

# Pre-Operative Skin Preparation: A Comparative Study of Three Different Protocols

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This study includes a clinical and cost comparison of three pre operative skin preparation protocols (razor, depilatory cream, no depilation) in 150 patients undergoing clean surgical operation in North Surgical Ward. The clinical research protocol included an evaluation of depilatory effect, skin integrity after depilation and postoperative wound infection. The cost comparison was performed by keeping a record of material used in three preoperative protocols. The clinical evaluation revealed that depilation cream protocol is appropriate method to depilate patients. The razor shaving method should be eliminated from clinical practice due to associated increased risk of postoperative wound infection. Cost calculation revealed that cream protocol is not too much costly as compared to shaving. Although changing to cream protocols may be associated with increase in cost compared to razor method, in the long term it is cost saving. The superiority of this protocol is due to decreased incidence of postoperative wound infections as compared to that associated with shaving. In case of no depilation protocol infection rate is also less than shaving. On the basis of this finding it is considered that hair removal protocol should be used only when that hair would interfere with performance of operation.

**Key words:** Preoperative, Shaving, Skin preparation, Depilatory cream.

The skin is the first line of defence between environmental microbes and host internal malieu<sup>1</sup>. So when we made incision for operation this barrier is broken. Bacteria are present on skin which are resident and transitional group. The resident flora may change. The resident flora lies in stratum corneum. And around gland orifices. As it is not possible to sterilise skin the term "skin preparation" is used. Aim of skin preparation is to reduce the resident flora<sup>2</sup>.

In the control of infection the concept of preoperative hair removal has been in existence since the time of lister. It has been found that extensive hair removal by whatever means result in an increase in bacterial colony counts and post operative wound infection when compared with no hair removal<sup>3</sup>. Shaving clipping and depilatory agents have been used to remove hair. Shaving remains the most commonly used method but nicks and cuts are caused by shaving. If shaving is done the night before operation there is an ample time for bacterial proliferation in any nick and cut<sup>1</sup>. Value of depilatory cream are conflicting. Some studies recommend depilatory protocol most appropriate method of hair removal. The superiority of this protocol is due to decreased incidence of post operative wound infection<sup>5</sup>.

## Aims and Objective

1. To determine the merits and demerits of three preoperative protocols of skin preparation.
2. This study will help the surgeon to adopt a safer and more effective technique of pre operative skin preparation.

## Material and Methods

This study was carried out on patient admitted in North Surgical Ward, Mayo Hospital, Lahore from July 1997 to

March 1998. Total number of patient was 150, which are grouped as follows.

### 1. Group I (Shaving Protocol)

This group consist of 50 cases shaving of operative site carried out just before starting operation on operation table with surgical blade or safety razor.

### 2. Group II ( Depilatory Protocol)

This group also consisted of 50 cases. Depilatory cream was applied over operation area from 10 minutes after moistening hair with water. After which hair cleaned with plastic spatula provided along with cream packing

### 3. Group III (with out hair removal)

This group also consist of 50 cases. No hair removal protocol done in this group. Only perioperative standard measures was undertaken.

In all groups preoperatively skin painted with 7.5% solution of povidone-iodine and prophylactic antibiotic given at that time.

Operation was done under general, spinal or local anaesthesia. Patient reviewed on 7<sup>th</sup> day, two weeks, four weeks, and six weeks. At their first visit suture was removed. Notes of the wound condition taken at all their follow up visits.

In case of wound infection swab taken for culture and sensitivity. Antibiotic given according to causative organism. Note made for cost, patient liking & effectivity of protocol.

## Criteria for Selection of Patient

1. Clean surgical procedure was included in the study so that endogenous source of infection was excluded e.g. inguinal hernia, hydrocele, thyroidectomy.
2. Patient not suffering from any local skin disease.

## Preparative Skin Preparation

3. Patient not suffering from any systemic illness which decrease wound healing and increase infection rate e.g. diabetes, malignancy, malnutrition, uraemia.

### Results

One hundred and fifty patient age ranged between 12-80 years were admitted and divided into three groups fifty in each group. Male female ratio shown in Table No.1

Table 1: Sex ratio in each group

Sex	I	II	Iii
Male	50	5	12
Female	-	-	38

The various surgical procedure done are shown in Table .2.

Table 2: Surgical procedure done in each group

Name of procedure	Group I	Group II	Group III
Inguinal herniorrhaphy	36	40	1
Paraumbilical hernia repair	1	1	4
Epigastric hernia repair	1	-	3
High ligation of varicocele	2	1-	
Subtotal thyroidectomy	=	-	12
Thyroid lobectomy	-	-	8
Operation on Hydrocoele	2	5	-
Incisional hernia repair	-	-	3
Orchidopexy	-	3	-
Excision of fibroaenoma	-	-	4
Miscellaneous	8	-	15

Majority of patients belonged to low socioeconomic status. In the first group patient selected for shaving, a disposable razor purchased and shaving done just before operation. In depilatory group, depilatory cream purchased by the patient and applied on operation area. Site of operation on skin examined after removing hair by depilation cream or shaving and efficacy of method noted. Majority of the operation done in less than one hour as shown in Table 3.

