Summary: Intervention & Options

Department /Agency:	Title:	
Department of Health	Impact Assessment of screening elective patients for MRSA	
Stage: Final	**Version:** 0.3	**Date:** 6 November 2008
Related Publications: MRSA screening operational guidance		

Available to view or download at:
http://www.tinyurl.com/59nwuu

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What is the problem under consideration? Why is government intervention necessary?

MRSA stands for methicillin resistant Staphylococcus aureus. It is a highly contagious strain of the Staphylococcus aureus family of bacteria, which cause a number of infections, such as boils, carbuncles, infected wounds and bloodstream infection (or bacteraemia), which can be fatal. Bacteraemia can lead to septicaemia, the kind of MRSA infection that has the highest death rate. MRSA is resistant to common antibiotics.

What are the policy objectives and the intended effects?

The policy objective is to reduce the risk of infection for MRSA, and ultimately the number of infections, by screening elective inpatients for MRSA, and decolonising those found to be carriers. By issuing NHS best practice guidance on screening patients for MRSA the aim is to prevent many of the infections that might otherwise have occurred.

What policy options have been considered? Please justify any preferred option.

The following options have been considered

1. Do nothing
2. Preferred option: implement screening for elective inpatients, but excluding maternity/obs, day cases in low risk specialties, children and paeds, minor dermatology. Screening for emergency cases to follow by 2011.
3. Implement screening for all elective inpatients and day cases.
4. As option 2, but also include screening for emergency cases immediately.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects? Post implementation review will be conducted over time as we monitor the number of bacteraemias, and will also be informed by PMDU review (due November 2008).

Ministerial Sign-off For final proposal/implementation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.

Signed by the responsible Minister:

..... Date: 3-12-08

Summary: Analysis & Evidence

Policy Option: 2	Description: MRSA screening for all except those in low risk groups, with implementation for emergencies by March 2011

COSTS

ANNUAL COSTS	
One-off (Transition) **Yrs**	Description and scale of **key monetised costs** by 'main affected groups' Cost of screening plus decolonisation totals £1.22bn in cash terms, £1.01bn PV over 10 years. However, there is a cash saving in treatment costs of MRSA bacteraemia and wound infections of £1.19bn cash, £987m PV. Typical annual outlay is £130m per year (cash terms) from 2010-11 onwards.
£ nil	
Average Annual Cost (excluding one-off)	
£ 2.6m (cash)	**Total Cost** (PV) **£ 19m (PV)**

Other **key non-monetised costs** by 'main affected groups'

BENEFITS

ANNUAL BENEFITS	
One-off **Yrs**	Description and scale of **key monetised benefits** by 'main affected groups' Key benefit recorded here is 'avoided deaths'. These do not count as a saving to the NHS, but a wider societal benefit.
£ nil	
Average Annual Benefit (excluding one-off)	
£ 274.6m (cash)	**Total Benefit** (PV) **£ 2.53bn**

Other **key non-monetised benefits** by 'main affected groups'

Key Assumptions/Sensitivities/Risks Levels of risk for each patient group estimated from SA septicaemia data in HES. Also, some of the data on costs and efficacy of tests is based on current expert view - no direct link to primary evidence has been identified.

Price Base Year 2008	Time Period Years 10	**Net Benefit Range** (NPV) **£ subj to sensitivity test**	**NET BENEFIT** (NPV Best estimate) **£ 2.51bn**

What is the geographic coverage of the policy/option?			England	
On what date will the policy be implemented?			2008	
Which organisation(s) will enforce the policy?			PCTs	
What is the total annual cost of enforcement for these organisations?			£ nil	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			£ N/a	
What is the value of changes in greenhouse gas emissions?			£ nil	
Will the proposal have a significant impact on competition?			No	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Decrease of £ **Net Impact** £

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Evidence Base (for summary sheets)

[Use this space (with a recommended maximum of 30 pages) to set out the evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Ensure that the information is organised in such a way as to explain clearly the summary information on the preceding pages of this form.]

Background – what is the policy problem that needs to be solved?

