

# A Clinical Evaluation of Advanced Barrier Film upon Prevention of Medical Adhesive Related Skin Injury among Children in Apollo Children's Hospital, Chennai

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**Abstract:** *Background:* The skin is the protective layer of the body; it provides an important anatomical barrier against pathogens, irritants, water loss, and environmental threats. Various conditions can damage the skin and breach the integrity of the barrier resulting in inflammation, disruption of epidermal integrity, pain, and increased risk of infection. Medical adhesive-related skin injury (MARS) is prevalent, under-recognized and preventable, and can occur in any patient group or setting. When superficial layers of skin are removed by medical adhesive, it not only affects skin integrity, but causes pain, increases risk of infection, and potentially increases wound size and delays healing, all of which reduce patient quality of life. *Materials and methods:* A descriptive study was conducted involving 500 children with 8- 16 years of age. Consecutive sampling method was used to select the samples for the study. The efficacy of the advanced skin barrier was assessed using MARS tool kit. *Results:* The findings revealed that the advanced skin barrier used were so effective in preventing, MARS with the significance of  $p < 0.05\%$ . *Conclusion:* It is hoped that the findings from the study will assist the nurses in preventing MARS and thereby improve the quality of life.

**Keywords:** MARS, Advanced skin barrier, Skin, medical adhesives, dressing

## 1. Introduction

Skin injury related to medical adhesive usage is a prevalent but under recognized complication that occurs across all care settings and among all age groups. If proper technique for application and/or removal of adhesive products is not used, tissue trauma can occur, impacting patient safety and quality of life and increasing healthcare costs. Medical adhesive-related skin injury (MARS) is prevalent, under-recognized and preventable, and can occur in any patient group or setting. When superficial layers of skin are removed by medical adhesive, it not only affects skin integrity, but causes pain, increases risk of infection, and potentially increases wound size and delays healing, all of which reduce patient quality of life. The presence of one or more intrinsic or extrinsic factors increases the risk that MARS will occur when medical adhesives are used. It is important to assess the patient and skin in order to devise the most appropriate care plan. Prevention can be implemented through steps in four broad categories: skin preparation, selecting appropriate medical adhesives, adhesive product application and adhesive product removal.

## 2. Materials and Methods

**Study Design:** A descriptive design

**Study Location:** Apollo Children's hospital, Chennai, Tamil Nadu.

**Study Duration:** August-October 2022

**Sample size:** Total of 500 samples was selected for the study based on the pilot study report.

**Subjects & selection method:** Consecutive sampling.

### Inclusion criteria:

- From 8- 16 years of age or above
- Both gender (male and female)
- Children on peripheral line, central/ arterial line, dressings, drains and tubes with adhesives
- Children admitted in ER, OT, CATH LAB, Wards and ICU'S
- Children already affected with MARS

### Exclusion criteria:

- Any previous history of allergy to topical applications of ointments
- Preexisting skin disease in the affected area were excluded

### Procedure methodology

Samples will be collected in the Wards, ICU'S, OT, Emergency department for a period of 3 months. The investigator collected the information regarding the children between 8 to 16years of age who were admitted in the wards, ICU'S, OT, Emergency department. The investigator collected the samples whenever adhesives are placed for securing lines, tubes, dressings both wound and surgical. The purpose of the study was explained and written informed consent from parents and an assent from children was obtained. Information on socio demographics and

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related to clinical variables was collected from parents and from the patient record. MARSII tool kit was used by the investigator to collect the data. Approximately 10 to 15 minutes were taken by the subjects to complete the inventories.

