

Costing statement: Surgical site infection: prevention and treatment of surgical site infection

The guideline on 'Surgical site infection: prevention and treatment of surgical site infection' (NICE clinical guideline 74) is unlikely to result in a significant change in resource use in the NHS nationally. However, there may be changes needed in NHS practice locally.

The guideline makes recommendations for the prevention and management of surgical site infections based on rigorous evaluation of the best available published evidence. It also makes recommendations about the information that should be provided to patients and carers on surgical site infections which takes into account their needs and preferences.

Surgical site infections have been shown to compose up to 20% of all healthcare-associated infections. At least 5% of patients undergoing a surgical procedure develop a surgical site infection.

Implementing the guideline will not necessarily involve major changes in current practice; consideration may need to be given to current care pathways and whether these follow an integrated approach in the management of surgical site infections. Any changes in practice as a result of implementing the guidance should be offset by a reduction in surgical site infections.

Patient numbers affected

About 4 million surgical procedures a year fall within the scope of the guideline (NHS Information Centre 2006). The guideline scope excludes patients undergoing a surgical procedure that does not involve a visible surgical incision and therefore does not result in a conventional surgical wound, for example, vaginal hysterectomy, transurethral resection of prostate

and oral surgery. Also excluded are procedures involving intravascular catheters, shunts, endoscopy and pin sites.

Resource impact

A number of the recommendations that could potentially result in significant resource implications were investigated. The assessment applied was whether they would significantly change current practice. Recommendations that are likely to have significant resource impact are discussed below. Where we were able to estimate the cost per unit, we provide examples. These may be subject to local variation.

This investigation, together with expert opinion, established that many of the recommendations would not significantly affect costs nationally.

Recommendations concerning preoperative showering, patient and staff theatre wear, and changing surgical wound dressings, for example, may already be current practice.

Five areas in the recommendations may have significant costs locally:

- information for patients and carers (recommendations 1.1.1–1.1.4)
- preoperative phase: hair removal (recommendations 1.2.2–1.2.3)
- intraoperative phase: maintaining patient temperature (recommendation 1.3.10)
- intraoperative phase: optimising blood glucose levels (recommendation 1.3.13)
- intraoperative phase: wound dressing (recommendation 1.3.17).

Recommendations

Information for patients and carers

- Offer patients and carers clear, consistent information and advice throughout all stages of their care. This should include the risks of surgical site infections, what is being done to reduce them and how they are managed. **(recommendation 1.1.1)**

- Offer patients and carers information and advice on how to care for their wound after discharge. **(recommendation 1.1.2)**
- Offer patients and carers information and advice about how to recognise a surgical site infection and who to contact if they are concerned. Use an integrated care pathway for healthcare-associated infections to help communicate this information to both patients and all those involved in their care after discharge. **(recommendation 1.1.3)**
- Always inform patients after their operation if they have been given antibiotics. **(recommendation 1.1.4)**

Expert opinion suggests that advice is usually verbal. However, written advice on wound care, the key signs of wound infection, and who patients should contact if they are concerned may be more effective, as patients may not be able to recall all verbal advice because of their circumstances or the nature of their operation. Written information should be evidenced based and tailored to the patients needs.

This may be a significant cost in areas where information needs to be provided in different languages. It is difficult to cost this recommendation nationally because of variables such as the format of the written information, whether it is needed for all operations, and the varying activity rates of operations. Local estimates, reflecting local circumstances should be applied.

Preoperative phase

- Do not use hair removal routinely to reduce the risk of surgical site infections. (recommendation 1.2.2)
- If hair has to be removed, use electric clippers with a single-use head on the day of surgery. Do not use razors for hair removal, because they increase the risk of surgical site infection .(recommendation 1.2.3)

Expert opinion suggests that current use of electric clippers varies. Both recurrent and non recurrent costs were therefore investigated and a small

survey of hospitals was carried out. The results are included in table 1 of this report.