The Staphylococcus aureus family of bacteria, to which MRSA belongs, is a very common cause of bacterial infections such as boils, carbuncles, infected wounds, deep abscesses and bloodstream infection (or bacteraemia). When penicillin was introduced in the 1940s, it helped tackle these infections, but after a while some strains of the bacteria began to become resistant to the antibiotic and by 1959, about 90-95% of S.aureus strains isolated from patients with clinical infections were resistant to penicillin. Methicillin (and, later, cloxacillin and flucloxacillin) was therefore developed, from penicillin, to treat these new strains with some success. Although the first case of MRSA was reported in England within a year of the launch of meticillin, MRSA was relatively uncommon through the 1960s and 1970s, and only a few more cases appeared in the 1980s.

In the mid -1990s, however, "epidemic" strains of MRSA became established in hospitals throughout the UK. These strains are easily transmissible (passing between and colonising both patients and hospital staff easily) and have the capacity to cause serious disease.

There is a high level of public concern about healthcare associated infections, and political and NHS determination both to reduce the number of MRSA bacteraemias and to bolster public confidence.

Most MRSA bacteraemias occur in people over 65, and primarily in men. In 2006/07 across England, 6,383 cases were reported. This impact assessment assesses the evidence without assuming that any existing public commitment is the right way to proceed. However we note that there is a public commitment to reduce MRSA infections, and PSA 19 includes a commitment to DH, "implementing best practice, for example through developing best practice guidance and spreading knowledge.....". By examining the available evidence on costs and benefits this impact assessment provides an evidence base to support the preferred option, which is to implement screening now for all elective inpatients (with certain exceptions) and to implement screening for emergency admissions by March 2011.

Why is Government intervention necessary?

Existing guidance leaves it open to NHS organisations to implement MRSA screening regimes. However, despite encouraging progress in reducing levels of infection there is scope to reduce the number of MRSA bacteraemia further.

MRSA infection is distressing to patients and their families, and the perceived risk of infection is also worrying to patients. In reality, the numerical risk of MRSA bacteraemia is very low, affecting around 0.04% of all inpatients. Comprehensive screening would involve screening large numbers of patients who did not have MRSA, and also decolonising a large number of patients who would not, in any case, have developed a bacteraemia despite being colonised on the skin or in the nose.

In essence, we argue in this IA that NHS organisations are operating on the basis of imperfect information (in an economic sense). A reasoned assessment of the costs and benefits indicates that the high costs of treating MRSA, together with the cost (in terms of lost life years) for the small number who die from MRSA infection, can outweigh the cost of a comprehensive screening regime. Government intervention provides a means to share information on the scale of relative risks and costs, and to define a cost effective testing regimen.

Although some Trusts do screen for MRSA, it is apparent that the NHS have not implemented a consistent and comprehensive screening regime to date. This supports the argument that the NHS is operating on imperfect information, and that Government intervention is needed.

Broad options for reducing infection – an outline case for screening and decolonisation

The broad policy objective is to reduce the risk of transmission from skin-borne MRSA on patients (on admission to hospital) to blood stream infections in patients after NHS treatment. The preferred option explored in this IA is for a programme of screening for MRSA. There are a number of pre-existing testing techniques. Testing is followed by decolonisation for those who test positive for MRSA. Decolonisation includes a body wash, shampoo and nasal cream. (the latter with an antibiotic cream).

When considering the costs and benefits of such an approach it is sensible to consider alternative strategies, including decolonisation for all patients in the particular 'relevant' group. Some clinicians favour this approach, and in some circumstances start decolonisation whilst awaiting test results. However, use of the antibiotic cream for very large numbers of NHS patients would run the risk of developing resistance. This may be counter-productive as a strategy to tackle antibiotic resistant infection and we rule it out for that reason.

We could consider the scope for 'partial decolonisation', including the full body wash and shampoo for all patients but without the nasal cream. This approach would fail to tackle one of key routes of infection (from colonisation of the nose) and so cannot be used as a comprehensive solution. It would also be poorly targeted, requiring partial decolonisation for large numbers of patients who were not colonised. We rule out this approach for those reasons.

