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Article

THE ACCEPTABILITY OF TELEMEDICINE IN POST-MASS CHARITY CIRCUMCISION IN INDONESIA: A PILOT STUDY

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ABSTRACT

Introduction: Charity circumcision is common in Indonesia. It is usually done by general practitioners or medical students under supervision. Procedures are often held on a mass scale and rarely followed with post-monitoring. We developed a telemedicine follow-up protocol to educate and address post-procedure complications. This pilot study evaluates the acceptability of telemedicine follow-up protocol for charity circumcision in Indonesia.
Method: Data were collected from operators and caregivers of children attending charity circumcision. The protocol consisted of text interviews (pain, urinary retention) and surgical sites' four-angle photographs (epithelialization, bleeding, infection, edema, and glans excoriation). The protocol was conducted two-way between caregivers and operators on days 1, 3, 7, and 30 after circumcision. The Ethics Committee of the Faculty of Medicine, Universitas Indonesia, has approved this study.
Result: Twenty-five boys with a mean age of 8.02±1.53 years old have similar pre-operative, operative, and postoperative protocols. Twenty-one caregivers completed four times follow-ups, one missed two times follow-ups, and three missed the last follow-up. Mild pain was the most reported complication, with 32% (8/25), 12% (3/25), 8% (2/24) incidence on days 1, 3, and 7, respectively. By the end of the follow-up, there were no persisting complications, and 80% (20/25) of boys showed complete epithelialization. All caregivers and most operators were satisfied with telemedicine for post-mass circumcision monitoring.
Conclusion: The telemedicine-based follow-up is acceptable and feasible to be applied in mass charity circumcision. This protocol is beneficial for monitoring the results and adverse events, therefore, should be routinely adopted in mass charity circumcision programs.

Keywords: *Charity; Mass; Circumcision; Telemedicine; Acceptability*

Latar Belakang: Khitanan amal merupakan hal yang lumrah di Indonesia. Biasanya dilakukan oleh dokter umum atau mahasiswa kedokteran di bawah pengawasan. Prosedur seringkali diadakan dalam skala massal dan jarang diikuti dengan pasca-pemantauan. Kami mengembangkan protokol tindak lanjut telemedicine untuk mengedukasi dan mengatasi komplikasi pasca prosedur. Studi percontohan ini mengevaluasi penerimaan protokol tindak lanjut telemedicine untuk sunat amal di Indonesia.
Metodologi: Data dikumpulkan dari operator dan pengasuh anak yang menghadiri khitanan amal. Protokolnya terdiri dari wawancara teks (nyeri, retensi urin) dan foto empat sudut lokasi bedah (epitelisasi, perdarahan, infeksi, edema, dan ekskoriasi glans). Protokol dilakukan dua arah antara caregiver dan operator pada hari ke 1, 3, 7, dan 30 setelah sunat. Komite Etik Fakultas Kedokteran Universitas Indonesia telah menyetujui penelitian ini.
Hasil: Dua puluh lima anak laki-laki dengan usia rata-rata 8,02 ± 1,53 tahun memiliki protokol pra operasi, operasi, dan pasca operasi yang serupa. Dua puluh satu pengasuh menyelesaikan empat kali tindak lanjut, satu melewatkan dua kali tindak lanjut, dan tiga melewatkan tindak lanjut terakhir. Nyeri ringan adalah komplikasi yang paling banyak dilaporkan, dengan kejadian 32% (8/25), 12% (3/25), 8% (2/24) masing-masing pada hari 1, 3, dan 7. Pada akhir masa tindak lanjut, tidak ada komplikasi yang menetap, dan 80% (20/25) anak laki-laki menunjukkan epitelisasi lengkap. Semua pengasuh dan sebagian besar operator merasa puas dengan telemedicine untuk pemantauan pasca sunat massal.
Kesimpulan: This will be Indonesian language translation of the Conclusion section, provided by the editor. Tindak lanjut berbasis telemedicine dapat diterima dan layak untuk diterapkan dalam khitanan amal massal. Protokol ini bermanfaat untuk pemantauan hasil dan KTD, oleh karena itu harus rutin diterapkan dalam program khitanan bakti sosial.

Kata Kunci: *Amal; Massa; Penyunatan; Telemedis; Akseptabilitas*

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Conflicts of Interest Statement:
The author(s) listed in this manuscript declare the absence of any conflict of interest on the subject matter or materials discussed.

