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不同术前皮肤准备方案与手术切口感染的关系研究*

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摘要 目的:研究不同术前皮肤准备方案与手术切口感染(SSI)的关系,为降低临床 SSI 发生率提供参考。**方法:**选择自 2015 年 1 月~2019 年 12 月在医院行手术治疗的患者 1810 例为本次研究对象。根据析因设计表,将因素 A:是否剃毛(1 不剃毛;2 剃毛), B:清洁方式(1 清水清洁;2 肥皂水清洁), C:术前备皮时间(1 术前 1 d;2 术前 2 h)配对分为 8 个组:A1B1C1 组 226 例,A1B2C1 组 229 例,A1B1C2 组 216 例,A1B2C2 组 232 例,A2B1C1 组 221 例,A2B2C1 组 241 例,A2B1C2 组 221 例,A2B2C2 组 224 例,比较各组手术部位及切口类型分布、术后 SSI 发生率,并采用析因分析法分析术前皮肤准备后各组菌落计数的相关性及交互作用。**结果:**各组患者的手术部位及切口类型之间的差异不存在统计学意义($P>0.05$)。A1B1C1 组及 A2B1C1 组的 SSI 发生率较高,分别为 12.83%和 14.48%。A1 水平的 SSI 发生率是 8.75%,与 A2 水平的 8.27%相比,差异不存在统计学意义($P>0.05$)。B1、C1 水平的 SSI 发生率分别是 11.31%、10.03%,明显高于 B2、C2 水平的 5.83%、6.94%,差异均存在统计学意义($P<0.05$)。各组术前皮肤准备后的菌落计数差异存在统计学意义($P<0.05$),析因分析结果显示,B、C 单因素分析差异存在统计学意义($P<0.05$),且 A 与 C、B 与 C 间具有交互作用,而 A、B、C 间具有二级交互作用($P<0.05$)。**结论:**术前皮肤准备对降低 SSI 发生具有重要作用,实际操作时,建议在较短的时间内利用肥皂水或其他消毒水进行皮肤清洗并完成备皮。

关键词:皮肤准备;手术切口感染;析因分析

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Study on the Relationship between Different Preoperative Skin Preparation Schemes and Incision Infection*

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ABSTRACT Objective: To study the relationship between different preoperative skin preparation schemes and surgical site infection (SSI) so as to provide the reference for reducing the clinical incidence rate of SSI. **Methods:** A total of 1810 patients who were received surgery in hospital from January 2015 to December 2019 were selected as the study subjects. According to the factorial design table, the three factors of factor A: whether shaving (1 without shaving; 2 shaving), factor B: cleaning methods (1 water cleaning; 2 soap water cleaning), factor C: preoperative skin preparation time (1 1d before surgery; 2 2h before surgery) were divided into 8 pairing groups, they were A1B1C1 group with 226 patients, A1B2C1 group with 229 patients, A1B1C2 group with 216 patients, A1B2C2 group with 232 patients, A2B1C1 group with 221 patients, A2B2C1 group with 241 patients, A2B1C2 group with 221 patients, A2B2C2 group with 224 patients, the distribution of surgical sites and incision types and the incidence rate of SSI in different groups were compared, and the correlation and interaction of colony counting among different groups analyzed by factorial analysis after preoperative skin preparation. **Results:** The differences of the surgical sites and incision types in different groups had no statistical significant ($P>0.05$). The incidence rates of SSI were higher in A1B1C1 group and A2B1C1 group, the incidence rates were 12.83% and 14.48% respectively. The incidence rates of SSI at level A1 was 8.75%, which had no statistical difference than 8.27% at level A2 ($P>0.05$). The incidence rates of SSI at B1, C1 levels were 11.31%, 10.03% respectively, which were significantly higher than 5.83%, 6.94% at B2, C2 levels, the differences were statistically significant ($P<0.05$). The difference of colony counting among different groups after preoperative skin preparation had statistical significant ($P<0.05$), and the factorial analysis showed the difference of single factors of B, C had statistical significant ($P<0.05$), and there were interaction between A and C, B and C, furthermore, there was second-level interaction among A, B, C ($P<0.05$). **Conclusion:** Preoperative skin preparation plays an important role in reducing the incidence rate of SSI, in actual practice, it is suggest to using soap water or other disinfection to clean the skin and complete skin preparation in a relatively short period of time.

