

Should eye protection be worn during dermatological surgery: prospective observational study.

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There is a potential risk of infection with blood-borne viruses if a doctor receives a blood splash to a mucous membrane. The quantification of facial contamination with blood has been documented in both orthopaedic,¹ and obstetrics and gynaecological surgery,² but never in the context of dermatological surgery. Therefore, we aimed to document the number of facial splashes that occur, to both the operator and assistant, during skin surgery and identify the higher risk procedures. In addition, the facilities available to and the attitudes of the UK based dermatological surgeons to the use of facial protection during surgery were sought.

Materials and methods

One hundred consecutive operations performed in the skin surgery unit of a major teaching hospital were assessed prospectively. The operator and their assistant, if they had one, used a new surgical mask with clear plastic visor for each procedure. After the operation the mask was placed in an envelope on which the grade of operator, site and nature of the procedure, and whether any electrocautery was used was noted. The mask was later examined (by AJB) using a magnifying glass, and the number of blood splashes on the visor was recorded. These were identified by their red-brown colour; clear or light yellow spots were ignored.

A logistic regression model was created including the following 4 variables: i) procedure type ii) status of operator iii) type of cautery and iv) body site involved. The binary outcome of splashed (yes/no) was used as the dependent variable. All variables were entered together initially, with entry criteria set at 0.05 and exclusion at 1.0. The model was then re-run including the two variables that were identified as being significant in the initial model.

In addition to the main study a postal questionnaire ([figure 1](#)) was sent to all UK based members of the British Society for Dermatological Surgery (BSDS) asking whether they were provided with facemasks and whether they used protective equipment whilst performing dermatological surgery. In addition they were asked in what proportion of their operations they perceive a blood splash to the face.

Results

Of all the surgical procedures conducted 33% resulted in at least one visor splash to the operator (range 1-75) and 15% resulted in at least one splash to the assistant (range 1-11). The most striking predisposing factor appeared to be the use of the bipolar with 27/57 (47%) procedures involving this instrument resulting in blood splashes. Having adjusted for the other factors using the logistic regression model, use of the Hyfrecator (monopolar) was significantly *less* likely to result in visor splashes compared to bipolar cautery (OR 0.04 95% CI 0.01 to 0.19). Compared to the

head/neck, operations on the body were significantly *more* likely to result in visor splashes (OR 6.52 95% CI 1.7 to 25.07). The type of procedure and the status of the operator did not have a bearing on the likelihood of receiving a visor splash. The accompanying tables provide the individual data.

Questionnaires were mailed to all 193 members of the BSDS. There were 159 responses (82.4%). 33/159 (20.8%) do not have any face-masks available and only 48/159 (30.2%) have access to face masks with visors. 54/159 (34.0%) do not wear any facial protection whilst operating, this includes eye protection – even basic prescription spectacles. The responses to the question asking the doctor's opinion as to the proportion of procedures in which they receive a splash to the face were positively skewed with only 12/159 (8.5%) thinking that they received splashes in more than 10% of operations; both the median and mode figures were splashes in 1% of operations.

Discussion

Principal findings: 33% of all surgical procedures resulted in at least one visor splash to the operator and in 15% of procedures the assistant received at least one splash. That use of the bipolar cautery results in more blood splashes is also significant. The majority of BSDS members thought that they only receive a blood splash in 1% or less of surgical procedures.

Strengths/weaknesses: We sought to avoid bias by documenting the number of blood splashes in consecutive procedures and thus a wide range of procedures was performed by all members of the department. It could be argued that the number of splashes recorded in this study may be higher than expected in other departments as the procedures performed in Nottingham may be of a higher complexity and a greater emphasis is placed on training in skin surgery. However, one might expect that with better technique fewer splashes may occur (which appears not to be the case as consultants received more splashes than registrars) and that those questioned in the survey are dermatologists with a special interest in dermatological surgery and thus may perform more complex procedures than the national average. We did not correlate the results of the assistant with those of the main operator as only a proportion of cases required assistance and it was felt that a higher number of recorded procedures was more useful than identifying whether a splash occurred at the same time to the assistant and the operator.

Comparison with other studies: This study is the first of its kind in dermatological practice in documenting the actual number of blood splashes occurring during skin surgery. Blood contamination has been identified in 86% of visor-masks used during orthopaedic procedures¹, in 50% of caesarean sections, and in 32% of vaginal deliveries.² Our results suggest that dermatological surgery is less traumatic than these specialties, which seems intuitively correct.