INTRODUCTION

Male circumcision is one of the oldest surgical procedures routinely performed globally, especially in Jewish and Muslim-populated areas.[1] Indonesia, the 4th most populous country, has a significant percentage (92.5%) of males circumcised.[2] In general, circumcision indications are cultural (local beliefs, religion) and medical purposes (phimosis, paraphimosis, preventing sexually transmitted disease).[3,4] In Muslim-majority countries (such as Indonesia, Turkey, or Egypt), male circumcision is often carried out by informal medical workers who conducted the procedure solely based on previous observation experience. Many organizers and financiers fund these circumcisions in low economic areas in Indonesia. These charity-based circumcisions are usually done by medical students or general physicians, supervised by an attending surgeon. However, they are typically organized without any assurance of postoperative monitoring.[1] Similar to other surgical procedures, circumcision has its intraoperative or postoperative complication risks. The procedure outcomes depend on the operator's skills and the quality of postoperative monitoring. As charity events, they are usually held outside the health facilities and have limited resource capacity for postoperative monitoring.[1]

Since the Coronavirus Disease-19 (COVID-19) Pandemic, telemedicine has been a staple clinical service choice for many physicians to ensure health protocols and minimize unnecessary contact. it is a quick and heavily applicated service to increase people's access to high-quality healthcare with an efficient and cost-effective approach. Physicians and patients may communicate via virtual visits, text messages, electronic mail, and social medias.[5] Despite the benefits, telemedicine also offers several barriers, such as connectivity issues, specific populations with inadequate technological capabilities, and problems monitoring the quality and safety of healthcare.[6]

No studies have reported telemedicine's role in post-circumcision monitoring in Indonesia or Asia. This paper aims represent an initial trial of telemedicine application in post-circumcision monitoring in Indonesia conducted by our study group. Through this pilot study, we aim to observe adverse events and wound healing progress postoperatively through patients' caregivers. Concurrently, we assess caregivers' and operators' satisfaction rate towards this novel telemedicine-based post-circumcision monitoring protocol.

METHOD

This pilot study used an uncontrolled trial study design in community-setting to evaluate the acceptability of a novel telemedicine protocol for monitoring results and adverse events in mass charity circumcision. Data were collected periodically on days 1, 3, 7, and 30 post-circumcisions from operators and caregivers of children attending a mass charity circumcision in Jakarta, Indonesia, on 29th January 2022.

All boys who underwent circumcision were included in the study. This study excluded boys with comorbidities (i.e., low nutritional status, coagulation disorder), external genitalia anomalies (i.e., hypospadias, epispadias), and those who declined to participate. All subjects, patients, and operators received detailed explanations regarding their participation in the study and signed an informed consent in advance to study enrollment. This study was approved by the Faculty of Medicine Ethics Committee, Universitas Indonesia (KET-166/UN2.F1/ETIK/PPM.00.02/2022).

Circumcision Day Protocol

Before participants were enrolled in this study, they received explanation about the circumcision procedures, possible complications, and postoperative telemedicine-based follow-up. After they signed the consent form, operators did COVID-19 antigen swab test and physical assessment to confirm the circumcision indications and absence of contraindications. Circumcision procedures were conducted using dorsal slit method under local anesthesia (2% lidocaine as a dorsal block at the base of the penis

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and local infiltration at the ventral along the frenulum). Post-operatively, operators applied topical dressing (gentamycin cream and gauze) and instructed the caregiver to keep it for 2-3 days. Patients were monitored for 30 minutes, given wound care instructions and medications (analgetic and oral antibiotics), then scheduled for the telemedicine-based follow-up.

Telemedicine Follow-up Protocol

We used a free and commonly used messaging application, WhatsApp Messenger, to conduct the telemedicine follow-up on days 1, 3, 7, and 30 post-circumcisions. The author reminded and gave the follow-up guidelines to all operators before the scheduled dates. The follow-up guides consisted of three components: essential education toward the caregivers, questions about the adverse events, and documentation requirements (dorsal, ventral, right, left). All operators were responsible for initiating the telemedicine follow-up on each designated date. The telemedicine-based follow-up protocol is presented in *Figure 1.*