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前言

手术切口感染(surgical site infection,SSI)主要是指在无植入物相关手术后的30 d内或有植入物手术后的1 d内产生的手术感染症状^[1-3]。SSI是外科最为常见的一类医院感染,若加以重视,轻者会干扰医治进程,严重者甚至可能导致患者的死亡^[4-6]。因此,采取科学措施预防SSI对于临床治疗意义重大。国内外有研究报道显示,术前皮肤准备能够较好地降低皮肤表面的定植菌数量,可以降低SSI的发生风险^[7,8]。但对于如何做好术前皮肤准备,并无详细而准确的相关报道。虽然有报道认为长期以来沿用至今的剃毛备皮等措施被认为已经达到了此种目的,然而SSI发生率依旧保持在较高水平^[9],且部分学者在是否剃毛和清洁方式,以及术前备皮时间等方面仍存在不同观点^[10,11]。本文基于此背景,利用析因分析法对“是否剃毛和清洁方式,以及术前备皮时间”这3个重点因素进行深入分析,旨在寻求最佳术前皮肤准备方案,现报道如下。

1 资料和方法

1.1 临床资料

选择自2015年1月~2019年12月在医院行手术治疗的患者1810例为本次研究对象。患者来自普外科、心外科、骨科和妇科的住院手术病房。男1025例,女785例;年龄20~64

岁,平均(46.38±2.12)岁。入选标准^[12,13]:(1)具有手术指征;(2)病历资料数据齐全;(3)年龄≥20岁;(4)根据我国卫生部对手术切口类型制定的划分标准,主要为I~II型。排除标准:(1)术前已存在皮肤感染及破损者;(2)存在切口脂肪液化者;(3)患者外周血的白细胞计数(WBC)值<2×10⁹/L;(4)有癌症、糖尿病或其他严重感染性疾病者。

1.2 研究方法

根据析因设计表,将因素A:是否剃毛(1不剃毛;2剃毛),B:清洁方式(1清水清洁;2肥皂水清洁),C:术前备皮时间(1术前1 d;2术前2 h)共设计出8种配对方式,分别记为8个组,见表1。其中(1)A1B1C1组226例,术前1 d进行备皮,不剃毛,且用清水清洁;(2)A1B2C1组229例,术前1 d进行备皮,不剃毛,且用肥皂水清洁共2遍;(3)A1B1C2组216例,术前2 h进行备皮,不剃毛,且用清水清洁;(4)A1B2C2组232例,术前2 h进行备皮,不剃毛,且用肥皂水清洁共2遍;(5)A2B1C1组221例,术前1 d进行备皮,剃毛,且用清水清洁;(6)A2B2C1组241例,术前1 d进行备皮,剃毛,且用肥皂水清洁共2遍;(7)A2B1C2组221例,术前2 h进行备皮,剃毛,且用清水清洁;(8)A2B2C2组224例,术前2 h进行备皮,剃毛,且用肥皂水清洁共2遍。术毕对所有患者均随访3个月,统计SSI感染情况。本次研究已获得患者的知情同意,且已通过医院伦理委员会的审批允许。

表1 析因设计表
Table 1 Factorial design table

Items		B	
		B1	B2
A1	C1	A1B1C1	A1B2C1
	C2	A1B1C2	A1B2C2
A2	C1	A2B1C1	A2B2C1
	C2	A2B1C2	A2B2C2

1.3 菌落计数

患者在术前皮肤准备后利用无菌棉拭子顺着横、竖方向进行粗擦皮肤共5次,转动采样。而后将棉拭子放置在含有无菌生理盐水的试管内,对试管口进行烧灼,利用无菌盖进行封盖处理,送检计数。

1.4 观察指标

(1)比较各组均衡性情况;(2)比较各组SSI发生率,SSI满足《医院感染诊断标准》^[14]中的相关定义,并经病原学检测确诊;(3)分析各组菌落计数的相关性及其交互作用。