Table 3: Duration of operation

Duration	I	II	III
Less than 1 hour	44	3	27
1-2 hours	6	47	14
More than 2 hours'	-	-	9

Post operative complications occur which are shown in Table.4

Two inguinal herniorrhaphy operation in shaving protocol get infected which shows Staph aureus, sensitive to Augmentin and first general cephalosporin but resistant to ampicillin. One patient of inguinal herniorrhaphy in depilation cream protocol also got infected. Culture of

these patients showed Staph aureus resistant to ampicillin but sensitive to Augmentin. One patient in without hair removal protocol also got infected but culture of pus showed no growth. So infection rate in shaving group was 4% and depilatory group was 2% and in without depilation group was 2%.

Table 4:

Complications	I	II	III
Fever	5	3	3
Wound infection	2	1	1
Stitch sinus	3	1	
Hydrocoele	1	-	-

Duration of stay ranged from 0-11 days shown in the Table 5 in various groups.

Table 5:

Duration of hospital stay (days)	Group I	Group II	Group III
OPD patients	3	0	4
1-2 days	14	24	10
3-4 days	24	16	15
5-6 days	4	5	10
More than 6 days	5	5	11

After removing hair or in case of without hair removal, operation site is painted with antiseptic skin preparation. No significant difference in postoperative infection rates was found between just painting the operation area or scrubbing it for ten minutes. Clinical and cost comparison is shown in the table 6

Table 6:

Comparison parameter	Group- I	Group-II	Group-III
Cost	Rs.30/- patient	Rs.45/- pt.	Rs.25/- patient-
Depilatory efficacy	Good	Satisfactory	No need of hair removal
Drawback	Nicks and cut post operative wound infection rate increased	Smell, messey, more time consumed for depilation	Hair may not interfere the surgical approach
Wound infection rate	4%	2%	2%

### Discussion

In recent years, there has been an increasing scientific evidence regarding effective skin preparation procedure prior to surgery. The goal of preoperative skin preparation is to reduce the risk of postoperative wound infection by cleansing the skin and eliminating transient flora. Moreover, preoperative skin preparation decreases the amount of resident flora to a minimum prior to surgery.

Table 7: Literature review of infection rates associated with the razor, clipper and cream protocols.

	Design	Sample	Depilatory Method	Postop wound infection	P=Value
Seropian & Reynolds (1971)	Prospective descriptive study	n=406 Surgical patients	Razor	5.6%	Not reported
			Depilatory cream	0.6%	
			No depilation	0.6%	
Cruse & Foord(1980)	Prospective descriptive study	n=62,939 Surgical patients	Razor	2.5%	Not reported
			Clipper	1.4%	
			No depilation	0.9%	
Alexander et al (1983)	Prospective randomized study	n=1,013 surgical patients	Razor	5.6%	p=0.027
			the evening before surgery	6.4%	
			the morning of surgery	4.0%	
Sellick et al (1991)	Retrospective longitudinal study	n=2,145 Cardiac Surgery patients	Sternotomy	1.8%	p=0.01
			Razor	1.2%	
			Clipper	0.2%	
			Leg incision (venectomy)	1.6%	
			Razor	1.6%	
Ko et al (1992)	Prospective randomized study	n=1,980 Cardiac surgery patients	Razor	1.3%	p=0.024
			Clipper	0.4%	

Prevention of postoperative wound infections is a priority as hospital infection are associated with prolonged hospital stays and an increase in health care cost.

Shaving with disposable razors, an old but persisting routine in surgical practice is dangerous as it increases the risk of post operative wound infection compared to other depilation method<sup>6</sup>, such as use of depilatory cream. Moreover, the risk of post operative wound infections increases the longer the duration between shaving and surgery<sup>7</sup>. Shaving cause nicks and cuts in skin. Bacteria settle in these nicks and cuts and cause infection. This enhanced awareness of the need for changing preoperative routines. Most patients are active and can depilate themselves. This is first step in changing routine practice. The comparison of three preoperative skin preparation protocol revealed that depilation with the cream is feasible in the clinical setting, yielding a satisfactory depilatory result. Although changing to a cream protocol is associated with an increase in cost, cost saving may be expected in the long term as these protocols are known to associated with a decreased incidence of hospital infections.

### Conclusion

Hair removal is not obligatory and only indicated when hair interfere with surgical procedure

Change in depilation protocol is necessary from shaving to depilation cream.

Initial increase in cost in depilation cream protocol is very modest but in long term depilation cream method is cost saving .

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