | 60 | 0.83±1.34 | | | |

Table 1. Mean + SD Wong-Baker Faces pain scores for pre and postpubescent boys undergoing circumcision.

## DISCUSSION

The reported pain levels peaked in both groups on the second follow-up day at 2.90±3.41 for the prepubescent group and 2.10±2.36 for the post-pubescent group. This is when the highest pain levels would be expected due to the lack of anesthetic prior to this evaluation, the removal of the bandage and increased inflammation. Pain levels trended with *The Faces Scales* during the postoperative course as would be expected, increasing at postoperative day two and decreasing at postoperative day seven.

However, there were no statistically significant differences between the pre- and postpubescent study groups at any time ($p > 0.05$ at all time points).

Many factors could account for the discrepancies between observation and self-reported pain scores. It is possible adults may expect teenagers to be more stoic and therefore interpret similar signs of pain as being more severe in the adolescent group. Another possible cause could be that severe pain in adolescents who had complications such as phimosis (stricture causing foreskin to not be retractable) or dehiscence (wound rupture along surgical incision) skewed the observers' perception as a form of negativity bias, in that seeing a few older patients in severe pain may have caused the observers believe older patients were in more pain in general.

The lack of differences between groups may also be due to limitations in study design. The age groups may be stratified incorrectly to see a difference. Starting the postpubescent group at 11 years may be too young. Many 11-year-olds will have begun puberty, but not fully completed it. Not completing puberty may also result in lower scoring of self-reported pain in this group. It is also possible that breaking down age groups into one-to-two-year ranges would provide more accurate estimates of pain by age. It may also be worthwhile to evaluate whether the decision to undergo VMMC was primarily the choice of the child or parent, and whether this correlates to self-reported pain scores.

Patients lost to follow-up may affect the results. The study being discussed took place in rural Swaziland where some patients did not return to every follow-up visit and had limited access to phones or other means of communication. This lack of access made data collection at all four time points for every patient difficult if patients did not return to follow-up. Patient return discrepancies may skew results because certain patients may be less likely to return, such as those without significant pain or discomfort.

Further studies may help elucidate the discrepancy between observers' impressions and self-reported pain. Some possible areas of further study could include assessing pain by Tanner stage rather than age. Tanner stages are a scale system that categorizes pubertal growth through secondary sexual characteristics such as testicular volume and the development of pubertal hair. Tanner stages would be a more accurate measure of pubertal stage than age alone, since patients at a given age may represent multiple stages of pubertal growth. A study comparing self-reported pain score versus observer pain score may also be helpful to determine if there is significant observer bias occurring or under scoring by patients in more severe pain.

## CONCLUSION

There is no statistical difference in self-reported pain scores between prepubescent and post-pubescent children following voluntary medical male circumcision at any of the times evaluated (preoperatively, 15-minutes post-operatively, postoperative day two, and postoperative day seven). Based on these results, there is no basis for lowering recommended ages for VMMC due to pain alone. However, completion of the procedure prior to puberty has other benefits in reducing the risk of HIV prior to sexual experience and possible reduction in complications due to penile engorgement in the acute postoperative period.

## ACKNOWLEDGMENT

The authors would like to acknowledge the statistical assistance of Dr. Ron Markert, and the assistance of the TLC Staff in providing validated data through the circumcision registry.