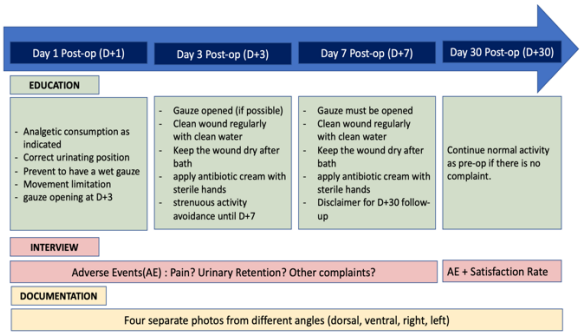

Figure 1. Telemedicine-based Follow-up Protocol

We evaluated the subjective pain and urinary retention data from text interviews. Meanwhile, the epithelialization, signs of infection, hematoma/bleeding, and denudation were evaluated through four separate pieces of documentation taken by caregivers. All caregivers had been demonstrated directly by the operators the proper way to take the documentation after the circumcision procedure. Text interviews were carried out in a two-way fashion using non-formal language.

Caregivers and Operators' Satisfaction

On the final follow-up day (D+30), caregivers and operators were asked about their satisfaction based on the cosmetic result and their experience conducting telemedicine-based follow-up independently. We objectified the subjective satisfaction into three categories using the Likert scale method, namely dissatisfied (1), neutral (2), and satisfied (3).

Data Analytics

Operators submitted the follow-up data through an online form directly linked to a datasheet for data retrieval. One investigator was assigned to data extraction from the text interviews. Meanwhile, two authors evaluated wound healing and adverse events from photographs independently. Any disagreements were discussed collectively between all the authors. A table and narrative presented the descriptive analysis of patients, caregivers, and operators. The study results, satisfaction towards telemedicine follow-up between operators and caregivers, were evaluated using Mann Whitney 1-tailed hypothesis, with statistical significance defined as $p < 0.05$ using *Statistical Package for Social Science* (SPSS) version 20.0 software.

RESULTS

Demographics of Patients Undergoing Circumcision and Caregivers Participating in the Telemedicine Follow-up

A total of 25 patients underwent mass circumcision in Cilincing region, East Jakarta, Indonesia, and all 25 caregivers voluntarily participated in the study. There were 12 (48%) male caregivers; the rest were female (52%). The majority of the caregivers (64%) were 30-40 years old, with a mean of 36.5 ± SD 7.7 years old. Most caregivers (32%) stay home due to unemployment, while others work outside the house. All caregivers have a smartphone to go through the telemedicine interview process, despite the fact that most caregivers (88%) have an income below the regional minimum wage in Jakarta (as of 2022), which is Rp 3.355.750,00. The indication of circumcision was the religion for all patients. All patients were boys, mostly (60%) with normal weight followed with obese, overweight, and underweight in similar quantities. A summary of the patients' and caregivers' demographic are displayed in *Table 1* and *Table 2*, respectively.

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Table 1. Patient Demographics

Characteristics	Mean ±SD	n (%)
Age (years)	8.02 ±1.53	
Weight (kg)	24.65 ±9.18	
Height (cm)	118.78 ±12.2	
Nutritional Status		
Underweight		3 (12)
Normal weight		15 (60)
Overweight		3 (12)
Obese		4 (16)

Table 2. Caregiver Demographic

Characteristics		n(%)
Age (years)		
	<30	3 (12)
	30-40	16 (64)
	>40	6 (24)
	Mean ±SD	36.5 ± 7.7
Gender		
	Male	12 (48)
	Female	13 (52)
Education		
	Elementary School	4 (16)
	Junior High School	7 (28)
	High School	11 (44)
	Bachelor	3 (12)
Income per month		
	< Reg. Min. Wage	22 (88)
	> Reg. Min. Wage	3 (12)
Occupation		
	Driver	3 (12)
	Private Employee	7 (28)
	Business Owner	4 (16)
	Labor Work	3 (12)
	Unemployed	8 (32)

Demographics of Circumcision Operators Performing Telemedicine Follow-up

Operators did the telemedicine-based follow-up based on the protocol, as displayed in *Figure 1.* The demographic of medical personnel participating in the telemedicine study is summarized in *Table 3.* Most operators are in the age bracket of 21-25 years (85%), with a mean of 22.9 years (SD ±1.5). Six out of 20 operators had already finished their medical degree when the mass circumcision was held, but only one had done more than ten circumcision procedures on patients. Female operators exceeded the male ones, with 13 personnel (65%) participating compared to 7 male ones (35%).