The preferred approach is the only appropriate means to use screening and decolonisation as a means to reduce infection. There is a theoretical enhancement to this approach, requiring partial decolonisation (without the nasal cream) for those who are negative screens (i.e. the test shows they are not colonised). However, the specificity of all the available tests is high, the number of avoided cases would therefore be very low and it is quickly apparent without a detailed assessment of the figures that this approach would not be cost effective.

We have therefore narrowed down potential solutions to variations of a screening-decolonisation strategy. The cost effectiveness of such a strategy rests on the scale of any benefits (in terms of reduced number of infections, measured in terms of quality of life and life years gain for the patient) against the direct costs of the screening and decolonisation programme itself. This will depend, in large part, on the relative risk of infection for patients in different groups.

Assumptions/ baseline data

Expert opinion is that it is generally true that colonisation precedes infection, and so that transmission from skin-borne infections to bloodstream infections is the primary infection route. However, there is potential for direct transmission in other ways, such as lapses in hand hygiene and aseptic practice. Expert opinion is that these would not, typically, represent more than 10% of cases. For the calculations presented here, we concentrate on patients identified on admission as MRSA positive. Decolonisation then removes the risk of transmission to the bloodstream. To avoid over-stating the benefits of the screening regime we assume that 10% of bloodstream infections occur by other routes and are therefore unaffected by a screening regime.

Other key assumptions and evidence used in this impact assessment are as follows:

- There is sound evidence to suggest that around 7% of admitted patients are colonised with MRSA. We assume that this figure applies equally to all admissions.
- Wound infections with MRSA are 4 times as likely as MRSA bacteraemia (supported by current figures)
- 23% of patients with MRSA bacteraemia will die as a result.
- There are no deaths from MRSA wound infections (already counted in the bacteraemia deaths).
- Currently, Trusts screen 25% of inpatients.

- Treating one case of MRSA costs £4999 at 2008-09 prices (source: Plowman et al, "The Socioeconomic Burden of Hospital Acquired Infection", using standard HCHS deflators up to 2006-07, and assuming 4.2% inflation beyond that).
- Treating one MRSA wound infection costs the same as treating MRSA bacteraemia
- A life lost from MRSA has a value of £250,000, valued in terms of QALY's (assumes 10 yrs of life at quality of 0.7, life year valued at £38.8k with 1.5% discount rate). This is a modest assumption, as average (mean) life expectancy after hospital admission is higher than 10 years for both electives and emergencies.
- The decolonisation process costs £7 at 2006-07 prices. Allowing for 4.2% price inflation puts this at £7.60 in 2008-09
- A standard medium based Chromogenic agar plating test costs £5.70 at 2006-07 prices (£6.20 at 2008-09 prices).
- A rapid PCR test costs £16.35 at 2006-07 prices (£17.75 at 2008-09 prices)
- Unless we have data to the contrary, we assume that NHS admissions grow by 3.2% per annum.
- All tests have a typical sensitivity of 90% (probability of +ve test given that patient is colonised), a specificity of 95% (probability of –ve test given that patient is negative).
- De-colonisation itself is 90% effective in the timescales required for NHS treatment (we assume that elective patients are typically tested one week before admission).

Relating the costs and benefits to level of risk

Before assessing the costs and benefits for different options, we rehearse the case for or against MRSA screening. The following calculations are not based on precise figures, but are designed to test 'orders of magnitude'. They show that the case for screening depends on the relative risk of a bacteraemia infection, given that the patient is already colonised.

The overall number of MRSA cases suggests an infection rate of around 0.05% of all patient admissions. As 7% of patients are 'colonised' on admission, this is equivalent to approximately 1 in every 140 'colonised' patients. To simplify calculations in this illustration, we assume that there are no bloodstream infections through other routes. We also assume that existing testing has already had an impact and we calculate a 'baseline' level of risk, without any screening, of about 1 in 120.

The benefits of screening are reduced incidence of bacteraemia, reduced incidence of wound infection and reduction in deaths from bacteraemia. With existing screening regimes (in which we assume that 25% of inpatients are screened, with resulting risk of 1 in 140), the costs of these undesirable outcomes are calculated as follows:

i) 7% are colonised, and of these 1 in 140 acquire a bacteraemia, 7500 cases, each costing £5k to treat.

ii) Four times that many acquire a wound infection, 30,000 cases at £5k each to treat.

iii) Of those with bacteraemia, 23% die. 1725 deaths at £0.25m each.

iv) Total baseline cost is therefore £618.75m.