**Conflicts of Interest:** None
**Funding:** None
**Ethical Approval:** Wright State University IRB

## REFERENCES MAKE SURE ARE SUPERSCRIPT FOR IN-TEXT


1. Harrison, A., Colvin, C. J., Kuo, C., Swartz, A., & Lurie, M. (2015). Sustained High HIV Incidence in Young Women in Southern Africa: Social, Behavioral, and Structural Factors and Emerging Intervention Approaches. *Curr HIV/AIDS Rep Current HIV/AIDS Reports, 12*(2), 207-215.
2. CIA. The World Fact Book. HIV/AIDS - ADULT PREVALENCE RATE, https://www.cia.gov/library/publications/the-world-factbook/rankorder/2155rank.html [accessed 06.02.16]
3. Swaziland, World Health Organization. (2009). *Policy on safe male circumcision for HIV prevention*.
4. Swaziland, Ministry of Health. (2012). *Swaziland HIV Incidence Measurement Survey*. Retrieved from https://photos.state.gov/libraries/swaziland/19452/pdfs/2012_SHIMS_Cheat%20Sheet%2006%2024%202013.pdf
5. Siegfried, N., Muller, M., Deeks, J. J., & Volmink, J. (2009). Male circumcision for prevention of heterosexual acquisition of HIV in men. *Cochrane Database of Systematic Reviews Reviews*.
6. Hallett, T. B., Alsallaq, R. A., Baeten, J. M., Weiss, H., Celum, C., Gray, R., & Abu-Raddad, L. Will circumcision provide even more protection from HIV to women and men? New estimates of the population impact of circumcision interventions. *Sex Transm Infect.* 2011;87(2), 88-93.
7. Heaton, L. M., Bouey, P. D., Fu, J., Stover, J., Fowler, T. B., Lyerla, R., & Mahy, M. (2015). Estimating the impact of the US President's Emergency Plan for AIDS Relief on HIV treatment and prevention programmes in Africa. *Sex Transm Infect Sexually Transmitted Infections, 91*(8), 615-620.
8. Tobian, A. A., & Gray, R. H. (2011, October 05). The Medical Benefits of Male Circumcision. Retrieved November 26, 2017, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3684945/
9. Mapureti, P., Chola, L., & Skinner, D. (2015). Factors associated with mothers' decisions on male neonatal circumcision in Swaziland. *African Journal of AIDS Research, 14*(2), 127-135.
10. Voluntary medical male circumcision for HIV prevention. (n.d.). Retrieved November 26, 2017, from http://www.who.int/hiv/topics/malecircumcision/fact_sheet/en/
11. Kripke, K., Okello, V., Maziya, V., Benzerga, W., Mirira, M., Gold, E., . . . Njeuhmeli, E. (n.d.). Voluntary Medical Male Circumcision for HIV Prevention in Swaziland: Modeling the Impact of Age Targeting. Retrieved November 27, 2017, from http://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0156776#sec010
12. Free Comprehensive Health Services Provided in Rural Communities. (n.d.). Retrieved November 27, 2017, from https://www.lukecommission.org/Portals/6/Documents/MS%20Cumulative_FY17_FB.pdf
13. Blum, D., Selman, L. E., Agupio, G., Mashao, T., Mmoledi, K., Moll, T., . . . Harding, R. (2014). Self-report measurement of pain and symptoms in palliative care patients: A comparison of verbal, visual and hand scoring methods in Sub-Saharan Africa. *Health and Quality of Life Outcomes Health Qual Life Outcomes, 12*(1).
14. Bosenberg, A., Thomas, J., Lopez, T., Kokinsky, E., & Larsson, L. (2003). Validation of a six-graded faces scale for evaluation of postoperative pain in children. *Pediatric Anesthesia, 13*(8), 708-713.
15. Garra, G., Singer, A. J., Domingo, A., & Thode, H. C. (2013). The Wong-Baker Pain FACES Scale Measures Pain, Not Fear. *Pediatric Emergency Care, 29*(1), 17-20.
16. Huang, K. T., Owino, C., Vreeman, R. C., Hagembe, M., Njuguna, F., Strother, R., & Gramelspacher, G. P. (2012). Assessment of the face validity of two pain scales in Kenya: A validation study using cognitive interviewing. *BMC Palliative Care BMC Palliat Care, 11*(1), 5.
17. Jones, L. L., Griffiths, P. L., Norris, S. A., Pettifor, J. M., & Cameron, N. (2009). Is puberty starting earlier in urban South Africa? *American Journal of Human Biology, 21*(3), 395-397.