1.5 统计学方法

采用SPSS 25.0进行数据分析,计数资料采用%表示,比较采用 χ^2 检验,计量资料采用($\bar{x} \pm s$)表示,各组菌落计数的比较采用析因分析, $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 手术部位及切口类型分布

各组患者的手术部位及切口类型之间的均衡性较好,差异不存在统计学意义($P > 0.05$),见表2。

2.2 各组SSI发生率比较

A1B1C1组及A2B1C1组的SSI发生率较高,分别为12.83%和14.48%。其中在A1水平的SSI发生率是8.75%(79/903),与A2水平的8.27%(75/907)相比,差异不存在统计学意义($P > 0.05$)。在B1水平的SSI发生率是11.31%(100/884),明显高于B2水平的5.83%(54/926),差异存在统计学意义($P < 0.05$)。在C1水平的SSI发生率是10.03%(92/917),明显高于C2水平的6.94%(62/893),差异存在统计学意义($P < 0.05$),见表3。

表 2 各组手术部位及切口类型分布构成比(%)

Table 2 Distribution and constituent ratio of surgical sites and incision types in different groups(%)

Items	A1B1C1		A1B1C2		A1B2C1		A1B2C2		A2B1C1		A2B1C2		A2B2C1		A2B2C2		χ^2	P
	(n=226)		(n=216)		(n=229)		(n=232)		(n=221)		(n=221)		(n=241)		(n=224)			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%		
Surgical sites																		
Head	27	11.95	20	9.26	17	7.42	20	8.62	18	8.14	14	6.33	17	7.05	24	10.71	2.977	0.104
Gastrointestinal tract	57	25.22	62	28.70	48	20.96	45	19.40	55	24.89	59	26.70	47	19.50	43	19.20	3.232	0.061
Thyroid	44	19.47	45	20.83	50	21.83	53	22.84	54	24.43	55	24.89	58	24.07	47	20.98	2.998	0.074
Liver and gallbladder	45	19.91	38	17.59	49	21.40	43	18.53	44	19.91	53	23.98	50	20.75	40	17.68	2.459	0.175
Heart	13	5.75	15	6.94	14	6.11	17	7.33	12	5.43	10	4.52	12	4.98	18	8.04	2.502	0.170
Bones	40	17.70	36	16.67	51	22.27	54	23.28	38	17.19	30	13.57	57	23.65	52	23.21	3.001	0.069
Incision types																		
I	129	57.08	121	56.02	123	53.71	125	53.88	128	57.92	125	56.56	130	53.94	118	52.68	2.896	0.130
II	97	42.92	95	43.98	106	46.29	107	46.12	93	42.08	96	43.44	111	46.06	106	47.32	2.976	0.105

表 3 各组 SSI 发生率比较(%)

Table 3 Comparison of incidence rate of SSI in different groups(%)

Groups	Total number of cases	SSI	
		Incidence cases	Incidence rate
A1B1C1	226	29	12.83
A1B1C2	216	20	9.26
A1B2C1	229	18	7.86
A1B2C2	232	12	5.17
A2B1C1	221	32	14.48
A2B1C2	221	19	8.60
A2B2C1	241	13	5.39
A2B2C2	224	11	4.91

2.3 各组菌落计数的析因分析

菌落计数结果显示,A1B1C1 组是 (6.84 ± 0.41) CFU,A1B1C2 组是 (1.66 ± 0.37) CFU,A1B2C1 组是 (9.44 ± 1.42) CFU,A1B2C2 组是 (6.43 ± 0.94) CFU,A2B1C1 组是 (5.25 ± 0.16) CFU,A2B1C2 组是 (2.54 ± 0.28) CFU,A2B2C1 组是 (12.48 ± 2.33) CFU,A2B2C2 组是 (5.37 ± 1.28) CFU。各组间的菌落计数经方差分析显示差异存在统计学意义($F=28.939$, $P=0.000$)。析因分析结果显示,B、C 单因素分析显示差异存在统计学意义($P<0.05$),且 A 与 C,B 与 C 间具有交互作用,而 A、B、C 间具有二级交互作用($P<0.05$)。见表 4。