If we assume that all admitted patients should be tested, with electives using the cheaper test and emergencies using PCR, we find illustrative costs as follows:

Number of admissions:	approx 15 million, of whom 4 million are emergencies
Cost of screening:	£6.20 times 11m + £17.75 times 4 million = £139.2m
Number decolonised:	7% x (sensitivity of test) + 93% x (1-specificity of test)

= 1.6425 million patients

Cost of decolonisation: £12.48m

Total cost: £151.68m

Introducing this screening regime for all elective and emergency cases would reduce the number of infections. Infections would still arise in two groups:

i) those for whom the test was insufficiently sensitive, and therefore no decolonisation takes place.

ii) Those who are colonised, but for whom the test is positive, but decolonisation is ineffective.

iii) The proportion infected is therefore:

7% *(1-sensitivity) * risk + 7% * (sensitivity) * (1-effectiveness of decolonisation) * risk.

= 7% x 0.1 x (1/120) + 7% x 0.9 x 0.1 x (1/120) = 0.0095%

iv) This implies 1425 bacteraemias, 5700 wound infections and 328 deaths.

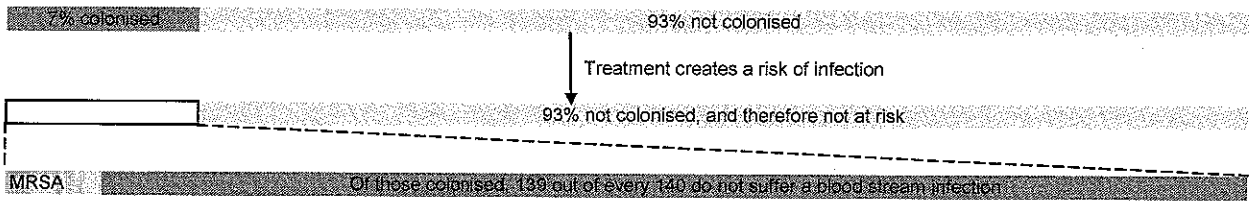
v) The total cost of these negative impacts would be £117.625m

Hence a full screening programme would reduce the negative impacts of MRSA from £618.75m to £117.25m, a benefit of £501m, at a cost of just £151.68m.

This outline calculation suggests that the benefits of screening are an order of magnitude larger than the costs, and there is therefore a prima facie case for considering comprehensive MRSA screening. However, this conclusion depends primarily on the level of risk. Decolonisation itself is a relatively small cost and therefore the costs of screening are virtually constant, whilst the benefits depend on the level of infection risk. If the baseline risk is 1 case in 120 colonised patients, there is a net benefit. If the risks are lower, the benefits reduce. If risk falls to around 1 case in 700 colonised patients (1 in every 10,000 admissions), the cost-benefit calculation becomes neutral.

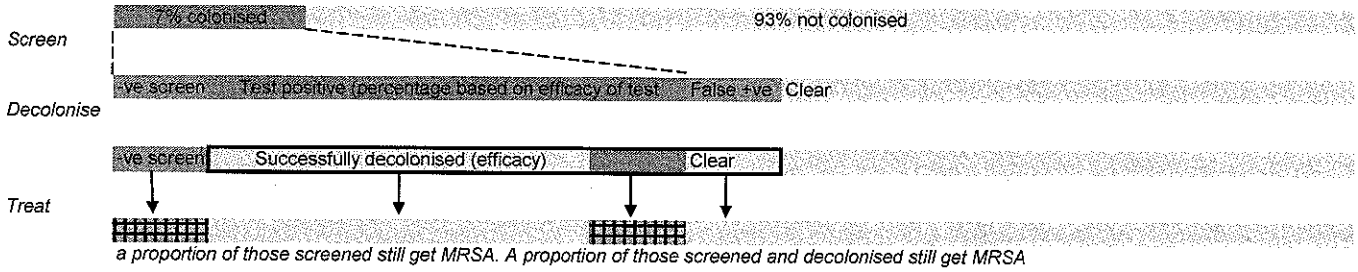
The following diagram illustrates the effect of screening on infection risk:

