King's Research Portal

DOI:

[10.1016/j.jpurol.2018.11.012](https://doi.org/10.1016/j.jpurol.2018.11.012)

Document Version

Peer reviewed version

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Davidson, J. R., Ford, K., Ade-Ajayi, N., & Paul, A. (2018). Improvise, Adapt, Overcome: Mobile phone LED used as light source for cystoscopy and resection of posterior urethral valves in a low cost setting. *Journal of Pediatric Urology*. <https://doi.org/10.1016/j.jpurol.2018.11.012>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

Accepted Manuscript

Improvise, Adapt, Overcome: Mobile phone LED used as light source for cystoscopy and resection of posterior urethral valves in a low cost setting

J.R. Davidson, K. Ford, N. Ade-Ajayi, A. Paul

PII: S1477-5131(18)30681-8

DOI: <https://doi.org/10.1016/j.jpurol.2018.11.012>

Reference: JPUROL 3027

To appear in: *Journal of Pediatric Urology*

Received Date: 11 November 2018

Accepted Date: 20 November 2018

Please cite this article as: Davidson J, Ford K, Ade-Ajayi N, Paul A, Improvise, Adapt, Overcome: Mobile phone LED used as light source for cystoscopy and resection of posterior urethral valves in a low cost setting, *Journal of Pediatric Urology*, <https://doi.org/10.1016/j.jpurol.2018.11.012>.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Improvise, Adapt, Overcome: Mobile phone LED used as light source for cystoscopy and resection of posterior urethral valves in a low cost setting.

Davidson JR^{1,2}, Ford K³, Ade-Ajayi N², Paul A⁴

1. Dept of Paediatric Surgery, Stem Cells and Regenerative Medicine, GOS-UCL Institute of Child Health, London, UK
2. Dept. of Paediatric Surgery, King's College Hospital, London, UK
3. Surgical Neonates and Paediatric Surgery, Great Ormond Street Hospital for Children, London, UK
4. Department of Paediatric Urology, Great Ormond Street Hospital for Children, London, UK

Corresponding author:

Mr Joseph Davidson, Academic Clinical Fellow

Paediatric Surgery Offices, DBC

Institute of Child Health

30 Guildford Street, London

WC1N 1EH

T: +44 (0)207 905 2000

E: Joseph.davidson@doctors.org.uk

Introduction

We demonstrate the feasibility of using an improvised light source for short cystoscopic cases. In the context of an unplanned light source failure, we were able to diagnose and treat posterior urethral valves in a 1 year old boy in a low-cost setting. This case illustrates an important point that access to endoscopic cases may not necessarily depend on purpose-built technology and demonstrates a concept that may be taken further to enable care provision in low- and middle-income countries (LMICs.)

Background

During a surgical outreach mission in western Gambia, a 1 year old boy presented to the team for diagnostic cystoscopy. A term-born baby boy, he had presented in the neonatal period with urosepsis, and hydronephrosis had been demonstrated on ultrasonography. A suprapubic catheter had been inserted and subsequently removed. He now dribbled urine.

Posterior urethral valves (PUV) were thought likely but confirmatory micturating cystourethrogram (MCUG) could not be performed within the local healthcare setting. The local host institution did however have access to a functional light source, camera and laparoscopic stack. With mission planning, the visiting team had brought a cystoscope/resectoscope and plans for a diagnostic cystoscopy and resection of PUV was planned.

Surgical Procedure

Once the infant had been anaesthetised and prepared for surgery, the single remaining bulb in the light source failed; no replacement bulb or light source were available in the hospital and the surgical team considered abandoning the case.

An improvised light source was employed in this case using the LED light from an iPhone 6 in direct contact with the fibre optic cable. It is possible to increase the intensity of a mobile phone LED to more than 500 lux. This provided sufficient illumination to diagnose and resect prominent leaflets that were identified at the 5 and 7 o'clock positions.

Outcome

The patient was shown to void well at the end of the procedure and had an excellent urinary stream demonstrated on subsequent clinical review.

Discussion

This case demonstrates the possibility of improvisation in a relatively emergent context. We found that in direct contact with a high-quality fibre optic cable, a mobile phone LED clearly provides sufficient illumination for short diagnostic and even therapeutic cases. Most endoscopic light sources quote luminescence between 60,000 and 100,000 lux; but considerably lower is required for paediatric endourology procedures if direct contact is made between the source and fibre optic cable.

Portable or hand-held light sources are a technology which has been brought to market, albeit these are still in the early stages of commercialisation and

certainly have not reached our healthcare colleagues in LMICs [1,2]. This improvised light source, using readily available technology, seems to be adequate to perform simple paediatric cystoscopy in any healthcare setting.

References

- [1] Sohn W, Shreim S, Yoon R, Huynh VB, Dash A, Clayman R, et al. Endockscope: using mobile technology to create global point of service endoscopy. *J Endourol* 2013;27:1154–60. doi:10.1089/end.2013.0286.
- [2] Bae JK, Vavilin A, You JS, Kim H, Ryu SY, Jang JH, et al. Smartphone-Based Endoscope System for Advanced Point-of-Care Diagnostics: Feasibility Study. *JMIR MHealth UHealth* 2017;5:e99. doi:10.2196/mhealth.7232.

Mr Joseph R Davidson
joseph.davidson@doctors.org.uk
GOS-UCL Institute of Child Health
London