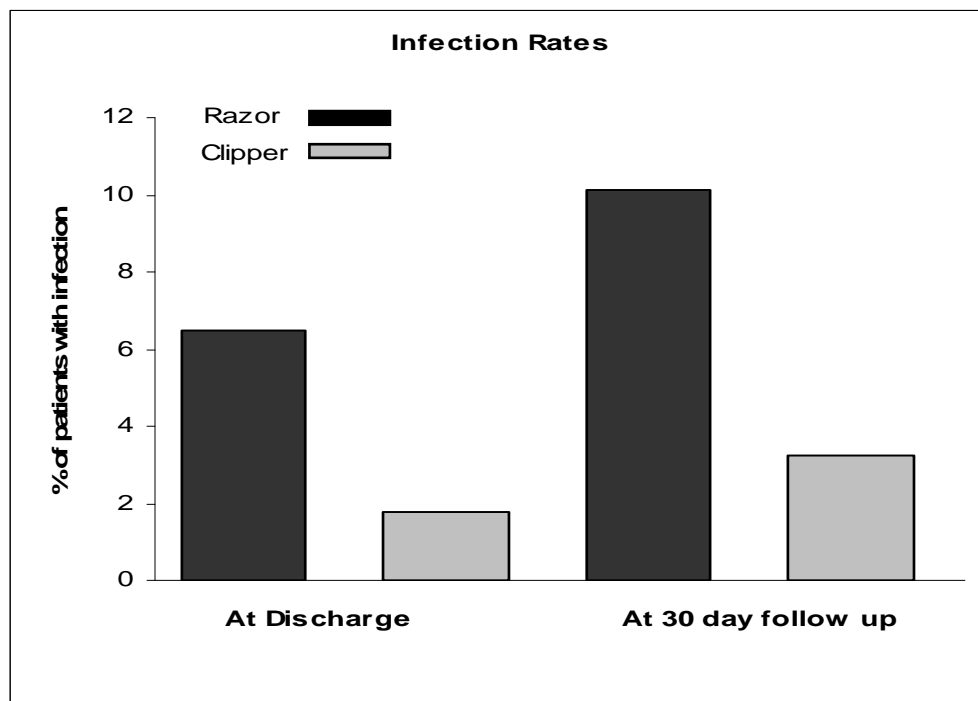
Non-recurring costs: electric clippers

In 2001 there were about 3,000 operating theatres in England (Department of Health 2001)¹. The unit cost of electric clippers, including the charging unit and wall mount, is £131.59. If theatres could be used to provide an approximation of cost, and if all 3,000 operating theatres needed to buy clippers, the total cost would be £395,000. A number of theatres are already using electric clippers. There may be ongoing costs associated with replacing the clippers.

Recurring costs: electric clippers

The full guideline notes that the ongoing costs of electric clippers – single-use disposable blades and nurse administration time – are much higher per 1000 patients than the cheapest option, which is razors. This difference is overcome, however, by savings made in the cost of treating surgical site infections associated with razors. There is evidence that infection rates are significantly higher when razors are used, as shown in figure 1 below.

Figure 1 Infection rates: Clipping vs Shaving (Alexander et al. 1983)².



Using the costs identified in the full guidance in respect of clippers with single use disposable blades and razors, the costs per patient (including the cost of nurse administration time) are as follows:

Cost per patient – single use blades	£2.50
Cost per patient – razors	£0.53
Difference	£1.97

This can be applied to the estimated 4 million operations covered by the guideline scope³. Using different take-up scenarios for electric clippers (based on a survey of hospitals), national costs have been estimated in the table below.

Table 1 Sensitivity analysis of the recurring costs of using electric clippers

Operations where hair removal is required (%)	25%	50%	75%
Total operations with hair removal (1000s)	2,700	3,375	3,825
Scenario (% currently using electric clippers)	Estimated number of operations to achieve full implementation of the recommendations (1000s)		
50% currently use clippers	563	1,125	1,688
70% currently use clippers	338	675	1,013
90% currently use clippers	113	225	338
	Estimated national cost if full implementation is achieved £000's		
50% currently use clippers	1,108	2,216	3,324
70% currently use clippers	665	1,330	1,995
90% currently use clippers	222	443	665

Table 1 shows estimated national costs ranging from £222,000 to more than £3.3 million, depending on current hair removal practice and the number of operations needing hair removal. It is difficult to provide a robust single estimate as there are no published data on the use of electric clippers and on the number of operations needing hair removal that fall within the scope of the guideline.

The shaded figures in table 1 represent instances where costs might be significant nationally. Local costs may vary because of bulk purchase discounts given on the purchase price of disposable blades and differences in administration costs.