1. Without screening



Proportion infected = proportion colonised * risk of infection for those colonised
=7% x 1/140 = 0.05%

2. With screening



a proportion of those screened still get MRSA. A proportion of those screened and decolonised still get MRSA

Prportion infected = proportion colonised * (1- efficacy of test) * risk of infection for those colonised
+ proportion colonised * (efficacy of test) * (1- efficacy of decolonisation) * risk of infection for those colonised

= 0.07 * (0.1) * (1/140) + 0.07 * 0.9 * 0.1 * (1/140)
= 0.0095%

i.e 81% of the risk has been removed, given 90% efficacy of test and 90% efficacy of decolonisaiton

Number decolonised = proportion colonised * efficacy of test + proportion colonised * probability of false negative
= 0.07*0.9 + 0.93 * 0.05
= 0.1095

i.e Assuming 5% of clear individuals receive 'false positives and 10% of colonised individuals get false negs, 11% of patients are decolonised in total

The options – for which groups of patients does the risk justify the cost?

For the remainder of this impact assessment, we assess the cost and benefits of MRSA screening for different groups of patients. The methodology is exactly as set out above, but calculated on precise figures and with a different level of risk calculated for patients in different groups. We also factor in an assumption that up to 10% of cases are caused by other infection routes.

We know that the level of risk varies for patients in different groups. The risks are higher for those who undertake an invasive procedure. They are also higher for men than for women, and higher for those in older age groups. Routine monitoring data collected by HPA suggest that the number of patient episodes with a reported MRSA septicaemia does vary considerably by specialty. Around 1 in 27 colonised nephrology patients goes on to develop a SA septicaemia. The equivalent figure for urology is around 1 in 370.

For this IA, we have considered the evidence for the following groups of patients:

Nephrology inpatient + day case
Neurosurgery inpatient + day case
Paediatric high risk inpatient (assume 10% of all IPs)
Day case ophthalmology
Day case dental
Day case endoscopy
Dermatology day cases for minor procedures
Paediatrics (IP + DC +emergency)
Maternity/obstetrics/ births
Mental health IP+DC +emergency
Other inpatient elective admissions
Other day case elective admissions
regular day attenders
Other emergency + other

The first two groups are included as illustrative examples of high risk groups, we expect these to show much higher benefit than cost. Expert opinion is that paediatric cases are low risk except for a few in high risk categories, we therefore include 'high risk' paediatrics as a separate group. The next 7 categories have all been identified by experts as potentially low risk, and therefore potentially not justifying screening. The remaining groups capture all remaining types of admission. In most cases we assume that all admissions would be tested once. The exception is for regular day attenders, for whom we assume that approximately one in every five admissions would require a test (22% based on calculations elsewhere).

From this list of categories, we form 4 broad options:

Option 1 – do nothing. Leave the screening regime as it is now.

Option 2 – Introduce MRSA screening immediately for those groups for which benefits outweigh the costs, with the exception of 'other emergency' cases, for which we propose implementation by March 2011.

Option 3 – screen all groups

Option 4 – as option 2, but introduce screening for emergencies immediately.

Under each option, we assume that emergencies would require the faster PCR test. For elective patients there are several tests that could be used. Whilst there is some variation in sensitivity or specificity, most tests seem to have sensitivity of around 90% and specificity of around 95%. It makes sense, therefore, to leave it open to Trusts to choose the most appropriate test suitable for local needs (and probably based on cost). For this IA, we assume a cost of £6.19, based on the cost of Chromogenic agar plate test at £5 at 2006-07 prices, with two years of 4.2% inflation to give a 2008-09 price.

Costs and benefits

Option 1 – Do nothing

The costs and benefits of option 1 are, by definition, zero. But in assessing the impact of other options, we need to consider the level of testing implicit in the do nothing option, and the extent to which this impacts on any latent risk of MRSA bacteraemia. The costs for other options are therefore the costs of additional testing required for 100% coverage. The benefits are the additional benefits, achieved over and above the benefits of any existing MRSA screening.

Option 2 – Screening for those groups where benefits outweigh costs, except for emergencies for which we introduce screening by March 2011.