**Statistical analysis**

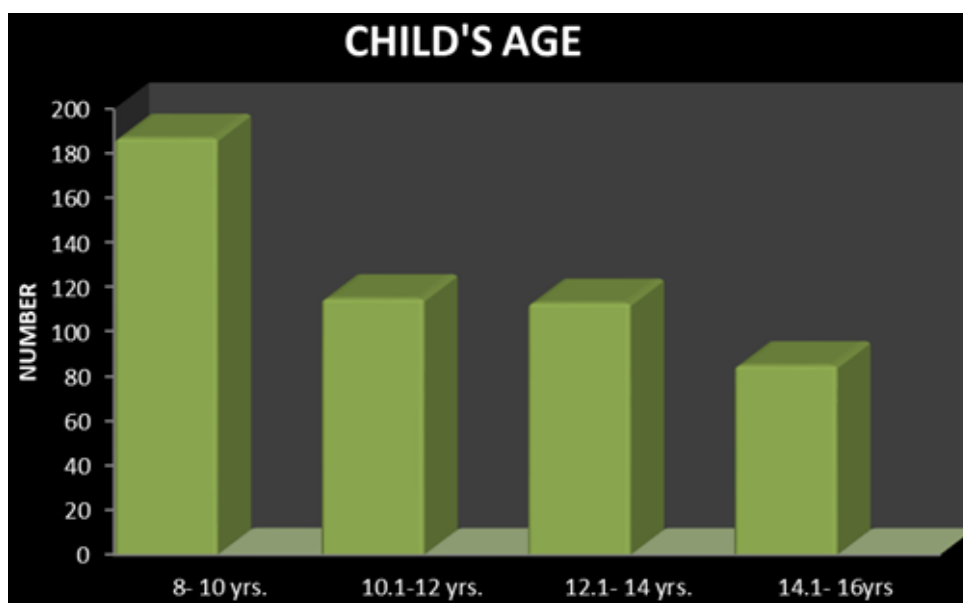
Data was entered using Excel and screened for outliers and extreme values using Box-Cox plot and histogram (for shape of the distribution). Summary statistics was used for reporting demographic and clinical characteristics. Frequency and percentage distribution were used to analyze the demographic variables, clinical variable and the independent variable. Tabular form, bar diagram will be used to represent the data.

**3. Result**

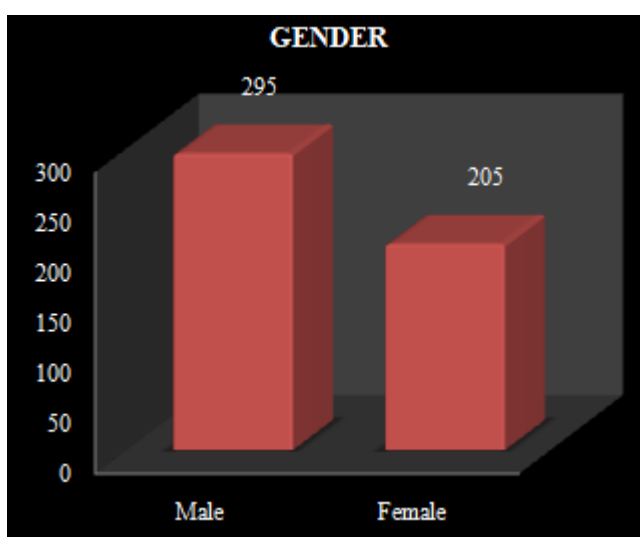
**Table 1:** Frequency and percentage distribution of samples according to the demographic variables

I	Demographic variable:	N= 500	
<b>1</b>	<b>Child's age:</b>	No.	%
a	8- 10 yrs.	187	37.40%
b	10.1-12 yrs.	115	23%
c	12.1- 14 yrs.	113	22.60%
d	14.1- 16yrs	85	17%
<b>2</b>	<b>Gender:</b>		
a	Male	295	59%
b	Female	205	41%

Table 1 shows majority of the child fall between 8- 10 yrs. of age with 37.40% , 10.1- 12 yrs. were 23%, 12.1- 14 yrs. with 22.6%, 14.1- 16 yrs. 17% and male with 59%, female were 41%