Table 3. Circumcision Operator Demographics

Characteristics		n(%)
Age (years)		
	<21	2 (10)
	21-25	17 (85)
	26-30	1 (5)
	Mean ±SD	22.9 ±1.5
Gender		
	Male	7 (35)
	Female	13 (65)
Experience as Circumcision Operator		
	<5	13 (65)
	5 – 10	6 (30)
	>10	1 (5)
Academic Stage		
	General Physicians	6 (30)
	Medical Student	14 (70)

Adverse event and wound healing post-circumcision

We evaluated the presence of adverse events: pain, urinary retention, infection, bleeding, denudation, edema, and other conditions expressed by caregivers or patients and found on visual evaluation through photographs. Through 4 days in a month of communicating with the caregivers, several adverse events were detected, which can be seen in *Table 4.*

Table 4. Monitoring findings through Telemedicine

Findings		D+1	D+3	D+7	D+30
Adverse Events					
Pain	N (%)	8 (32)	3 (12)	2 (8)	0 (0)
	VAS (Mean ±SD)	1.3 ± 2	0.4 ± 1.1	0.2 ± 1	0 (0)
Signs of infection; N (%)		NA	0 (0)	0 (0)	0 (0)
Urinary retention;		1 (4)	0 (0)	0 (0)	0 (0)

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Findings	D+1	D+3	D+7	D+30
N (%)				
Bleeding; N (%)	NA	0 (0)	0 (0)	0 (0)
Edema; N (%)	NA	1 (4)	1 (4)	0 (0)
Glans excoriation; N (%)	NA	5 (20)	3 (12)	0 (0)
Wound Healing Epithelization; N (%)	0 (0)	3 (12)	15 (60)	20 (80)

NA= not available.

Figure(s) 2. Epithelization progress in the right part of the coronal sulcus.

Patients that suffer from post-operative pain were reported, with the highest number observed on the day after the circumcision (32%). It gradually decreased to 8% a week after, and no complaint regarding pain in the wound area was reported 30 days after the operation. The visual evaluation could not be done on follow-up D+1 due to post-operative wound gauze dressings. Findings of glans excoriation were seen in five patients during follow-up D+3, with the remaining three patients on D+7. In these patients, our photos showed crusta at the glans penis. Urinary retention was reported only by a patient one day after the circumcision. There were no reports of urinary retention in any patients on later follow-ups. No infection or denudation was observed in any stages of follow-ups.

Wound healing progression was also available to be monitored through a series of documentation by the caregiver. The earliest epithelization was detected three days after the circumcision in 3 patients and gradually increased in 20 out of 25 patients undergoing epithelization in the wound area a month after. An example of epithelization progress is displayed in *Figure(s) 2*, showing the wound area in different time durations (D+1, D+3, D+7, D+30).

The gauze was kept intact until D+3; thus, no visual evaluation could be done on D+1. One patient received tailored instruction to change the dressing daily at the healthcare provider due to difficulties during surgery. He showed edema and bleeding on D+1. The bleeding subsided, but edema with decreasing intensity was still observed until follow-up D+7. During the final follow-up day, the patient and caregiver subjectively reported healed wound with no adverse event.

Satisfaction with Telemedicine-based Follow-up between Operators and Caregivers

Operators and caregivers were asked regarding the satisfaction rate with the follow-up method through smartphone at the end of the study (D+30); the answers are displayed in *Table 5*. There is a significant statistical difference ($p<0.05$) between operators' and caregivers' satisfaction with the telemedicine-based follow-up. All caregivers were satisfied with this method of long-distance communication. On the other hand, the operators' opinions were divided, mostly satisfied (70%) and a few shared their neutral position towards the idea of performing telemedicine to monitor post-operative conditions.

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Table 5. Caregivers and Operators' Satisfaction Towards the Telemedicine Follow-up Protocol

Answers	Samples		p-value
	Operators (n=20), n (%)	Caregivers (n=25), n (%)	
Satisfied	14 (70)	20 (80)	
Neutral	6 (30)	0 (0)	<0.05
Dissatisfied	0 (0)	0 (0)	

DISCUSSION

As we face the COVID-19 Pandemic, telemedicine popularity is becoming more prevalent. Societies' awareness of the technology supports this trend and makes telemedicine accessible to almost everyone.[7] A review across 11 countries reported that younger people are more likely to own a smartphone (age 18 to 29 years old) compared to older people and those with higher levels of education compared to lower levels of education.[8] Data from our study show that despite most caregivers (88%) had income below the 2022 regional minimum wage in Jakarta and aged older compared to previous study (between 30 to 40 years old), all caregivers have a mobile phone to go through the telemedicine follow-up process. Absences from follow-up were due to work or school activities. Telemedicine should solve these problems by having the flexibility to conduct follow-ups at mutually agreed time adhering to patients', caregivers', and operators' availability.