The full guideline shows the difference in treatment cost per 1000 patients when treating infections associated with using razors and infections associated with using electric clippers. From this, we calculated the treatment cost per patient as follows:

Cost of treatment per patient for SSI caused by razors	£329
Cost of treatment per patient for SSI caused by clippers	£193
Additional costs of treating SSI's caused by razors	£136

The additional ongoing cost of electric clippers of £1.97 per patient is therefore insignificant when compared with the increased treatment costs of surgical site infections associated with razors, and any additional costs are likely to be fully absorbed by the potential cost savings in treatment.

Intraoperative phase: wound dressing

- Cover surgical incisions with an appropriate interactive dressing at the end of the operation. **(recommendation 1.3.17)**

According to the full guideline, the main purposes of surgical dressings are to allow appropriate inspection of the wound postoperatively, absorb exudates, and ease pain and provide protection for newly-formed tissue.

A cost-effectiveness analysis was carried out as part of the economic evidence in the full guideline (appendix 1).

A straightforward cost analysis was not possible as there were many reasons for choosing a particular wound dressing, depending on the surgery, type of wound and patient characteristics.

The analysis concluded that it was important to take into account the additional costs of changing dressings as well as the initial price of each dressing when choosing which dressing to use.

Intraoperative phase: optimising blood glucose levels

Blood glucose is an important factor in the healing process and there is evidence to suggest that maintaining blood glucose level within the normal range may reduce the risk of surgical site infection.

- Do not give insulin routinely to patients who do not have diabetes to optimise blood glucose postoperatively as a means of reducing the risk of surgical site infection. **(recommendation 1.3.13)**

This highlights how important it is to investigate blood glucose levels before surgery. Where this is made standard practice, it will have a cost impact because of the cost of assessing blood glucose levels. The average unit cost of a blood glucose test (HbA_{1c} test) is estimated to range from 28p to 60p (South Devon Health Services 2008)⁴, with an average cost of 44p, including nurse administration time.

This would need to be offset against the current cost of giving insulin routinely, which is difficult to estimate as the amount given depends on the weight of the patient, the type of surgery and other patient-specific conditions.

Practice may also vary so costs need to be investigated locally.

Intraoperative phase: maintaining patient temperature

- Maintain patient temperature in line with 'Inadvertent perioperative hypothermia' (NICE clinical guideline 65). **(recommendation 1.3.10)**

Maintaining the patient's core temperature during the intraoperative phase reduces the risk of surgical site infections.

The costs associated with this recommendation include the use of disposable forced air warming blankets and the need to warm intravenous fluids and blood products. The net cost impact identified in NICE clinical guideline number 65, per 100,000 patients is summarized below for information:

Increased use of forced air warming blankets	£43,000
Increased warming of IV fluids and blood products	£23,000
Total costs	£66,000

Savings:

Expected reduction in surgical site infections	£43,000
Estimated net cost of implementation	£23,000

Outcomes for patients are also improved through a reduction in cardiac events and in blood transfusions.

A costing template for the NICE clinical guideline on inadvertent perioperative hyperthermia can be found at:

www.nice.org.uk/Guidance/CG65/CostReport/xls/English

Savings and benefits

In 'Draft scope: Surgical wounds – prevention and treatment of surgical site infection' (NICE clinical guideline 74), hospital costs attributable to surgical site infections were calculated as £409 per person in 2004.

At today's prices this is estimated to be £469. If this is applied to the latest average rate for annual occurrence of surgical site infections within the scope of the guideline, we can estimate the national cost as £57 million. These costs relate to increases in the length of hospital stays and subsequent use of healthcare resources.

Given the cost estimates of surgical site infections above, any measures to ensure the guidance becomes embedded into current practice should result in cost savings.

Conclusion

The guideline includes a number of recommendations to reduce the risk of surgical site infections. There may be significant national resource implications in some areas, which have been explored in this statement. However, these would be mitigated by cost savings in treating surgical site infections and minimising hospital stays. The full financial impact will depend on local circumstances.

References

1. Department of Health (2001) Hospital Activity Statistics – England 2000–01
2. Alexander JW, Fischer JE, Boyajan M et al. (1983) The influence of hair-removal methods on wound infections. *Archives of Surgery* 118 347–52.
3. NHS Information Centre (2006) Hospital episode statistics 2005–06 ungrossed data – Main operation 3 character. Available from: www.hesonline.nhs.uk
4. South Devon Health Services (2008) Monitoring blood glucose – information for people with diabetes treated with diet, exercise and/or tablets. Available from: www.sdhct.nhs.uk