**Figure 1:** Child's age



**Figure 2:** Child's Gender

**Table 2:** Frequency and percentage distribution of samples according to the clinical variables

II	Clinical variable:	N= 500	
1	Duration of illness:		
a	<1 week	73	14.60%
b	1 week – 1month	295	59%
c	> 1month	132	26.40%
2	Duration of hospital stay		
a	<1 week	291	58.20%
b	1 week – 1month	204	40.80%
c	> 1month	5	1%
3	No. of day's on adhesives:		
a	<3 days	158	31.60%
b	3 days to 1 week	206	41.20%
c	>1 week	136	27.20%
4	No of adhesives used:		
a	1	132	26.40%
b	2	176	35.20%
c	3	56	11.20%
d	>3	136	27.20%
5	Size of adhesive used		
a	1cm	305	61%
b	3cm	178	35.60%
c	10 cm	17	3.40%

Table 2 shows majority of the Duration of hospital stay is <1 week (58.20%) and 61% were 1cm size of adhesive used. Duration of illness were <1 week with 14.6%, 1 week – 1month with 59%, > 1month 26. 4%. No. of day’s on adhesives were <3 days 31.6%, 3 days to 1 week with 41.2%, >1 week was 27.2%.

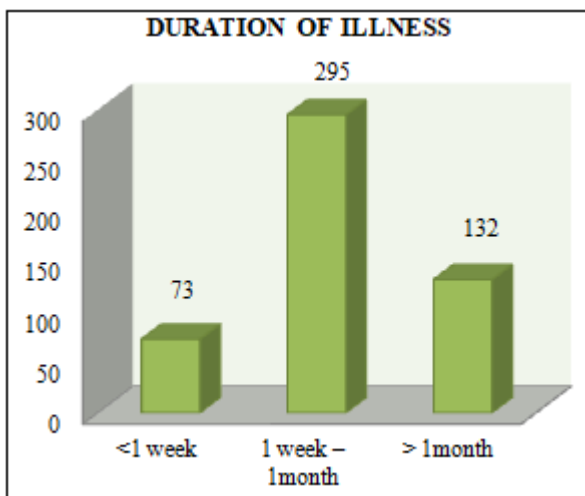


Figure 3: Duration of illness

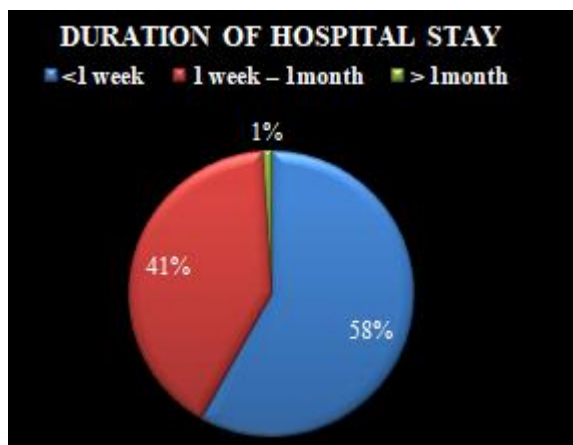


Figure 4: Duration of hospital stay

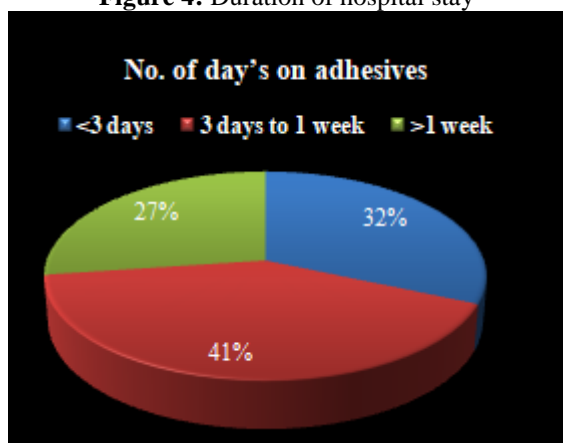


Figure 5: Number of day’s on adhesives

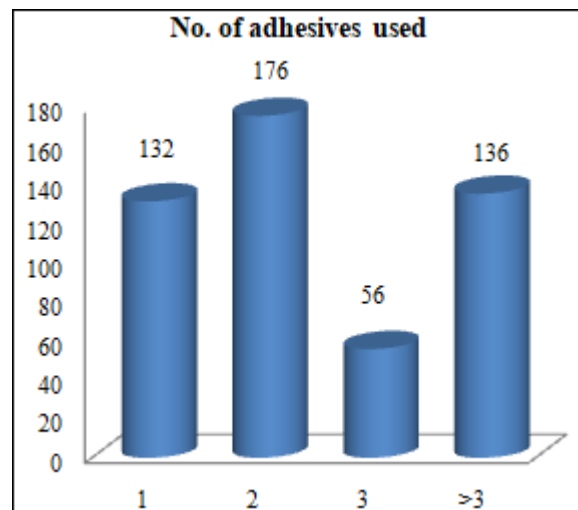


Figure 6: Number of adhesives used