Mass circumcision was statistically more significant in causing complications than circumcisions performed in operating room conditions (RR 3.05 p<0.001).[9] Risk factors are non-sterile conditions, older children, and operation by medically untrained circumciser.[1] Operators in this study were medical students and general physicians under the supervision of an attending surgeons. All of them were trained for circumcision procedures and were aware of the post-operative monitoring protocols, thus eliminating the risk of complications due to untrained personnel.

Most people organize mass circumcision without assurance of post-operative monitoring, which is associated with an increased risk of life-threatening and prolonged complications.[1,9] This study harnesses the availability of telemedicine to provide an accessible and thorough follow-up post-charity mass circumcision. Throughout the follow-up span, we were able to educate caregivers and give additional suggestions and interventions when appropriate. However, there is also a challenge in telemedicine related to the absence of physical contact that may make it hard to monitor post-operative wounds.[6] This study combined text interviews and 4-anges-photographs to mimic the standard history taking and physical examinations. WHO stated that we could evaluate whether the condition is improving or worsening by taking a series of photographs post-circumcision post-circumcision.[2]

We evaluated any presence of adverse events, pain, urinary retention, infection, bleeding, denudation, and edema evaluations on day 1, 3, 7, and 30 after circumcision. The operator provided post-operative analgesics and reminded the caregivers periodically regarding their usage instructions during the follow-up period. In this study, mild pain was the most common finding during the first week of follow-up. However, its incidence remained low and showed no increase in intensity after serial follow-up.

We noticed glans excoriations after having dressing changes in five patients during follow-up D+3 with the remaining three patients on D+7. Excoriations were iatrogenic and caused by mechanical debridement and removal of smegma during the procedure. On the last follow-up day, all excoriation wounds were healed with no scars. However, exposure to raw surfaces in excoriated glans provides a port of entry for infections. When identification of crusta and other secondary lesions were present, operators directly gave direct suggestions, reminded them of proper hygiene, and educated them on mechanical debridement when appropriate. There were no infections observed in this study.

One caregiver reported the patient's inability to urinate one day after circumcision. However, the patient's complaint of urinary retention was gone after pain relief. Urinary retention is an inability to empty the bladder voluntarily for more than 12 hours with an adequate urine volume or a palpable distended bladder. It can occur primarily or secondary to surgery, immobility, local neurogenic problem, cognitive impairment, or drug induced.[10] Urinary retention is usually reported in cases of circumcision with medical devices. Urinary retention in the dorsal slit method may occur due to post-operative swelling, fear, pain, and penile

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block.[11] The inability to urinate is a rare but disastrous experience for children and their caregivers. Healthcare providers should try to find the etiology, observe closely, and instruct additional measures when appropriate.

Most of the caregivers (80%) were able to complete one month of follow-up. All those who stayed until the last follow-up day were very satisfied with the telemedicine-based follow-up. Caregivers were mainly satisfied due to the operators' caring, responsibility, and readiness to answer questions and complaints throughout the follow-up process. Meanwhile, the operators were divided into two options, mostly satisfied (70%) on performing telemedicine to monitor post-operative patients and the rest were neutral towards the application of the follow-up protocol. None of the operators expressed dissatisfaction towards the application of telemedicine for post-circumcision follow up showed that telemedicine actually held a place in post-procedural monitoring, especially in an unfavorable condition, such as COVID-19 Pandemics. Difficulties faced based on operators' point of view resolves around adaptation issues. Operators are used to seeing patients in clinic and have the ability to assess wound directly, making it easy to provide wound care education simultaneous with demonstrating the act which were not available in telemedicine-based monitoring.

This article is the first study to accommodate the post-charity mass circumcision evaluation through telemedicine in Indonesia. Research comparing a telemedicine-based monitoring group to a control group with randomizations may improve the strength of evidence upon clinical uses. Protocol improvement could also be made when deemed necessary prior to future applications. Additionally, related topics to this area, such as evaluating adverse event rates in mass circumcision and in-depth analysis of factors affecting operators' satisfaction and dissatisfaction towards telemedicine follow-up can also be explored.

CONCLUSION

The telemedicine-based follow-up protocol applied in this pilot study is generally acceptable and feasible for caregivers and operators in mass charity circumcision. It has proved its function in controlling circumcision results and minimizing adverse events. Similar follow-up procedures should be applied in future mass charity circumcision.

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