In assessing costs and benefits for this and subsequent options, we need some measure of risk for each patient group. To estimate this, we use HES data to determine the risk of a diagnosis of A41.0 SA septicaemia. This is not a direct proxy for MRSA (since it includes non-resistant strains), but it gives an indication of the relative risk of bacteraemia. The figures are then re-based to match the total number of cases (6383) in 2006-07. For some groups (eg day case ophthalmology) there are no cases of SA septicaemia, but for the calculations in this paper we assume a nominal number of cases.

If we assume instantaneous implementation, these calculations result in the following figures for net benefit in each group:

Table 1: balance of costs and benefits in a single year

	Total direct costs	Net benefit	Baseline number of cases
Nephrology inpatient	£664,619.45	£9,226,721.64	168
Neurosurgery	£353,183.54	£3,578,207.05	67
Paeds high risk	£440,626.97	£5,734,349.57	105
Day case ophthalmology	£3,208,689.47	-£2,947,984.90	4
Day case dental	£1,406,176.26	-£1,278,706.03	2
Day case endoscopy	£9,082,721.21	-£8,746,082.07	5
Minor dermatology electives	£1,229,330.25	-£1,063,531.97	3
Paediatrics	£8,433,027.12	-£7,019,142.74	22
Maternity/obstetrics/ births	£7,766,276.54	-£5,207,819.09	40
Mental health	£1,209,484.62	-£132,239.38	17
Other inpatient elective admissions	£16,407,376.26	£82,930,161.47	1691
Other day case elective admissions	£16,517,357.28	£40,426,748.53	889
regular day attenders	£1,663,549.67	£4,741,327.39	100
emergency + other	£80,236,802.82	£129,182,120.93	3270
Total	£148,619,221	£249,424,130	6383

Thus, MRSA screening has a total potential cost (initial outlay) of £148m per year, but shows a net benefit for most groups. For the low risk groups identified above, the costs appear to outweigh the benefits. However for one group, Mental Health, this is a very marginal result: £132k net cost on an overall spend of £1.2m. There is a degree of uncertainty in the baseline counts of MRSA cases in each group, and just two more cases in the assumed baseline figures would make net benefits for this group positive. For option 2, therefore, we include Mental Health in the initial tranche. Option 2 then implies MRSA screening in 2009-10 to include all except the 'low risk' groups and emergencies. In 2010-11 it is extended to include emergencies (the reasons for this are discussed below).

For technical reasons, the avoided cost of treating bacteraemia and wound infections count as a 'negative cost' rather than a benefit. Avoided deaths count directly as a benefit. With this proviso, the costs and benefits of this option are shown in the following table:

Table 2: Costs and benefits over 10 years of a screening programme

Cash terms £millions									
Costs	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Additional costs of screening (above opt 1) (£m)	£0	£39	£122	£126	£130	£134	£138	£143	£147
Cost of decolonisation (£m)	£0	£5	£9	£10	£10	£10	£10	£11	£11
Avoided treatment costs (£m)	£0	-£57	-£127	-£131	-£135	-£139	-£144	-£149	-£153
Total	£0	-£13	£4	£5	£5	£5	£5	£5	£5
Benefits									
Value of avoided deaths £m	£0	£132	£292	£301	£311	£321	£331	£342	£353
Net Benefit	£0	£145	£288	£297	£306	£316	£326	£337	£347
NPV terms £millions									
Costs									
Additional costs of screening (above opt 1) (£m)	£0	£38	£114	£113	£113	£112	£112	£111	£111
Cost of decolonisation (£m)	£0	£5	£9	£9	£9	£9	£8	£8	£8
Avoided treatment costs (£m)	£0	-£55	-£118	-£118	-£117	-£117	-£116	-£116	-£115
Total	£0	-£13	£4	£4	£4	£4	£4	£4	£4
Benefits									
Value of avoided deaths £m	£0	£130	£283	£288	£293	£297	£302	£307	£312
Net Benefit	£0	£143	£279	£284	£289	£293	£298	£303	£308

Thus this option has a total out-lay cost of just over £1bn in NPV terms over 10 years, with direct costs of around £130m per year in cash terms from 2010-11 onwards, increasing in line with increases in admissions. However, the net benefit of this option is substantial, at £2.5bn over 10 years.