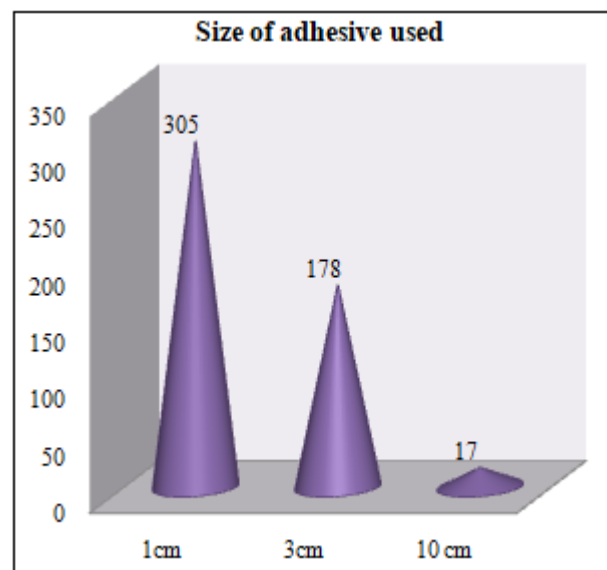


Figure 7: Size of adhesives used

Table 3: Frequency and percentage distribution of Medical Adhesive Product used for Dressing, Tape, securement/ tubes, and others.

MARSJI TOOLKIT		N= 500	
Medical Adhesive Product		YES	
		no.	%
Dressing	1 = PIV dressing	447	89.40%
	2 = Central Line dressing	132	26.40%
	3 = PICC dressing	1	0.20%
	4 = Port dressing	Nil	Nil
	5 = Wound (other dressings)	73	14.60%
	6 = Surgical (island dressing, adhesive closures E.g. Steri-Strip™)	177	35.40%
	7 = Tape and Gauze dressing	177	35.40%
Tape	8 = Tape to secure dressing	177	35.40%
	9 = Tape to secure tubing and/or other devices	136	27.20%
Securement/ Tubes	10 = NG tube securement device	132	26.40%
	11 = Feeding tube securement device	126	25.20%
	12 = Chest tube securement device	130	26%
	13 = Foley securement device	136	27.20%
	14 = Wound drain securement device	84	16.80%
	15 = Miscellaneous securement	Nil	Nil

	device		
Other	16 = Electrodes	155	31%
	17 = Medication patches	Nil	Nil
	18 = Negative Pressure Wound Therapy dressing	Nil	Nil
	19 = Adhesive bandage	42	8.40%
	20 = Ostomy (faceplate, pouch, flange)	2	0.40%
	21 = other (describe)	Nil	Nil

Table 3: shows that medical adhesive product for PIV dressing with 447(89.40%) is more evident in Apollo