3 讨论

SSI 作为医院感染的一个重要组成部分,不仅会增加临床治疗难度,而且可能延长患者的住院时间,甚至导致死亡^[15,16]。众多报道显示^[17-19],引发 SSI 的相关病原菌大都源自患者的皮肤,因此,强化术前的皮肤准备对于防控 SSI 具有重要作用。虽然当前对于皮肤准备的相关报道较多,但多数报道通常仅仅强调皮肤准备的重要性及相应的护理措施,而并未对皮肤准备所需注意的问题及具体操作步骤进行深入细化,本研究就 "是否剃毛和清洁方式,以及术前备皮时间" 进行析因分析,旨在为指导临床操作提供参考。

本文通过比较各组患者的手术部位及切口类型之间的均衡性,发现差异不存在统计学意义,确保了研究结果的准确度

表 4 各组菌落计数的析因分析
Table 4 Factorial analysis of colony counting in different groups

Influence factors	SS	df	MS	F	P
A	0.301	1	0.301	0.088	0.651
B	20.597	1	20.597	7.849	0.000
C	51.258	1	51.258	20.635	0.000
A*B	2.078	1	2.078	0.781	0.249
A*C	12.286	1	12.286	4.682	0.005
B*C	26.850	1	26.850	12.085	0.000
A*B*C	22.343	1	22.343	10.269	0.000

Note: A: whether shaving; B: cleaning methods; C: preoperative skin preparation time.

及可信度。进一步研究显示,在清水清洁及术前 1 d 备皮的前提下,无论剃毛与否,患者 SSI 的发生率均较高,分别为 12.83% 和 14.48%。且在清水清洁、术前 1 d 备皮条件下的 SSI 发生率明显高于肥皂水清洁、术前 2 h 备皮的水平,提示清洁方式与术前备皮时间与 SSI 的发生密切相关。究其原因,可能是因为在清洁方式的选择过程中,利用肥皂水洗手能够增加对致病菌的抑菌作用。报道证实,利用肥皂水清洗超过 30 s 后,能够明显地降低金黄色葡萄球菌及铜绿假单胞菌的细菌含量。因此,建议手术前应尽量选用肥皂水或其他类型的消毒水进行清洁^[20,21]。而在术前备皮时间的选择上,若术前使患者的术区较长时间地暴露在空气中,容易致使各类病原菌在其皮肤准备区形成定植,此时毛囊及皱褶处的细菌也不断朝着表层迁移,而且长时间的暴露甚至还可能使得皮肤准备区的细胞产生分裂繁殖,进而达到致病阈值,从而形成感染^[22-24]。此外,经析因分析结果显示,清洁方式、术前备皮时间经单因素分析后显示差异存在统计学意义,且是否剃毛与术前备皮时间,清洁方式与术前备皮时间之间具有交互作用,而是否剃毛、清洁方式、术前备皮时间之间具有二级交互作用。提示无论采取哪种术前准备护理措施,都应缩短术前准备时间。究其原因,可能是患者皮肤腺体未获得充足时间以分泌汗液及油脂,确保了手术区域相对清洁,降低了污染和感染的可能^[25-27]。因此,建议术前准备时间应尽量接近手术时间,和手术过程进行无缝对接^[28,29]。需要指出的是,本研究并未发现剃毛与否对患者术前皮肤表面的菌落总数及 SSI 发生的影响。而国外 Ahmed 等^[20]报道指出,剃毛后患者术区环境不容易遭受污染,因此也不易发生继发性的感染。分析结果差异的原因,可能与本研究样本量较少有关,这也值得后续进一步跟进研究。然而在未深入确定剃毛与否与患者 SSI 之间的关系前提下,进行剃毛可能是一种更加保险的预防感染的措施。

综上所述,术前皮肤准备对降低 SSI 发生具有重要作用,实际操作时,建议在较短的时间内利用肥皂水或其他消毒水进行皮肤清洗并完成备皮。

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