Option 3 – screening for all groups.

A similar calculation for option 3 yields slightly higher out-lay costs, because it includes the cost of screening and decolonisation for low risk groups. The total out-lay cost is £1.36bn over 10 years (NPV). The net benefit is £2.4bn over 10 years.

The outlay costs are £164m cash in 2010-11, increasing gradually over time in line with increases in admissions (3.2% per year).

Option 4 – as for option 2, but screening for emergencies cases introduced in 2009-10 instead of 2010-11.

Under option 4, the total out-lay costs are slightly higher than option 2 because we factor in an extra year of screening for emergency cases. The total outlay is £1.086bn over 10 years (PV), with direct costs in cash terms being similar to option 2 except in 2009-10.

The net benefits of option 4 are £2.6bn over 10 years.

Discussion and conclusion

These calculations show that there is an outline case for introduction of comprehensive MRSA screening. Each of options 2,3 and 4 provide net benefits in comparison to the do nothing option.

Option 3 is not recommended, because it includes a number of patient groups for whom the risks of MRSA do not justify the costs. Although this option provides net benefits overall, there is a net cost implicit in screening each of the following groups:

Day case ophthalmology
Day case dental
Day case endoscopy
Dermatology day cases for minor procedures
Paediatrics (IP + DC +emergency)
Maternity/obstetrics/ births
Mental health IP+DC +emergency

The net cost for Mental health, however, is very small and within the margin of error for these calculations. We therefore do not include mental health in the list of exclusions under option 2.

Option 4 provides the greatest net benefit. However, there are two practical reasons for not recommending this option:

i) CSR funding has been secured to support this policy. This funding provides £70m in 2009-10 and £130m in 2010-11. Although this cost-benefit analysis suggests that there would be 'saved costs' from reductions in MRSA cases, this funding will not

necessarily be directly available at the point of testing. It makes sense, therefore, to constrain the outlay costs to be below these benchmarks. Since option 4 has an outlay of £127m in cash terms in 2009-10 it is not 'affordable' in the sense defined here. In practice, the NHS may be able to implement some screening for emergency cases as the benefits of elective screening reduce treatment costs.

ii) There are potential issues of practicality in introducing 11 million tests in 2009-10. Such an approach would put pressure on testing facilities. It is also likely to be more difficult administratively to implement testing for emergency cases (although the administration of testing is included in the costs described above).

Option 2 is therefore the preferred option. It has net benefits to the service, it avoids unnecessary testing for patients in very low risk groups and has the advantage of being deliverable in a practical sense.

Sensitivities

The costs of screening and decolonisation are not subject to substantial variation or error in calculation. The key sensitivities in the above analysis relate to estimates of the levels of risk within different patient groups and the extent to which the route of infection addressed by screening covers all, or virtually all, cases of bloodstream infection. In this section, we test these sensitivities.

Table 1 above shows the costs and net benefits for each patient group in a single year, assuming that a screening programme is in operation for all patient groups. This table is based on the assumption that baseline risk of infection can be estimated by looking at the number of infections in 2006-07. If we assume that baseline risk is much lower than this, for example 40% of the level suggested by 2006-07, then table 1 is amended as follows:

Table 1a: cost benefit calculations with baseline risk reduced to 40% of 2006-07 levels

	Total direct costs	Net benefit	Baseline number of cases
Nephrology inpatient	£664,619.45	£3,291,916.99	67
Neurosurgery	£353,183.54	£1,219,372.70	27
Paeds high risk	£440,626.97	£2,029,363.65	42
Day case ophthalmology	£3,208,689.47	-£3,104,407.64	2
Day case dental	£1,406,176.26	-£1,355,188.17	1
Day case endoscopy	£9,082,721.21	-£8,948,065.56	2
Minor dermatology electives	£1,229,330.25	-£1,163,010.94	1
Paediatrics	£8,433,027.12	-£7,867,473.36	9
Maternity/obstetrics/ births	£7,766,276.54	-£6,742,893.56	16
Mental health	£1,209,484.62	-£778,586.52	7
Other inpatient elective admissions	£16,407,376.26	£23,327,638.83	676
Other day case elective admissions	£16,517,357.28	£6,260,285.05	356
regular day attenders	£1,663,549.67	£898,401.15	40
emergency + other	£80,236,802.82	£3,530,766.68	1308
Total	£148,619,221	£10,598,119	2553