Children’s Hospital. Central Line dressing with 26.4%, PICC dressing with o.20%, Wound dressings with 14.6%, Surgical dressing, Tape and Gauze dressing, Tape to secure dressing with 35.4%, Tape to secure tubing and/or other devices 27.2%. NG tube securement device with 26.4%, Feeding tube securement device with 25.2%, Chest tube securement device with 26%, Foley securement device with 27.2%, Wound drain securement device with 16.8%. Electrodes with 31%, Adhesive bandage with 8.4%, ostomy with 0.40%

Table 4: Efficacy of the advanced skin barrier in prevention of MARSJ

		NO	
Dressing		NO.	%
1	PIV dressing	447	89.40%
2	Central Line dressing	132	26.40%
3	PICC dressing	1	0.20%
4	Port dressing	NA	NA
5	Wound (other dressings)	73	14.60%
6	Surgical (island dressing, adhesive closures E.g. Steri-Strip™)	177	35.40%
7	Tape and Gauze dressing	177	35.40%
<b>Tape</b>			
8	Tape to secure dressing	177	35.40%
9	Tape to secure tubing and/or other devices	136	27.20%
<b>Securement/ Tubes</b>			
10	NG tube securement device	132	26.40%
11	Feeding tube securement device	126	25.20%
12	Chest tube securement device	130	26%
13	Foley securement device	136	27.20%
14	Wound drain securement device	84	16.80%
15	Miscellaneous securement device	NA	NA
<b>Other</b>			
16	Electrodes	155	31%
17	Medication patches	NA	NA
18	Negative Pressure Wound Therapy dressing	NA	NA
19	Adhesive bandage	42	8.40%
20	Ostomy (faceplate, pouch, flange)	2	0.40%
21	other (describe)	NA	NA

Table 4: Represents that the advance skin barrier used shows 100 % effectiveness in preventing MARSJ (Medical Adhesive Related Skin Injury)

4. Discussion

The purpose of this study was to assess the efficacy of advanced skin barrier in prevention of Medical Adhesive Related Skin Injury. Study findings shows majority of the child fall between 8- 10 yrs.’ of age with 37.40% , 10.1- 12 yrs. with 23%, 12.1- 14 yrs. with 22.6%, 14.1- 16 yrs. with 17% and male with 59%, female were 41 %.

Study finding reveals majority of the Duration of hospital stay is <1 week with 58.20% and 61% were 1cm size of adhesive used. Duration of illness were<1 week with 14.6%, 1 week – 1month with 59%, > 1month 26. 4%. No. of day’s on adhesives were <3 days 31.6%, 3 days to 1 week with 41.2%, >1 week with 27.2%.

Study findings also reveals that the medical adhesive product for PIV dressing with 447(89.40%) is more evident in Apollo Children’s Hospital. Central Line dressing with 26.4%, PICC dressing with o.20%, Wound dressings with

14.6%, Surgical dressing, Tape and Gauze dressing, Tape to secure dressing with 35.4%, Tape to secure tubing and/or other devices 27.2%. NG tube securement device with 26.4%, Feeding tube securement device with 25.2%, Chest tube securement device with 26%, Foley securement device with 27.2%, Wound drain securement device with 16.8%. Electrodes with 31%, Adhesive bandage with 8.4%, ostomy with 0.40%.

To conclude with study finding represents that the advance skin barrier used shows 100 % effectiveness in preventing MARSJ (Medical Adhesive Related Skin Injury).

5. Conclusion

It is hoped that the findings from the study will assist the nurses to use advanced skin barrier in preventing Medical Adhesive Related Skin Injury. For many patients, MARSJ is a preventable injury .Adopting a focused, structured approach to risk assessment will help clinicians to choose the right product for each patient. Education incorporating skin preparation, adhesive selection and application and removal of adhesive products will also reduce the risk of MARSJ.

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