Meaning/Implications: BSDS members may considerably underestimate the number of facial blood splashes they receive during dermatological surgery, and it would seem reasonable to extrapolate this to anyone undertaking skin surgery. The actual figure of 33% of procedures causing facial splashes suggests that many departments may be putting their employees at risk by not providing them with protection as there is a potential risk of infection with blood-borne viruses if a doctor receives a blood

splash to a mucous membrane. Indeed, this can be extended to the assistant operators – 15% of all procedures (which includes simple biopsies). Conjunctival transmission has been reported for both HIV and hepatitis B viruses.³ The risk of transmission of these viruses by this route must be low as there have been so few reports of infection despite the large number of procedures performed, however in today's risk averse society one would expect surgeons to protect themselves as much as possible.

Intuitively, one may have expected there to be more visor splashes resulting from operations on the head as this is a more vascular area, however the results did not support this and indeed there was a significantly greater chance of receiving a splash when operating on the body. One possible explanation for this is that one tends to experience a more “explosive” response when using the bipolar on sites with a lot of fat. The trunk is often an area with increased fat and the surgery in these areas may also be deeper due to wide local excisions for malignant melanoma excision.

These results show that there is a substantial risk of a splash of blood coming into contact with the face for both the operator and assistant regardless of the procedure. Indeed, although only 8 out of 100 procedures in this study were punch biopsies, there was still one visor splash resulting from a punch biopsy. Likewise, three out of seven procedures performed without any electrocautery resulted in the visor receiving a blood splash. One possible reason for this finding may be that when tying a suture some blood may splash as the knot is pulled together, a situation which the authors (AJB and SV) have encountered.

One may be able to extrapolate these results to other surgical procedures as most will involve passing through the skin and in particular to general practice where an increasing number of minor operations are being performed. The subject of face, and in particular eye, protection is given little space, but recommended, in dermatology and dermatological surgery textbooks.^{4,5,6} The use of protective eyewear is advisable at all times, but particularly when using the bipolar cautery and operating on high-risk patients. Thus, this evidence could be presented to hospital infection control and managers when planning surgical services.

Unanswered questions/future research: The question as to why more cases of conjunctival transmission have not been reported needs to be considered. Perhaps the heat of the electrocautery sterilises the blood before it splashes the operator. Skin surgery is a major specialty in Nottingham and the results here may not be reflected in smaller units performing less complex procedures. Although visor splashes were significantly increased when performing operations on the body, rather than on the face, the 95% confidence intervals were wide and it would be useful to be able to confirm this finding. A repeat of this study in another centre would help answer these questions. One has to ask why surgeons do not protect themselves more. Could it be that they find the mask uncomfortable, or suffer from steaming up of the visor, perhaps they are not concerned if they receive a splash of blood to the face, or, alternatively, surgeons are unaware of the amount of blood that splashes towards the face during dermatological surgery? If properly applied then the visor does not steam up and can be worn by those who wear spectacles, so with further education and after publication of this manuscript it would be interesting to repeat the questionnaire study to see if attitudes have changed.

References

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Results tables for Mask study.

Table 1.1 Mask Study Results - Operator

Variable	No. of procedures	No. with splashes	%
Grade of Operator			
Consultant	35	15	42.9
SpR	48	14	29.2
SHO	1	1	100
GP/Assistant	16	3	18.8
Total	100	33	33
Procedure			
Excision	82	31	37.8
Mohs	4	1	25
C&C	5	0	0
Punch	8	1	12.5
Not specified	1	0	0
Cautery			
Bipolar	57	27	47.4
Monopolar	36	3	8.3
None	7	3	42.9
Body site			
Head/neck	55	14	25.5
Body	23	11	47.8
Limb	19	7	36.8
Not specified	3	1	33.3

Table 1.2: Results of logistic regression model for operator (n=97); dependent variable = splashed yes/no.

Variable		Sig	OR	95% CI for OR
Cautery type	Bipolar	<0.001		
	Hyfrecator	<0.001	0.04	0.01 to 0.19
	None	0.47	0.52	0.09 to 3.03
Site of operation	Head	0.01		
	Body	0.01	6.52	1.7 to 25.07
	Limb	0.06	3.74	0.93 to 14.93

2. Mask Study results – Assistant

Table 2.1: Blood splashes to the face by operator.

Variable	No. of procedures	No. with splashes	%
Grade of Operator			
Consultant	65	9	15.4
SpR	29	5	17.2
SHO	1	0	-
GP/Assistant	1	0	-
Total	100	15	15
Procedure			
Excision	86	13	15.1
Mohs	11	2	18.2
C&C	1	0	-
Punch	1	0	-
Not specified	1	0	-
Cautery			
Bipolar	57	27	47.4
Monopolar	36	3	8.3
None	7	3	42.9
Not specified	2	0	-
Body site			
Head/neck	76	12	15.8
Body	13	3	23.1
Limb	11	0	-