The broad pattern of the table is similar to our central model, in that most groups show a positive net benefit from screening. Lower risk groups show a net cost. We note here that for Mental Health patients the benefits of screening are negative, to the order of three quarters of a million pounds per year. However, as in the central model, these figures are based on very small numbers of cases. The total outlay on screening for mental health patients is small, at less

than 1% of the total out-lay cost, and it is sensible to include this group in the screening programme given:

a) uncertainty about the level of risk

b) very large potential benefits to the small number of individual patients who avoid MRSA infection.

The second area of sensitivity is the extent to which this transmission route describes all or virtually all cases of infection. In our central model we assume that 90% of cases are due to this transmission route (and it is possible, for example, that this figure is even higher in reality). Assuming that all cases are due to 'skin to blood' transmission makes virtually no difference to the substantive argument. The benefits are slightly larger for all groups, and for Mental Health patients there is a very small net cost (around £12k).

If we assume that only 80% of cases are due to this transmission route, the pattern is again as shown in tables 1 and 1a. The net cost for Mental Health patients is around £0.25m.

We would need to assume that as many as 65% of cases are caused by other mechanisms for any of the other groups included in the analysis to show a net cost. This would not be a realistic assumption.

What this sensitivity analysis shows is that the analysis is robust to variation in the key assumptions. The conclusion of this impact assessment makes qualitative arguments for the inclusion of Mental Health patients in the screening programme, despite a small net cost. Under certain assumptions this net cost is higher, but the substantive argument remains the same.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	***Results in Evidence Base?***	***Results annexed?***
Competition Assessment	Yes/No	Yes/No
Small Firms Impact Test	Yes/No	Yes/No
Legal Aid	Yes/No	Yes/No
Sustainable Development	Yes/No	Yes/No
Carbon Assessment	Yes/No	Yes/No
Other Environment	Yes/No	Yes/No
Health Impact Assessment	Yes/No	Yes/No
Race Equality	Yes/No	Yes/No
Disability Equality	Yes/No	Yes/No
Gender Equality	Yes/No	Yes/No
Human Rights	Yes/No	Yes/No
Rural Proofing	Yes/No	Yes/No

Annexes

An Equality Impact Assessment has been carried out on the programme to reduce the number of MRSA infections, and which covers the screening aspects, is published on the Department of Health website

MRSA equality impact assessment : Department of Health - Publications

A full Health Impact Assessment has been considered unnecessary, the rationale for which is reproduced here.

MRSA Screening Health Impact Assessment

The MRSA screening programme set out in this Impact Assessment has additionally been considered in terms of the need for a full Health Impact Assessment. To determine whether a Health Impact Assessment is necessary the standard three screening questions have been considered as follows:

1. Will your policy have a significant impact on human health by virtue of its effects on the following wider determinants of health?

Income
Environment
Housing
Employment
Social cohesion
Crime
Transport
Education
Agriculture

The screening programme is concerned purely with its effectiveness in reducing MRSA in the healthcare environment – there appears to be little potential for significant (either positive or negative) impact in the areas described above.

2. Will there be a significant impact on any of the following lifestyle related variables?

Physical activity
Smoking, drugs, or alcohol use
Accidents and stress at home or work
Diet
Sexual behaviour

Similar to Q1 above, there appears to be little potential for significant (either positive or negative) impact in these areas.

3. Is there likely to be a significant demand on any of the following health and social care services?

Primary care
Hospital care
Accident or emergency attendances
Health protection and preparedness response
Community services
Need for medicines
Social services

There will be a demand for screening and decolonisation (where necessary) in hospital care; this has been funded through CSR (included in the general tarrif). The extent to which primary care are involved is a matter for local determination.

As the answers to two or more of these questions are "no", a full health impact assessment has not been conducted. That said, the cost benefit analysis included in the IA centres on the health benefits to patients against the cost to the NHS.